TecnoCampus

Centres universitaris adscrits a la

upf. Universitat Pompeu Fabra Barcelona

Grau en Disseny i Producció de Videojocs

The building blocks of blocks: Understanding the design behind building games through the analysis of user-generated content

MEMÒRIA FINAL

Marina Codony Lleonart
Tutor: Dr. Víctor Navarro Remesal
2023/2024

TecnoCampus Mataró-Maresme

Acknowledgements

To the people of Qadakh, my Minecraft family, whom without I would not have found my passion for building and online sandbox communities. Grain by grain of sand, or shall I say, block by block, we made the dream come true.

Thanks to my musicboard fellas for cheering me on through this journey. As promised, the time has finally come…to play Dark Souls. And Minecraft.

Special thanks to my tutor, Víctor Navarro, for believing on the potential of this research field and supporting me up until the last days of the project. I'll also be forever grateful to my university, Tecnocampus, and teachers, for introducing us to the magnificent world of game studies from early on in our careers.

Abstract

This research project is an examination of what will ultimately be defined as *building games*. Drawing from cultural phenomena such as LEGO and its digital predecessor, Minecraft, research will expand the focus on analysing their system design as a tool for thinking. To do so, research will trace back to topics such as literature on play, design systems, game genres and game analysis, to propose a methodology for the analysis of these said-to-be *building games* in an attempt to provide a new lens through which this form of play can be understood.

Resum

Aquest treball de final de grau és una examinació del què serà finalment definit com a *jocs de construcció*. Prenent com a referència fenòmens culturals com LEGO i el seu predecessor digital, Minecraft, la recerca es centrarà en l'anàlisi del disseny darrere dels sistemes de construcció com a eina per a la creació. Per tal d'assolir aquest objectiu, el marc teòric revisarà conceptes de la teoria del joc, sistemes de disseny, gèneres de jocs i anàlisi de jocs. Seguidament, la part pràctica proposarà una metodologia a través de la qual analitzar aquests *jocs de construcció*, amb la finalitat de proporcionar una nova perspectiva holística sobre aquesta tipologia de joc.

Resumen

Este trabajo de final de grado es una examinación de lo que será definido en última instancia como *juegos de construcción*. Tomando como referencia fenómenos culturales como LEGO y su predecesor digital, Minecraft, la investigación se basará en el análisis del diseño de sistemas de construcción como una herramienta para la creación. Para hacerlo, el marco teórico revisará temas como teoría del juego, sistemas de diseño, géneros de juegos y análisis de juegos, proponiendo en la parte práctica una metodología a través de la cual analizar dichos *juegos de construcción*, con tal de proporcionar una nueva perspectiva holística de esta tipología de juego.

Index

Index of figures

Index of tables

1. Introduction

Video games, as a relatively new form of media, are characterised by their varied and ever-changing nature. The multifaceted essence of video games is manifested not only through the many disciplines it encompasses, but also in the varied perspectives through which they are examined. Drawing knowledge from an array of academic disciplines such as psychology, sociology, literature, design and computer science, game studies often result in a broad yet fragmented understanding of this form of media instead of taking an aesthetic, analytical approach (Aarseth, 2003).

In particular, the psychological perspective of play in contemporary research has limited the focus on building toys to one of a tool for child development (Nguyen, 2016). This perspective, now being passed down to building video games, is exemplified by Minecraft which, despite being the most sold videogame of all time, is most often singlehandedly studied for its educational applications. Ironically, because of Minecraft's eclipsing popularity, it has been studied as a cultural phenomenon of sandbox games, acting as a magnet of attention instead of becoming the starting point for a holistic examination of its core building mechanic. This has exacerbated the already-limited field of view surrounding building video games.

This heavily Minecraft-centred and fragmented understanding of building video games have turned them into a form of play which has yet to receive comprehensive scholarly attention, with missing answers to fundamental and barebone questions such as: what is a building game?

Although we still may be far from an ontological answer, at heart we all are familiarised with the nature of this type of play, thanks to LEGO. It is no wonder that this geometrical toy, inspired by Bauhaus design (J.P. Wolf, 2014), has transcended to video games, with a block-based game such as Minecraft becoming its digital evolution (Thompson, 2016) (Schut, 2014), and being described by its *LEGO-like* feel (I. Mørch et al., 2016). Being defined as LEGO System in Play by its creator, Ole Kirk Christiansen, LEGO

has had an imperative role in defining our idea of what a building game is: an interconnecting set of parts, with a low entry level, an open system with infinite possibilities that allow you to create something where previously there was nothing (Ackermann et al., 2009) or, as Gauntlett would describe it, a tool for thinking (Gauntlett, 2014).

Therefore, this research will try to, taking LEGO and Minecraft as reference points, explore the concept of a building game typology, by extending the extracted theory to other video games with similar mechanics.

2. Research goals

The research in this project will focus on the development of a framework for the analysis of the design behind building systems, with the hopes of opening the doors to the scholarly understanding of this type of game typology.

In order to do this, this research project will:

- Revisit the knowledge in game studies and related academic fields which brings us closer to an understanding of building games.
- Propose a methodology for the analysis of building games, and provide a list of video games for their analysis.
- Analyse video gameplay of said games in which players develop UGC through the medium of its building system.
- Understand the system design of the analysed games and their traits as building games.

Therefore, the goal of this project is to explore the spectrum of games which can and cannot fit within a new conceptualisation of a building game type and provide a methodology through which academic research on this form of play can be furthered.

Heading into this research, it is paramount to consider that, when referring to building games, we're referencing a hypothetical collective of existing games that are *LEGO-like* and *Minecraft-like* regarding player experience and motivations. Therefore, the focus of the research will be around building systems as a system of mechanics, assuming that games are composed of several mechanical systems (Zubek, 2020). This means that the games will be analysed ignoring other systems of mechanics (such as inventory, crafting, gathering…) if they constrain the free use of building blocks or game world elements. In simpler terms, taking Minecraft as reference, game modes such as survival will be omitted in preference to creative game modes. In The Sims, building systems will be analysed in situations where players have infinite resources, and so on.

3. Historic references

Though little research has been made on building games, LEGO has been able to spark the curiosity of research over the years due to its revolution of the play world in the last half century, becoming the foundation for the fields of interest that will be examined in this work.

Some of this interest has been regarding philosophy of play, with works such as *Legosophia: Apologia filosofica del Lego* by Tommaso W. Bertolotti (2017), who defines LEGO as platonic, a form of orderly and mathematical structure, which is reflected in many ways in the Greek polis, from architectural representation to education. Other works such as *LEGO and philosophy: Constructing reality brick by brick*, edited by Cook and Bacharach (2017), touch on topics such as the relationship between LEGO and Dao, Buddhism, metaphysics, Plato, Locke and Rousseau, amongst other ethical concerns.

Regarding a more tangible, cultural and game design perspective, *LEGO studies: Examining the building blocks of a transmedial phenomenon* (2014) is perhaps the most comprehensive work to date. Edited by Mark J. P. Wolf, it delves into the history of LEGO, its several franchises and their cultural implications, transmediality and digitalisation. Most notably, especially for this research, authors like David Gauntlett, Nathan Sawaya, Kevin Schut and Seth Giddings discuss the design implications of LEGO, their possibilities as a tool for representation and artistic expression, player experiences and materiality of the medium.

The LEGO Group itself has sponsored research in formalising the study of its own media with The LEGO Learning Institute, with researchers such as Edith Ackermann, David Gauntlett and Cecilia Weckstrom. Their extensive research advocated for the coin of the term *systematic creativity* to define the blend between logical, structured, imaginative and creative play which is found in the LEGO System of Play (Ackermann et al., 2009) (Ackermann et al., 2010).

Exceptionally, older traces can be found which explain this type of play, unbound from LEGO. Jean Piaget (1952) in *Play, dreams and imitation in childhood*, defines *constructive play* as the use of blocks or elements in an organised, goal-driven mean to create a desired representation. Additionally, Caillois (1958/2001) acknowledges Erector Set toys as a form of *mimicry*, *ludus* play, in his work *Man, Play and Games*.

Building blocks as a concept has also made its way into game studies, denoting how deeply rooted this notion is within culture. Many authors have used the parallelism of building blocks to try and deconstruct a game genre or phenomena, such as Josef Nguyen (2016) in *Minecraft and the Building Blocks of Creative Individuality*, Clara Fernández-Vara (2019) in *Introduction to game analysis*, Jaakko Stenros (2024) in *The Rule Book: The Building Blocks of Games*, Engelstein and Shalev (2022) in *Building Blocks of Tabletop Game Design: An Encyclopedia of Mechanisms,* and Zubek (2020) in *Elements of Game Design*.

4. Theory

4.1. From toy to block to a medium of expression

The history of building toys, although arguably has been present for as long as humanity has existed, emerged in the mid-late 19th century with a focus on early “learning by playing” philosophy, popularised by thinkers like John Locke. The first blocks were not intended for complex building as we understand it now, but for their pedagogical use, such as the Alphabet Blocks patented by Charles M. Crandall in the 1870s (Hewitt, 2001).

The transition into the 20th century saw a diversification of wooden building toys, with the arrival of different coloured and shaped blocks (Bauspiel blocks, 1923), as tools of architectural representation (Richter’s AnchorBlocks, 1899).

Figure 1. “The Bungalow Box” building set from Anchor Blocks.
Source: Eames Institute.

What perhaps differentiates all these toys from LEGO, and our modern perception of building toys, is their interlocking property which allows more abstract representations. Kiddicraft, patented in 1944, is considered the direct predecessor of Lego, labelled as “self-locking building bricks” in its own toy’s box (Lauwaert, 2008). LEGO would go on to release their first plastic brick set in 1949, branded “Automatic Binding Bricks”.

However, many others preceded Kiddicraft itself, with the earliest reference of a stud interlocking system being found in Bild-O-Brick in 1934. It is also likely that the concept of stud connection was inherited from mechanical building toys such as Meccano (Salter, 2011) which, unlike the predecessors of LEGO, afforded other gravity-less building applications such as vehicles thanks to the use of metal sheets and screws.

Figure 2.Box of Bild-o-Brick blocks. Source: Jangbricks.

In fact, the first record of interlocking bricks dates to 1867, with Crandall's building toys, who invented interlocking pieces after observing his children play with cutoff finger-joint pieces of wood (Hewitt, 2001).

Figure 3. Set of Crandall Building Blocks. Source: Maynard Historical Society Archives.

Late 20th century was characterised by the break free from building toys as architectural models representation, partly thanks to LEGO's System of Play perfecting the interlocking property of blocks and the consolidation of the plastic-moulded pieces (Lauwaert, 2008).

Figure 4. Pile of LEGO blocks. Source: LEGO.

LEGO wasn't the first one to digitalise their building system either with Lego Digital Designer in 2004. Gryphon Bricks, released 10 years earlier in 1996, was a copycat of the LEGO system in a digital design interface, while PC-BLOX 2 and 3 from 1993 and 1998 respectively used cubes as the fundamental building unit, without the kinship to LEGO-like block features.

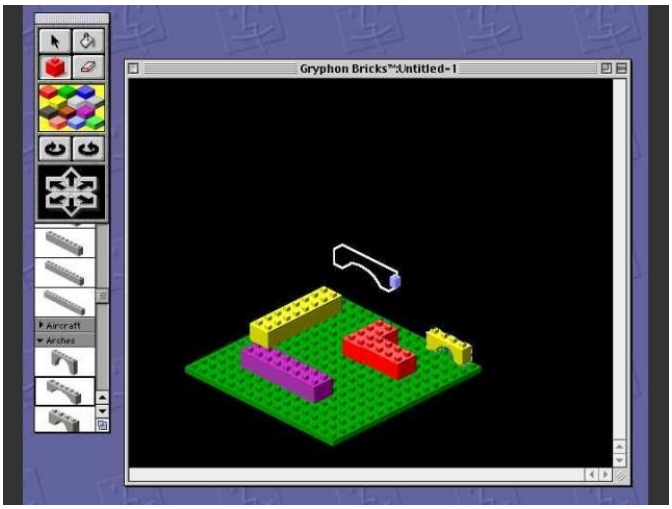

Figure 5. Screenshot of Gryphon Bricks gameplay. Source: Macintosh Repository.

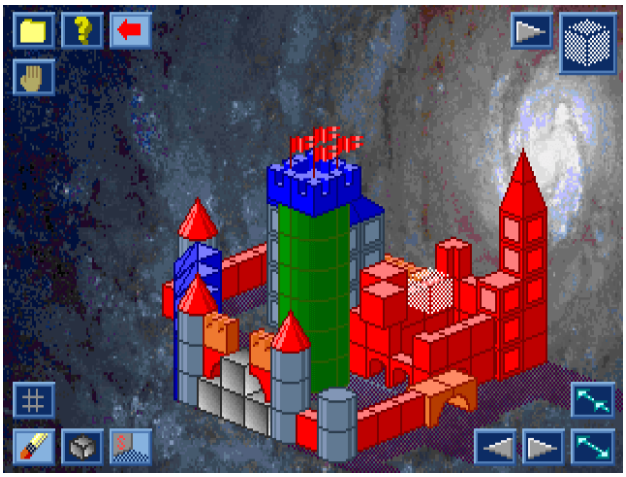

Figure 6. Screenshot of PC-BLOX 3 gameplay. Source: My Abandonware.

In the case of Minecraft as the staple of the block-meets-sandbox phenomena, many others have preceded it, such as Cubelands, Roblox and even Blockland released 6 years before. However, Minecraft was not intended as a building game, nor a sandbox: Infiniminer is said to have inspired the aesthetic of blocks, while the fundamental gameplay was already prototyped around the idea of an RPG (Marsh, 2012). In fact, it is what tells apart Minecraft from the games mentioned above is the default survival mode: it is unique compared to previous sandbox or building games because of the added exploration component, crafting mechanics and systemic approach to blocks as an ecosystem. Some academics have even compared Minecraft to island fiction narratives, on the creativity of an individual blooming outside of societal constraints (Nguyen, 2016).

Figure 7. Screenshot of Infiniminer gameplay. Source: Softpedia.

The popularity of Minecraft can be correlated to the Web 2.0 and amateur creativity phenomenon, since the lack of information it provides to the player despite its complex system mechanics extends the creativity outside the game, not only within it. Paired with the lack of a proprietary content sharing platform, leading the community to express their creativity in the web space. By summer 2011, there were over 2 million Minecraft videos on Youtube (Lastowka, 2012). It has become, as Henry Jenkins (2006) would call it, a transmedial phenomenon.

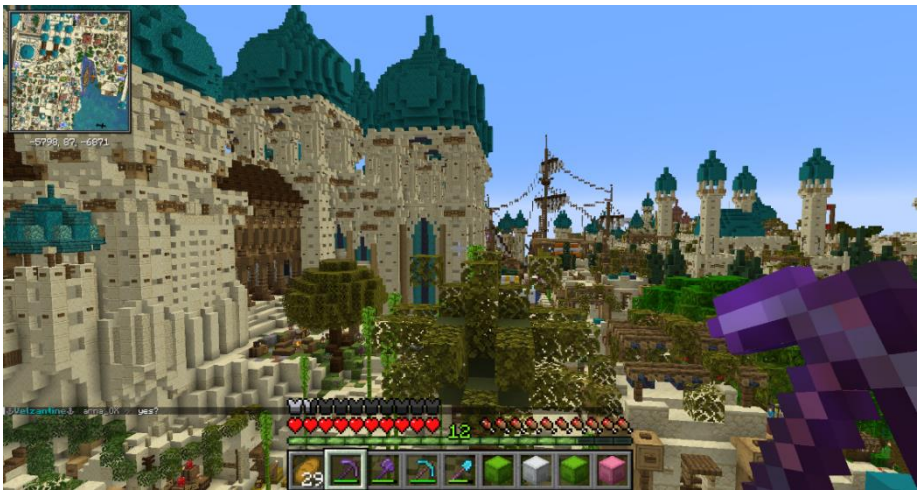

Figure 8. Screenshot of Minecraft gameplay. Source: Own.

Figure 9. Screenshot of The Sims 3 gameplay. Source: IGN.

Though there’s a cultural correlation between building toys, and their evolution into sandbox video games from a form follows function perspective, this research will also explore other evolutionary branches of games which showcase building or construction gameplay mechanics, such as The Sims. Finding its roots in dollhouse play and emerging from RPG games, all the way back from Little Computer People, Alter Ego or Jones in the Fast Lane, The Sims has evolved into a hefty building tool in addition to its main life-sim component, with many players dedicated to a build-exclusive playstyle. A similar phenomenon can be seen in farming-sim games such as Animal Crossing: New Horizons, where customising your island is in fact the meta goal of the game.

4.2. Philosophy of play, creativity & design

4.2.1 Why building systems are *ludus*

In the book *Man, Play and Games* (1958), by Roger Caillois, the concepts of *ludus* and *paidia* as distinctive types of play was introduced. As coexisting forms of play within a culture, Caillois (1985/2001) defines *paidia* as “the spontaneous manifestations of the play instinct”, and ludus as its metamorphosis “...to give the fundamental categories of play their purity and excellence”. That is, in *ludus* we find all the types of play defined by Caillois: *agôn* (competition), *alea* (chance), *mimicry* (mimesis) and *ilinx* (vertigo). *Ludus* is found when, within *paidia*, the player establishes conventions, goals, tools and structure.

However, where does building fit within this definition? If building is based on how we represent the world around us, the same way we learn about the world through observation, the principle of Aristotelian *tabula rasa*, then building can be considered a form of *mimicry*. Caillois (1985/2001) makes this classification himself, pointing out that the conjunction of *ludus* with *mimicry* leads to construction games, as *mimicry* is disciplined “until it becomes an art rich in a thousand diverse routines, refined techniques, and subtly complex resources”. Caillois accompanies this explanation by putting as an example the toy Erector set, comparable to Meccano.

Therefore, it could be said that a system of play inherently implies a *ludus* playstyle. However, this means that Cailloi’s own definition goes against other academics who classify LEGO as a form of *paidia* (Landay, 2014) (Buerkle, 2014) (Hanson, 2014) (Schut, 2014) (Shores, 2017) (Cook and Backarach, 2017). Tseng and Resnick (2012) in fact point out that LEGO, as a structured material toolkit (in contrast to an unstructured material), with pieces such as wheels, directs and affords children’s play into building vehicles.

Although digital building games are often assumed to be *ludus* types of play, as “digital games are based on materially embodied rules in their software and hardware” (Stenros, 2024), in contrast to analogue building game forms which are often regarded

as *paidia*, both mediums can be considered *ludus* as long as there is a system of play, and both can be considered *paidia* if there's no of system of play.

4.2.2 A brief introduction to creativity in building

When studying creativity in video games, Minecraft has been labelled as one of the games with high potential for such a goal, as the lack of a finite goal makes it the ideal space for creative expression (Bowman et al., 2015). As the game designer of The Sims, Will Wright (2006), would put it, it is a possibility space where there are initial state conditions but user-defined end-goals:

> "In an era of structured education and standardised testing, this generational difference might not yet be evident. But the gamers' mindset - the fact that they are learning in a totally new way - means they'll treat the world as a place for creation, not consumption." (Wright, 2006).

Although the aim of this research is not to assess the creative levels of players in itself, framing it or rather understanding building games as LEGO-like revolves around the assessment of the creative possibilities a building game affords.

However, assessing creativity is something rather subjective, and has been challenged by psychologists (Amabile, 1983) as much as it has been standardised, categorising different types of creativity and tests such as TTCT to evaluate it. To evaluate creativity in video games, methodologies such as Stealth Assessment have been developed (Jeon Kim et al., 2015).

American psychologist Guilford (1956) divides intellect between memory and thinking factors or abilities. The latter is comprised of *cognition* (or discovery), *production* (of an end result) and *evaluation* (decision-making). In particular, *production*, in this case which we associate with the act of creating, can be classified into either *convergent thinking* or *divergent thinking* abilities. *Convergent thinking* is the intellectual process of reaching a conclusion in a context where only one answer is unique. On the other

hand, *divergent thinking* is the undirected process of reaching a solution where there is no unique conclusion, problem-solving.

Hereby, puzzle games are designed around a predefined solution or set of solutions, allowing the user to reach a single answer. As a *solitary-passive* and *closed-ended* game, they encourage *convergent thinking*. On the other hand, *solitary-passive* and *open-ended* games such as blocks, encourage *divergent thinking* (Lloyd, 2003). Lloyd even defines that “non intended use of materials may partly define the notion of divergent thinking”. This implies that, the more unpredictable the possibilities of the medium, the more effective they are as a tool for creative expression.

Many studies that use Minecraft to evaluate or train creativity define it as a divergent thinking model (Melián et al., 2020) (Rahimi et al., 2022) (Cipollone et al., 2014). Although predicting player creations is close to impossible depending on the medium, we can analyse this unpredictability post-gameplay through the analysis of UGC. Previous studies, such as Rahimi et al. 's (2002), have even proposed codes for the assessment of the creativity in UGC structures, by analysing the syntax used in narrated Youtube videos of Minecraft builds. The study concludes the following codes to operationalise creativity:

- Elaboration: “The amount of detail. Any time the evaluator remarks on a Minecraft build in terms of the level of detail regarding the materials, mechanics.”
- Originality: “How rare is the building? Any time the evaluator refers to the construction being unique, rare, or states something similar referring to the building being novel.!
- Aesthetics: “Is it aesthetically pleasing? Well-thought-out designs, symmetrical elements, great choice of colour?”
- Surprise: “Was there any sense of surprise in the evaluator’s narration? If the narrator was amazed, impressed, wowed.”
- Complexity: “Refers to ideas from different categories. If the narrator referred to Variation of shapes, colours. Combining different elements in the building.”

- Novel use of materials: “If the narrator refers to the use of a material in an unusual way.”
- Effort: “How much effort it seemed a build took to be created.”
- Realism: “How real the build was in the evaluator's view.”

As external evaluators, these can be extrapolated as required codes of creativity for other building games. In other words, if a game allows these codes of creative expression, they can be classified as a game that enables a high degree of *divergent thinking* and therefore identifiable as a tool for creative expression or building video game.

These codes can be especially useful when observing players with a high level of competency with the building system, as they master and challenge it. For instance, LEGO artist Nathan Sawaya (2014), who has a high level of proficiency with their artistic tool, or system for representation at hand, presents that the geometric pieces and limited colour palette make LEGO a challenging art tool. These enable, precisely, one of the codes suggested by Rahimi et al. (2022): complexity and novel use of materials as indicators of a creative creation. Nathan Sawaya (2014) indicates that working around those limitations is what makes creating with LEGO enticing. For example, Nathan uses scattered pieces in his work *Yellow*, challenging the intended use of the medium, relating this practice to Lloyd’s (2003) conception of divergent thinking.

4.2.3 Building as a design process

Relating to the notion of *divergent thinking* as creativity, we can find similarities between the notion of applying *divergent thinking* and designing. There exist many definitions for the concept of design but, academic perspectives say that the act of designing involves eight elements: the agent, the primitives, the design object, the specifications, the goal, the environment, and the constraints (Ralph et al., 2009).

Constraints are especially present when the design takes place in a physical environment: amount and properties of the medium. But are there constraints when designing takes place in a digital environment? LEGO researcher Kevin Schut (2014), on *The Virtualization of LEGO*, argues that "...because the digital medium has unlimited amounts of space and virtual blocks, the only restriction for LEGO players is now the amount of time they have". Defining the notion of design may be an impossible task given the myriad of contexts it tries to encompass, but even in building systems there may be more differences than initially thought between analogue and digital forms of play. Unintended use of the medium is more unlikely to occur in digital games, given that the properties of the medium as a system design are pre-programmed, unlike in real life. In this instance then, media ecology takes importance in justifying the biases of the medium, especially when it affects the way players create.

4.2.4 Design Rationale

In the previous chapter of identifying creativity in building games, it was determined that creativity in a building game is an act of *divergent thinking* and thus problem solving. This is, all in all, not so far-fetched to what is conceived as design, with the act of building being a design process. In fact, design-related literature contemplates *divergent* and *convergent thinking* indirectly, by differentiating the notion of *design problem* from *decision problem* (Moran et al., 1996).

Design rationale is the discipline that studies the thought process behind a design, or rather the context in which design takes place (Moran et al., 1996). The interest in design rationale boomed in the 70's because of the computerisation, and the need to standardise design processes through software tools. That is, design environments: computer systems that allow a design activity to occur between designer and computer collaboration (Fischer et al., 1989).

In the book *Design Rationale: Concepts, techniques and use*, Moran and Carroll (1996) define that every designed artefact has a life cycle, involving a *requirements* phase, *design* phase, *building* phase, *deployment* phase, *maintenance* phase and *redesign*

phase. Aside from that, “the design process is open in the sense that, although there are constraints, such as time and budget, the boundaries of the process are not limited” (Moran et al., 1996).

Lee (1997) also expresses design systems and environments as “differing in the richness of the constructs they provide to represent a particular space. Generally, the less a system represents, the less overhead it will impose, but the trade-off is fewer services” (Lee, 1997). This remarks that, the less structured or the less constraints the medium affords, the more creativity they offer while having less usability. This is relatable for almost any design software but is also applicable to building games: they vary in their degree of complexity and usability.

Given the similarities between designing and building, the principles of design rationale can be applied to understand the player’s thought process when designing with a building system. A design process is split into two activities: *construction* and *argumentation*. *Construction* means reaching a solution by the means of placing blocks, while *argumentation* is the reasoning of the quality of the solution. In fact, during a design process designers are constantly switching between construction and argumentation, as an iterative process (Fischer et al., 1989). This behavioural pattern is later observed through the analysis of gameplay in the project’s research.

Such process is applied to software through Fischer’s approach as he develops a design environment: a software for professional kitchen designers in which to plan their builds. In this case, (Fischer et al., 1989) researches a knowledge-based system that standardises the argumentation process by advising the user on whether designs fulfil the design requirements, which he calls *satisficing*. This *satisficing* depends on *metrics* (fulfilment of objective, standardised construction codes) and *viewpoints* (subjective, perceived quality of the design).

If building video games are approached as a design environment, *metrics* would be equivalent to game rules (if, for example, the building game prompts the user with requirements, whereas *viewpoint* would be the player’s aesthetic design choices. Therefore, in a setting of *open-ended* play, such as with LEGO or Minecraft, there’s no

right or wrong design per se, assuming that the subject of representation is a product of the player's imagination. However, it is notable that, as a transmedial phenomenon, UGC seeks validation from the community, with it being a criterion for viewpoint satisficing.

What's relevant is Fischer's design environments is them being defined as *knowledge-based*. That implicitly means requiring the user to know the system in order to use it, "supporting human problem-domain communication, letting users work within their domains of expertise" (Fischer et al., 1989). He expands this concept even further introducing end-user modifiable in *knowledge-based convivial systems*, touching on the subject of how the need arises to modify pre-designed systems in order to adapt it to new problem-solving needs and how, in fact, the modifiability of a system is its strongest trait as a design tool (Fischer et al. 1990). This is, in short, the equivalent of modding: user-made extensions or modifications of the game, a phenomenon present in Minecraft, for instance, which has played a crucial role in its popularisation. Minecraft has, therefore, extended the *divergent thinking* beyond problem-solving within a design environment to a *convivial* one: one that fits the user's creative need for expression.

Fischer also defines the concept of *construction kit* as: "a set of domain-specific building blocks". He refers to them as design units (DUs) which can be selected from a palette given to the user. (Fischer et al., 1989). This relates to the idea of building with a set of bricks (or blocks) as we've seen when talking about LEGO or Minecraft, but also as a *metric-based* or *grid-structured* form of construction.

4.3. Game theory and system design

4.3.1 Formal approaches to game space

As observed, the paradigm of games we're trying to study is radically different from others because of their play nature. How do we, however, conceive them as a collection of mechanics, and formalise them from a game design perspective?

In the case of *LEGO-like* games, based on the several academic definitions of mechanics collected by Sousa et al., we'd say that the closest way to define *LEGO-like* games's mechanics are "ways that players interact with the game to affect the *game state*" (Sousa et al.2021).

The games researched can be distinguished from other games because of their use of the *game space*. While a Mortal Kombat or Tamagotchi happen in a *game space*, modification of the space is the primary mechanic in building systems (or focused on *resource management mechanics*, according to Zubek's (2020) classification). As McGregor (2007) points out "a *game space* is also something that can be constructed as a part of the gameplay". In the Sims, there is a conjunction between McGregor's c*reation spaces* and *nodal spaces*, as players in The Sims generally mimic house structures when constructing, in which each of the Sim's action takes place.

It is also notable how, in games that have building systems (as a mechanic), the *game state* is always fully observable: with *game state* and *space* being synonyms, the user needs to see the *game state* at all times in order to modify such *game space*. Or rather, the challenge of such games is not created by *hidden game state* information, as the games do not have finite, imposed goals in the first place.

4.3.2 Rule-based systems

Zubeck (2020) divides game mechanics into *pieces* (the physical elements that can be manipulated), the *actions* (that can be performed with pieces) and *rules* (that constraint which, when and how actions can happen). It is interesting to see the concept of *game pieces* being introduced, as they are a common ground between analogue and digital construction games. If block-placing is considered as a game action, then *game rules* are how and where those blocks can be placed. In LEGO, blocks can only be placed if the studs match with the brick holes. In Minecraft, blocks can be placed on any surface within the world (except blocks with special physical properties), constrained by the abstract, *grid-structure* of squares the world is composed of.

As brought up in the section Building as a design process, digital and analogue differences do not only affect play from a subjective experience. Sousa et al. specially make a point of how mechanics differ between digital and analogue games (Sousa et al., 2021). For instance, building blocks in digital games are *dynamic* entities that can have properties, and morph according to the environment in ways that analogue games cannot. In Minecraft, certain blocks connect with each other when placed side by side, like glass panels or fences, a mechanic which in LEGO is simply not possible.

This relates to the notion of *adjectives*, when talking about language as a metaphor for game mechanics. If *nouns* are *game pieces*, *verbs* are *actions*, and *grammar* is *rules*; adjectives, which modify nouns, describe the event of a glass panel connecting to each other. The same can be said of *adverbs*, and *prepositions*: they are mechanic *modifiers* that can only occur in a digital ecosystem (Zubek, 2020).

Seeing the relation of building video games as the digitalisation of building games, the MMDE model proposed by Sousa et al., as the analogue version of MDA, provides some clear insights on the mechanics at hand. The player action of *block-placing* or *block-breaking* can in fact be classed as *mechanisms* (the simplest action form). The grid system that governs *block-placing* can be called an *auxiliary* or *sub-mechanism*. These things together conform *construction mechanics*, on end becoming *building dynamics* (Sousa et al., 2021).

4.3.3 Player type models

Given that video games with building systems allow for many forms of play, such as Minecraft which includes from combat and parkour to building mechanics, no player enjoys all experiences equally. Specially, some players may find the lack of goals or direction frustrating and would rather play *close-ended* games.

The challenge comes when we try to define the motivation behind building, or player types that enjoy building above other play styles. However, it can be observed that some player models fail to englobe the motivation of building. MUD taxonomies that evolved from Bartle (1996), such as Yee's (2005), fail to describe that type of play (Bateman et al., 2011), with the closest category being the customisation of your character. That is because Bartle's classic model and derived ones are centred around how players interact in the game, when in fact there are players that find enjoyment in interacting with the game or, in other words, modifying it, becoming creators (Navarro, 2015).

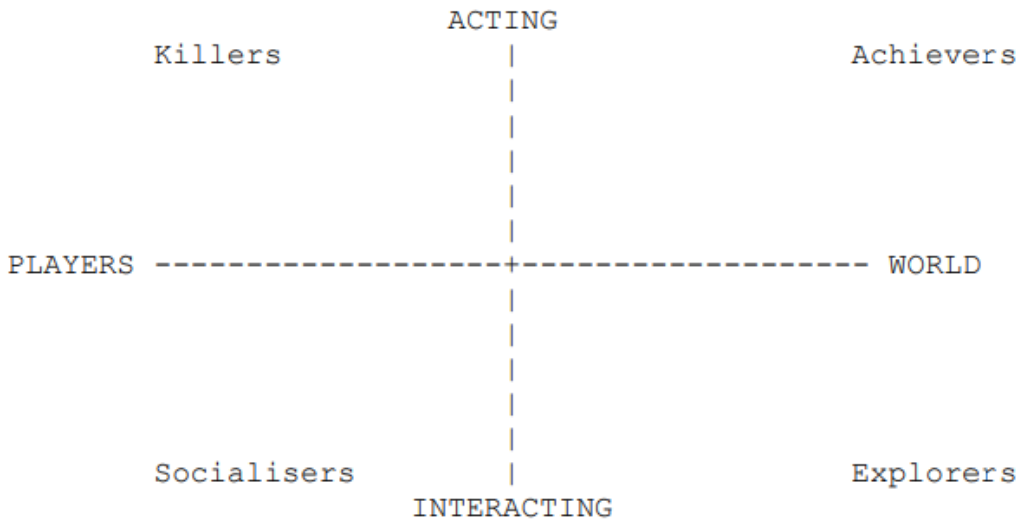

Figure 10.. Bartle's taxonomy. Source: Richard Bartle.

Quantic Foundry's model, Yee's (2015) evolution of his own model, accounts for multiple types of games experiences outside of the RPG-inspired Bartle-like models. It includes a design motivation factor within the creativity dimension. The design factor is centred around how much control the player gives up to experience the game

designer's vision of the game, compared to experiencing their own, personalised, game experience. Yee associates games such as Animal Crossing or The Sims in the high end of the design spectrum (GDC, 2019).

Figure 11. Quantic Foundry's gamer motivation model. Source: Quantic Foundry.

Amy Jo Kim's (2018) player type matrix, though centred in social play, makes the clearest division between acting with the world and acting in the world. Moreover, it specifically uses terminology such as *build*, *design* and *create* when referring to expression in the world, and the use of *tools* and *systems* to do so.

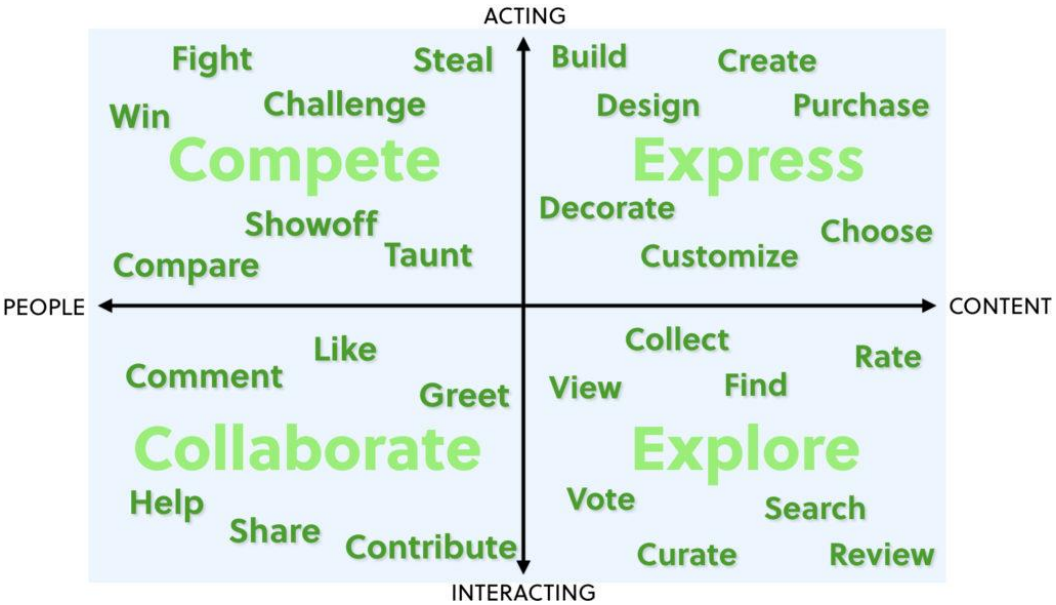

Figure 12. Amy Jo Kim's Social Action Matrix. Source: Amy Jo Kim.

Overall, there's a still a lack of definition of generalist, genre-transcending motivational patterns. Moreover, the effectiveness of player typology over player trait models has been raised, since player type relies too much on personality theories (Bateman et al. 2011). After all, a player's motivation behind *constructive play* may depend on many factors, such as the theme at hand, a player's play style, unique creative process, building attached to social activity, etc., and can be related to multiple personality models. Minecraft, for instance, has previously been selected as a personality evaluation testbed because of the wide possibility of behaviours it affords (Canossa et al. 2013)

As Seth Giddings (2014) describes in his chapter of the book Lego Studies, some players enjoy building LEGO by following instructions, as they are motivated by the goal of achieving the final set. Others find special enjoyment in deconstructing sets once created. Others enjoy deconstruction in order to rebuild the same set, as a form of admiration. Others enjoy building both by following instructions and/or *free building* in order to role-play with the characters and the environment. Others are rather fans of *free building* alone and may recreate existing from observation or build straight from imagination. And others find enjoyment in playing with people and teaching them to play.

All these plethora of behaviours showcase that building can be enjoyed in multiple ways, and perhaps cannot be categorised in a player model. At the end of the day, what all these experiences may have in common is players reaching a *flow state* in their own *open-ended* activity because of it being intrinsically motivated (Csikszentmihalyi, 1990). Instead, another approach in trying to understand player behaviour, aside from looking at their intrinsic or extrinsic motivation, is knowing how it affects their emotions (Navarro, 2015).

Lazzaro's (2009) Four Factor model, a taxonomy of player emotions, splits player enjoyment into *hard fun* (challenge), *easy fun* (curiosity), *serious fun* (focus) and *people fun* (social bonding), but even Lazzaro accounts that any game support at least three of these emotions. Players who build LEGO sets from instructions may experience *hard fun (fiero)* the most as they try to interpret the provided steps, which "focuses player attention on achieving results by providing an obstacle, an objective" (Lazzaro, 2009), and require players to reach a state of flow. *Fiero* can specially be experienced from a sense of mastering, perhaps explaining while players enjoy building the same set more than once.

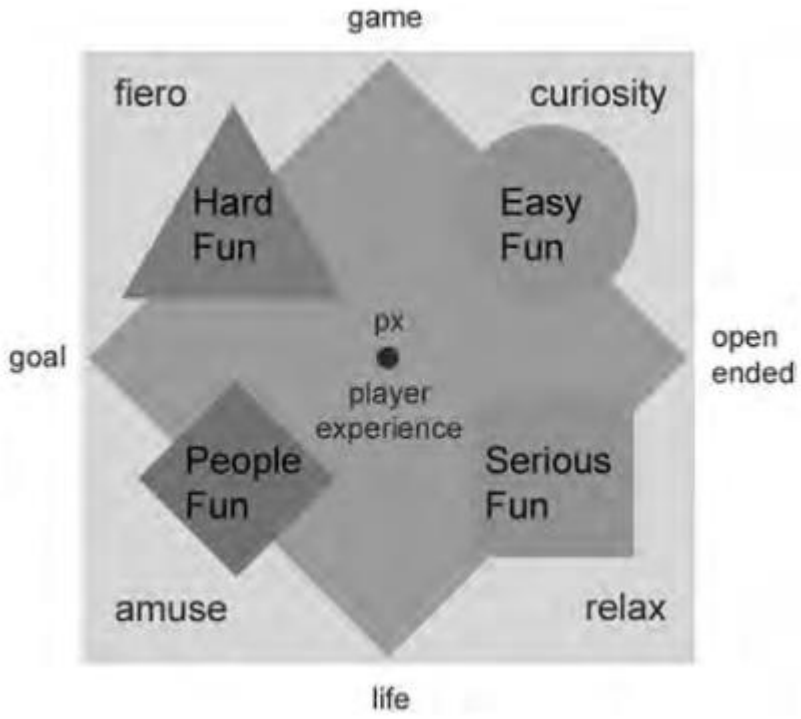

Figure 13. Lazzaro's Four Factor model. Source: Nicole Lazzaro.

In contrast, players who enjoy *free building* may experience *easy fun*, as a "self-motivating activity that maintains player's engagement through novelty beyond an obstacle or goal … inspiring player curiosity to explore fantasize and role play" (Lazzaro, 2009). It is experienced when a balance between disbelief and disinterest is met, being associated with positive emotions instead of frustration, extended play sessions, and lack of purpose (Lazzaro, 2009).

4.4. Game genres

In order to understand what defines or makes a building game, it is imperative to provide context on the nature of cultural videogame classification. In other words, it is important to understand what is a game genre and the different genre taxonomies that are at play.

Game genres have been a constant topic of discussion, primarily because of the opposite narratologist and ludologist, which offer different taxonomies of genres focusing on their particular field of study because of the classification criteria they apply (Arsenault, 2009). Narratologist perspectives specially apply taxonomies based on past media forms, while ludologists argue that ergodicity or interactivity should be the focus of classification rather than the representational features or *Milieu* (Apperley, 2006). Some research even proposes the term *game genre* to be exclusively a description of the narrative content, and the term *game type* to describe the game play (Grace, 2005).

This is especially present in the used methods of popular game classification, as industry classification is often distinct from users. For instance, Steam's classification system is based on tags, assigned by users, tags being both narratological and ludological criteria coexisting. Research has even created a cluster model to classify games by popular keywords or tags (Heintz et al., 2015).

Additionally, what complicates the notion of genre is the evolving nature of the video games industry, in which the methodical form of innovation is the fusion of different popular game attributes which leads to evolutions in game genres (Arsenault, 2009). This is particularly interesting as both simulation and construction games, which evolved as two completely different types of games, have many family resemblances (Wittgenstein, 1953).

Therefore, the following sections will gather scholar understanding on specific game genres which may include traits of a *building game type*.

4.4.1 Simulation games

Following the debate of *games* versus *toys*, some scholars debate if simulations can be called games altogether. Prensky argues that that notion depends on the level of fidelity of the simulation, *high-fidelity* or *low-fidelity* (Prensky, 2001). As it will be described in following sections, simulation is largely tied to procedurality and *software toys* which, even if they are not games, are directly aligned with the subject of study.

Apperley (2006), in his approach to genre classification, defines four main genres: *simulation*, *strategy*, *RPG* and *action*. This is especially interesting, seeing how Ernest Adams (2014) conceptualises simulation and strategy as a single genre he calls CSGs: *Construction and simulation games*.

Adhering to Ernest Adam's (2014) definition of the genre, *construction and simulation games* are about system management, the challenge of which is economic growth. They require the player to understand the processes and systems. Games that fall under this label would be SimCity or World of Goo (which others would simply deem as strategy games).

Figure 14. Gameplay screenshot of SimCity BuildIt. Source: Electronic Arts.

Adams (2014) points out the following properties of CSGs:

- Game play based on an economy system, which the player intervenes in through indirect control.
- A building mechanism, either purchase-and-place or plan-and-build, their difference being if the building is created immediately after purchase or first placed and then paid for in ultima res with money or resources. Purchase and place is preferable in games with a focus on building since the iteration is faster.
- Social play, it being the meta-act of sharing the built creation.
- Lack of victory conditions, and the loss of your resources being the defeat condition.

Ernest Adams (2014) also classifies Minecraft as a CSG, while identifying it as a sandbox as “the game gives the player no explicit goal to aim for, and construction is the primary activity”. Although Minecraft can be analysed through the lens of CSGs, Adam points it out as an exception compared to other suggested games of the genre, such as SimCity or Cities: Skylines, as well as many other first person survival games with integrated building mechanics, making one wonder if it’s even worth trying to encapsulate both game types into one.

Adams (2014) does point out that CSGs often have both a *regular* and a *free building mode* (that is, a mode in which the economy of the games is ignored and only building matters), something that Minecraft embodies very well, to the point of the game modes providing radically different forms of gameplay.

4.4.2 Software toys

In the latest game innovations, there’s been a rise in hyper casual building games, with the likes of Tiny Glade, Summerhouse or Townscaper. These revolve around a lack of sense of time, focused on the little details, and with no sense of economic progression, which englobes them in the rising tendency of *slow Gaming* (Navarro, 2020).

Additionally, such *games* have been referred to by a sector of the press as *toys*, raising the terminological concern between both conceptions of play (O'Connor, 2020). Such games define themselves as having no goals other than the enjoyment of a creative experience (Morton, 2024b) (Gray, 2021). Games of the same nature succeeding Townscaper, such as Dystopika or Gourdlets have even been tagged as *Townscaper-like* (Morton, 2024a) (Cox, 2022).

Figure 15. gameplay screenshot of Tiny Glade. Source: Pounce Light.

Because of their ease of use and accessibility, closed game experience, portability, and lack of explicit victory conditions, we can consider Townscaper and the likes a perfect embodiment of digital toys (García, 2023). Additionally, because of the open world element and lack of game-imposed rhythm, Townscaper can also be considered a sandbox game (García, 2023). As Fullerton defines in *Game Design Workshop*, following Crawford's four types of play, "Toys are manipulable, like puzzles, but there is no fixed goal" and, in fact, describes The Sims as an example of toy (Fullerton, 2008).

Another crucial element often related to *software toys* is procedurality. *Procedural toys* are tiny worlds that operate on their own, and create play spaces of possibility to explore the intricacies of how they work (Sicart, 2014). Tracing back to SimEarth, it refers to itself as a *software toy* in its own game manual. Bremer (1990), the author of

said manual, describes it as a programmable planet toy that can become an infinite number of planets, just like a ball can be used to make up hundreds of different games. The manual, just like Sicart suggested, explicitly encourages the players to think outside standard win conditions and to enjoy exploring how the system works.

Figure 16. Gameplay screenshot of SimEarth. Source: Myabandonware.

SimEarth's manual also defines three components of the game: the system simulation, the tools, and the rules (Bremer, 1990):

- System simulation: Is created and controlled by the rules and tools.
- Tools: To create, modify and manage a planet.
- Rules: The provided framework that defines and allows the control factors, such as the atmosphere of the planet, the pollution, food and energy supply…

These can be easily extrapolated as the elements of a software toy and/or procedural toy. As Stenros (2024) would describe it, such rules are *formal* rules, instead of *internal*. Stenros makes a distinction between playing *by following* rules versus playing *with* the rules, the limitations of the rules. Such formal rules are often *private*, as they modulate the gameplay experience independently from the player experience.

4.4.3 Sandbox games

In *sandbox games*, “the players have full freedom to experiment and affect the world, and the game responds in turn” (Zubek, 2020). *Sandbox* games can be considered *digital toys*, and are often correlated to *procedural toys*, the difference being that *sandbox games* are specially centred around providing a free creative experience (García, 2023), whereas *digital toys* are working systems meant to be explored. Zubeck points out that, precisely because *sandbox* games are so open, the storytelling provided by the game will inevitably suffer (Zubeck, 2020).

Relating back to *formal* and *internal rules*, Stenros adds: “...we can conceive of the formal rules of the game as a sandbox in which players play around with limitations, but they can also add internal constraints to keep the game engaging” (Stenros, 2024). That is, players are expected to set their *internal rules* and therefore define the game.

The *digital playground* provided by *sandbox games* is their distinctive trait. In Play Matters, Sicart makes the distinction between game spaces over play spaces: Game spaces are those subject to level design, that guide the course of action of the player, with play spaces (as in sandbox games) allowing the player’s freedom, roaming a virtual environment (Sicart, 2014). Therefore, it could be said that *sandbox* embodies the notion of a *magic circle* more than any other game, by defining a little digital universe where the player’s *constructive play* can take place (Salen and Zimmerman, 2004). As Lastowka (2012) describes, “Minecraft does not present new users with a blank page or space. Instead, it presents a simulated landscape and a set of tools to manipulate a fictional space. The game is a creative tool”.

Minecraft is generally considered as the staple of sandbox, together with the likes of Roblox, but according to the academic notion many other titles can fit under this label. Zubeck, for instance, tags SimCity and Dwarf Fortress as *sandbox simulations* (Zubeck, 2020).

Figure 17. Gameplay screenshot of LEGO Fortnite. Source: IGN.

A common characteristic of *sandbox games* is their design approach of players as *player-designers* or *player-producers*, like Roblox, Fortnite, Garry's Mod, Minecraft or The Sims. They are open system games that are intentionally made for the design of the game to be manipulated. The Sims, for instance, allow players to download custom objects for their house or sims and patches that add variants of game play. It is often the case that sandbox games become popular because of the ecology of fan culture that surrounds them. Therefore, sandbox games do not only create a *magic circle* or space for creativity within the game software: they extend the *magic circle* to the online space, creating a movement of social play (Salen and Zimmerman, 2004).

4.4.4 Digital dollhouse games

Another traditionally different type of game that conceptually involves building are, as some would define it, digital dollhouse games (Savina, 2020) (Montes et al., 2013). Just like LEGO, representing building toys, or Minecraft, representing sandbox games, this type of genre has been mostly represented by The Sims. They're also conceived as *god-games*, as you control and witness the world rather than become a part of it (Montes et al. 2013).

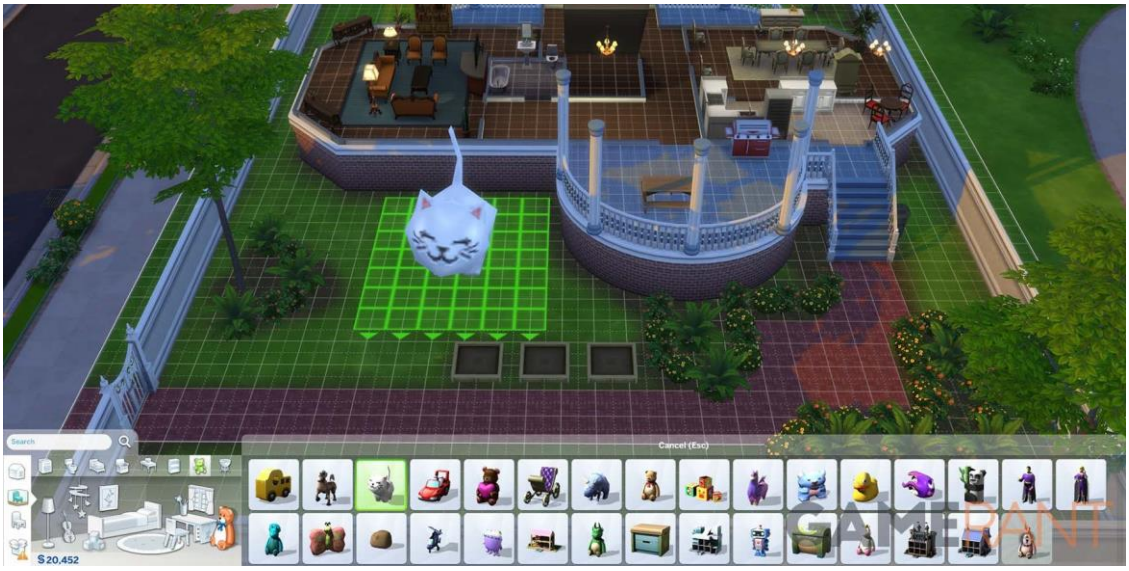

Figure 18. Gameplay screenshot of The Sims 4. Source: Game Rant.

Iversen (2005) calls this type of gameplay within The Sims *constructional challenge*, as the building projects the player sets out to complete are often an expansion to the role-play agenda. That is, representing the identity of the Sim through the space or, as Iversen calls it, playing in-character.

Games such as Animal Crossing are similar to the Sims, in the sense that the system *initiates* goals but does not *set* challenges: their gameplay is a social simulation at its core and has *constructional challenges* that help build on the in-character play. Iversen (2005) refers to these games as *open challenge structures*.

Figure 19. Gameplay screenshot of Animal Crossing: New Horizons. Source: Own.

Authors have even compared The Sims to LEGO, referring to how in both games not two people play it in the same way, and in fact it is the game itself that encourages players to be experimental (Paulk, 2006)

5. Methodology design

5.1 Questions on methodological approaches

The performed analysis on a number of building games will focus on the relationship between the two dimensions of *gameplay* and *game-structure* (Aarseth, 2003), in order to decode the structure or *rules* of the system. Following Kücklich's perspective, in order to get closer to the understanding of a game, playing it is required, as it is only then when the framework of rules is challenged (Kücklich, 2002). Therefore, based on the premise that our understanding of a game is contextual, the more we challenge the system the richer our understanding be, empirically speaking. That will be achieved by both the researcher's own experience as a player in the following analysed games, and the observations of other player's publicly available gameplay footage.

However, given the undeveloped literature on methodology for the qualitative analysis of video game content, or rather the impossibility for the standardisation of a methodology given the varied needs of every qualitative study (Aarseth, 2003), this research will structurally follow other proposed generic methods, such as *Libertad Dirigida* (Navarro, 2016) and *Introduction to Game Analysis* (Fernández-Vara, 2019), while taking into consideration the terminology and concepts introduced in the theory section of this research.

Although admitting that no empirical analysis will be exhaustive enough, given the infinite nature of creation possibilities within building systems, an attempt will be made to the formalisation of knowledge and terminology surrounding these types of game systems to set a precedent for further academic understanding.

5.2 Proposed methodology

The methodology proposes the following categories, taking as building pillars Víctor Navarro's (2016) and Clara Fernández-Vara's (2019) work on game analysis, with the aim to answer the suggested questions:

- Virtual space: Where do players play (build)?
- Meditation: How do players perceive the virtual space?
- Mechanics: How do you modify the game state?
- Rules: What constraints the mechanics of the ludic world?
- Blocks and units: With which entities can you manipulate the game state?
- Dynamics: How is the player's interaction unique to the creative tool?

The contents of the framework are also built upon the researcher's own observations and knowledge about building games, prior to the analysis, as base prompts to discuss the media at hand. Through the analysis of the selected games, the framework will be challenged and debated in the conclusions of this project.

<table>
<tr><td rowspan="3">VIRTUAL SPACE</td><td colspan="2">Initial space</td><td>- Modifiable or unmodifiable
- Blank, flat or terraneous
- …</td></tr>
<tr><td rowspan="2">Dimensionality</td><td>Space</td><td>2D or 3D</td></tr>
<tr><td>Intervention</td><td>2D or 3D</td></tr>
<tr><td rowspan="6">MEDITATION</td><td colspan="2">Perception</td><td>- 2D or 3D
- Perspective or orthographic
- Fixed or free
- First person, third person
- …</td></tr>
<tr><td colspan="2" rowspan="2">Intervention</td><td>Direct</td></tr>
<tr><td>Indirect</td></tr>
<tr><td colspan="2" rowspan="3">Navigation</td><td>Diegetic</td></tr>
<tr><td>Non-diegetic</td></tr>
<tr><td>Spatial</td></tr>
<tr><td colspan="2"></td><td>Meta</td></tr>
</table>

<table>
<tr><td rowspan="4">MECHANICS</td><td rowspan="3">Core mechanisms</td><td>Primary</td><td colspan="2">- Block placing
- Block breaking
- …</td></tr>
<tr><td rowspan="2">Secondary</td><td rowspan="2">Grid</td><td>Unitary or subdivided</td></tr>
<tr><td>Regular or irregular</td></tr>
<tr><td>Grid-less</td></tr>
<tr><td>Sub-mechanisms</td><td colspan="3">- Block selector
- Block palette
- Block picker
- …</td></tr>
<tr><td rowspan="3">BLOCKS AND UNITS</td><td colspan="4">Static or dynamic</td></tr>
<tr><td colspan="4">(Un)placeable and (un)breakable</td></tr>
<tr><td colspan="4">Modifiable or unmodifiable</td></tr>
<tr><td rowspan="3">RULES</td><td>System mimics</td><td colspan="3">- Gravity
- Physics
- Collisions
- …</td></tr>
<tr><td colspan="4">Systemic relations</td></tr>
<tr><td>Medium limitations</td><td colspan="3">- Build height limit
- Block number limit
- …</td></tr>
<tr><td rowspan="2">DYNAMICS</td><td colspan="4">Topics of representation</td></tr>
<tr><td colspan="4">Design lifecycle</td></tr>
</table>

Table 1. Framework for the analysis of building games. Source: Own.

5.2.1 Virtual space

Whereas a physical *magic circle* is established where the player wants, in a videogame the player finds themselves in a given world, with physical constraints, influencing how they act.

The *initial space* will describe the physical properties of such initial *game state*, whether it is void, giving no affordances to the player; flat, as an initial physical support; or is composed of volumes such as a terraneous environment. All of them will influence how the player perceives the environment, and direct their creative process

Depending on the *dimensionality of space*, the space can exist in 2D or in 3D dimensions. Depending on the *dimensionality of intervention*, the space can be modified in 2D or in 3D dimensions

5.2.2 Meditation

Meditation refers to how the player perceives the digital space and perceives the interaction with the game, not necessarily how it is in its formal properties.

- In regard to visual *perception*, the camera may be in 2D or in 3D, perspective or orthographic, pivot around a first person, third person character… and so on.
- In regard to *intervention* within the virtual space, intervention can be *direct*, as in player actions having effect immediately, or *indirect*, as in player actions having effect asynchronously.

Navigation of the space and tools for building, assisted by interface elements, can be *diegetic*, *non-diegetic*, *spatial* or *meta*, as proposed by Fagerholt and Lorentzon (2009).

5.2.3 Mechanics

Mechanics are the actions the player is able to perform in order to alter the game state into their desired state (Sicart, 2008).

- *Core mechanisms* are those essential to any building game, as in the altering tools, such as block placing or block destruction, which are supported by the secondary mechanics, such as a grid which allows the player to choose what is being placed and destroyed.
- *Sub-mechanisms* are generally added mechanisms that expand on the intricacy of the building experience or improve the user's quality of life, but are not required for the act of building.

5.2.4 Blocks and units

Blocks may be radically different from game to game, depending on the virtual space, mechanics, rules, and domain of representation. However, the main distinction will be made between three properties:

- *Static* blocks and *dynamic*, with *static* being unalterable units, and *dynamic* blocks being subject to system relations. In other words, *dynamic* blocks can present themselves to the player in different *states*.
- *Placeable* or *unplaceable* and *breakable* or *unbreakable*, on whether the player can use the *primary mechanisms* with these blocks.
- *Modifiable* and *unmodifiable* refer to whether the player can alter or edit the block unit itself in any way.

5.2.5 Rules

Referring to the constraints, is perhaps the most discernible from analogue play, as in contrast to the real world, physical constraints are pre-programed design choices.

- *System mimics* are those physical properties that mimic or do not mimic those of the real world, such as if blocks in the game are affected by gravity or not.
- *System relations* refer to dynamic relations that may exist between dynamic blocks, for instance constraining if a block can be placed next to another or not. This also refers to relations between systems of mechanics in the game.
- There may be *medium limitations,* especially spatial constraints, which would not typically exist with an analogue toy. Such constraints may be caused by the hardware, like computer memory limiting the not so infinite number of blocks that can be placed.

5.2.6 Dynamics

Dynamics will shortly delve into the study of the player's interaction with the system of play, the *design lifecycle* or creative process the player follows, the iteration between *construction* and *argumentation* phases and the topics of representation the system affords.

5.3 Research planning

The table underneath shows the timeline this will research project will follow.

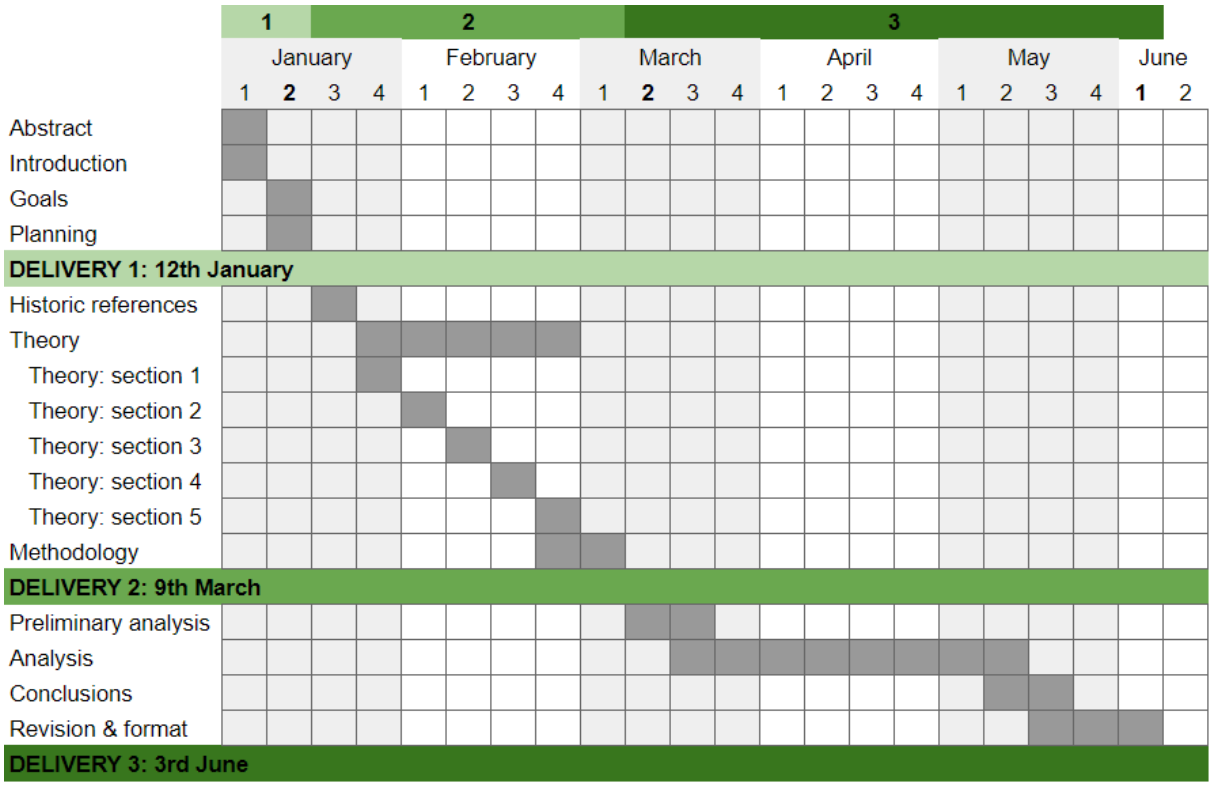

Figure 20. Research chronogram. Source: Own

6. Research

6.1 Research choices

The selected games were based on four main criteria, being a diversity in game genres, diversity in mechanics, diversity in release date, and historical relevance. Diversity in game genres and mechanics ensures that this analysis covers all aspects of a building game and the sub-typologies that can be identified. Diversity in released date provides this analysis with a rich understanding of the evolution of building games and typology tendencies over the years. Finally, historical relevance ensures that all games have some unique element that appeals to the player's experience, indirectly making them a building system of higher quality in their design.

PC-BLOX 3 (1998) is one instance of an early digital building game that did not replicate LEGO’s stud system, compared to the likes of Gryphon Bricks, and instead went for a cube building system, being a significant step in the conceptualisation of digital block pieces. In this instance the analysed game will be PC-BLOX 3, as it is the only software version of PC-BLOX available to the researcher.

Minecraft (2011) will be analysed, as the main building game referenced through this project, and perhaps the most culturally standardised notion of building game. It is also relevant as a symbol of the consolidation of voxel technology that was explored during the decade by other games such as Infiniminer, Roblox, Cubelands, Blockland or Minetest.

As for Cities: Skylines (2015), it has been chosen as a referent of city building games, especially because of its outstanding complexity and simulation’s realism, in comparison to Sim City which is closer to a closed game experience. Although Cities: Skylines has no creative mode per se, the user can choose to have infinite money and unlock all the available blocks at the start of the game, essentially prioritising building as the main mechanic system of the game.

Animal Crossing: New Horizons (2020) will be considered as a referent of social-sim and decoration or doll-house games. It is a relevant choice due to the diversity and depth of building mechanisms, its popularity, and the overwhelming amount and quality of UGC.

Townscaper (2020) and Summerhouse (2024) will be analysed as examples of software toys. Remarkably, they are rather different from one another mechanically, with Townscaper being a 3D procedural toy, and Summerhouse presenting itself with a 2D aesthetic and non-procedural system.

The last game in the analysis will be Enshrouded (2024) as an example of a recent open-world, survival game with building mechanics targeted at a base-building experience, resembling Valheim (2021).

6.2 Videogame analysis

6.2.1 PC-BLOX 3 (1998)

Space, mediation, mechanics, rules and blocks

PC-BLOX 3 is a DOS game developed by Vic Slade Software and published by Vector Space, released in 1998. It defines itself as “easy-to-use building block toy for kids”. The *virtual space* is introduced to the user as a pre-built structure for the *initial game state*. that you can either build upon or restart from a blank world. Such space exists in three dimensions, as the i*nitial game state* has blocks placed in all three dimensions and can also be modified in three dimensions by the player.

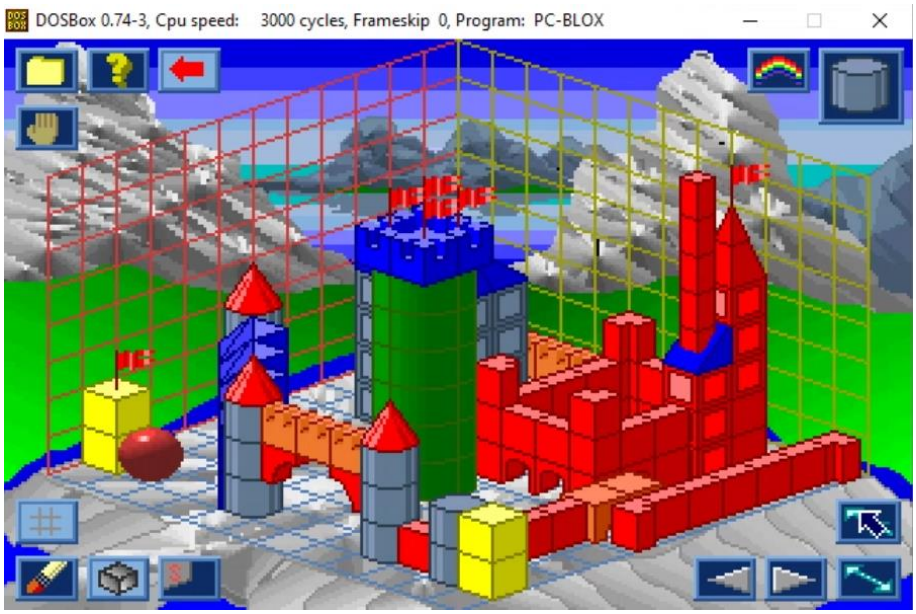

Figure 21. Screenshot of PC-BLOX 3 gameplay. Source: Own.

As for player perception of the space and digital interaction, PC-BLOX 3 is perceived in two dimensions, given that it is represented with an isometric projection, and fixed camera. However, *navigation* through the 3D space is made possible by flipping the Y axis and the ability to scroll through the X axis, by using the *non-diegetic* interface buttons at the bottom right of the screen. Three-dimensional navigation is also made possible thanks to the *spatial* grid element which can be toggled by the player.

Figure 22. Navigation tools explained in PC-BLOX's in-game tutorial. Source: Own.

As core mechanisms, PC-BLOX 3 allows users to place and break blocks. The player can switch between these two actions by toggling the pencil rubber button at the bottom left of the screen. Another primary mechanism fundamental for building to take place, due to the *system mimic rules*, is the transparent block option which will be explained later on. As the secondary, *core mechanisms*, the grid is *unitary* and *regular*, made of perfect cubes. Regarding *sub-mechanisms* of the building mechanics, the following are available through *non-diegetic* buttons:

- Shadows: Players can toggle a purely visual option for shadows to be displayed.
- Block palette: Menu accessed through the top right button, which holds the block types available in the game.
- Random colour picker: The rainbow icon next to the previous feature cycles through the available block colours.

Figure 23. Block palette menu in PC-BLOX 3. Source: Own.

Block units in PC-BLOX 3 are completely *static*. They are also always *placeable* and *breakable*. As observed, many different-shaped blocks are provided, but all occupy one unit of the grid and have the same mechanical behaviour. They are *unmodifiable*, except for the colour choice, and can be rotated to achieve the desired placement.

The *systemic rules* try to mimic real-life gravity, meaning that blocks can't be floating, even if attached to another block. In order to replicate that, PC-BLOX introduces an invisible block type that allows solid, visible blocks to be placed on top of it, and

consequently appear as floating units. The game offers an option to toggle invisible block's visibility to be able to manipulate them. Aside from that, blocks have collisions, meaning that they can't intersect with each other.

The medium presents limitations, with a notably closed off game space of 12x12x8 *block units* in each respective dimension. Such limitations, aside from hardware, may be due to the navigation limits of an isometric perspective and non-existing camera controls, which would not be so user-friendly regarding the perception and manipulation of the space if it were bigger.

Dynamics

Though no gameplay footage is available through online sources, inferences can be made from the researcher's own experience when playing with PC-BLOX3. Since blocks follow gravity rules, any creative process must follow the logic of building from bottom to top. Builds also require more planning in advance, since modifying a block requires the blocks on top to be removed beforehand, meaning that the iteration process between *construction* and *argumentation* phases is more time-consuming than with other systems.

The topics of representation the system offers are varied, though abstract, given the generic block shapes and the provided *colour palette*. However, since *decorative blocks* are detailed representations of real-life elements, these may limit the player's choice of topic for representation.

Conclusion

Despite the software's simplicity, PC-BLOX 3 has proven to be a comprehensive build system with an array of block types and colours, simple yet effective navigation tools and customisation options. Its most unique feature is the imitation of a gravity mechanic with an invisible block type, which serves as support for solid ones.

6.2.2 Minecraft (2011)

Space, mediation, mechanics, rules and blocks

Minecraft is a sandbox game released in 2011, with a procedurally generated world and virtually infinite space. It fosters exploration through resource gathering, crafting, fighting mobs, discovering structures and building. It offers three main gameplay modes: survival, in which players manage a life system; hardcore, like survival, but reaches the endgame if the player ever dies; and creative, in which players have unlimited resources and more freedom of movement.

Minecraft presents the player with a completely *modifiable initial space*, which can be a procedural terrain or flat, composed of block units. The space is in 3D and perceived in 3D, and the player can modify it in all dimensions. The camera is in perspective, from a first-person view, and has no constraints of movement. Intervention is generally direct, except in some cases given that players can intentionally delay actions with functional blocks (redstone).

Figure 24. Screenshot of Minecraft gameplay in creative mode. Source: Own.

Navigation has *non-diegetic* UI components, such as the *item inventory* bar at the bottom of the screen which holds the blocks that are to be immediately used, and the *inventory* and *library of blocks* (if in creative mode) which can hold more blocks. To guide the player in the placement of blocks, a *non-diegetic* cross is placed at the centre of the screen, which points to the block that will be modified.

Block placing and *block breaking*, the *primary mechanisms*, are available with the right click and left click respectively. The left click must be held down until the block breaks, working as a means of sensory feedback. Blocks can be placed anywhere as long as they are in contact with another surface. Minecraft is the prime example, as a voxel-based game, of a *unitary* and *regular grid* as the *secondary mechanism*, as all the blocks in the game take up one block unit. The provided *sub-mechanism*s are, as mentioned in the *meditation* section, an *inventory* to hold the blocks and a *library of blocks* from which to obtain infinite blocks (in creative). Additionally, players can use the mouse wheel button to cycle through the blocks in the *item inventory* bar. The mouse wheel button can also be clicked to *block pic*' the block type the *non-diegetic* cross is pointing at.

Figure 25. Screenshot of Minecraft's block library menu in creative mode. Source: Own.

Block units in Minecraft can be divided into two types: *blocks* and *decorations*. *Blocks* can be defined as a single solid cube unit with 6 faces, whereas *decorative* blocks are those with more intricate geometric shapes. Blocks, regardless of type, are all generally static, except for blocks such as walls, chests, fences and fence gates, iron bars and glass panes. They all change state and connect depending on the block that is annexed to them. All blocks in the world are *placeable*, *breakable*, and *unmodifiable*.

Blocks can be placed against any other surface, which makes them neglect gravity rules. However, some blocks such as sand or gravel do are affected by gravity and will fall once placed. Blocks can't intersect with one another, as they have collisions, except in some cases in which players can use tricks to achieve overlays between blocks and decoration.

Dynamics

Minecraft's blocks, being a 16x16 bit texture, are almost abstract representations of realistic materials, which allow for almost any representation when thought of as textures to paint the world with. Minecraft's blocks, with simplified textures and shapes, can take on any form when set apart from their formal, intended function. Take for instance these representations of a bush in Minecraft. The bushes on the left lean towards abstraction, which can be a deliberate artistic choice made by the creator, compared to the ones on the right. Minecraft has the power of, with just two block units, take on any representation the player imagines.

Figure 26. Showcase of abstraction levels in Minecraft.
Source: Own.

As observed in the gameplay of BdoubleO100 (2024), their goal is to build a futuristic city, roughly following the described creative process.

1. The first stage is to build the roads of the city, which at the same time delimit where the buildings will go.
2. Build miniatures of the buildings, roughly in player size, to plan its unique distinctive features and block types that will be used.
3. Build the framework of the building, or edges of the geometrical shape.
4. Fill in the building with solid cube blocks, using several blocks to combine textures and colours.
5. Add decorative blocks, to both the buildings and the street, by building machines, vehicles, powerlines and several other city elements.

Figure 27. BdoubleO100 planning a pink building in miniature. Source: BdoubleO100, 2024.

In this case, the player is a proficient builder and has a very refined creative process, planning ahead and taking into account artistic choices such as colour theory when choosing blocks to build with. In complex and detailed builds such as these, building is often divided into a *structure building* phase and a *decorative* phase, partly due to the huge variety of blocks the player must hold in their inventory.

Conclusion

Minecraft is characterised by a *unitary* block system, in which all blocks take up one unit. Most of them are *static*, but some have *dynamic* properties, being able to create more interesting shapes. The world is not constrained by generic, *systemic rules*, but rather depends on that particular block's properties: some blocks are gravity-less, whereas some are affected by gravity, some blocks have collisions, and others can be clipped through by using redstone or console commands. The simplified geometry and abstract nature of blocks allows them to be used beyond their formal function, creating many possibilities of representation.

6.2.3 Cities: Skylines (2015)

Space, mediation, mechanics, rules and blocks

Cities: Skylines is a city building game developed by Colossal Order and published by Paradox Interactive, released in 2015. The player is presented with a flat *initial space*, with geographical features such as rivers, which are completely *modifiable*. The space is three dimensional and can be modified in two dimensions since blocks can't be stacked.

The game is perceived in 3D, thanks to a perspective camera, which can be rotated freely and used to zoom in with mouse controls. Most navigation is through *non-diegetic* UI elements, except for *spatial* highlights that signal the block that is to be modified.

Regarding mechanisms, block placement is the default option, while block breaking needs to be toggled with the excavator icon on the bottom right. The system has no grid, as blocks can be placed anywhere, even though the game includes a *spatial grid* element to aid in the placement of roads and residential and commercial blocks.

Figure 28. Road block placing mechanism in Cities: Skylines. Source: Game UI Database.

Regarding block units, Cities: Skylines offers a huge variety in mechanics, given that its focus is to serve a simulation system:

- Roads: Roads are *dynamic* and *modifiable* blocks, which connect together to form road systems. With the help of a *sub-mechanism*, a line can be drawn, and blocks are automatically filled in.
- Residential and commercial: Residential and commercial blocks are *dynamic* and *modifiable*. In this case, intervention is *indirect* as the blocks simply delimit the area in which houses and commerce will grow procedurally with the progress of time.
- Services: Services contain both standalone buildings and network blocks. For instance, a water deposit building is connected to the city through pipe blocks, which are invisible in the standard view mode since they run below the city.
- Monuments and unique buildings: As the name suggests, are unique and standalone, static and unmodifiable blocks, which can be placed manually by the player.
- Terrain: Terrains are, contrarily to the notion of block, modification tools used for the edition of the provided terrain block. That is, elevation, flattening, and hollowing brushes that enable the modification of the mesh of the block.

- Vegetation: Like monuments and unique buildings, they are standalone, static elements that can be placed anywhere, such as trees or rock features. However, vegetation is not ruled by system mimics: they ignore collision rules and can be overlaid.

The system mimics a real city and, since the space can't be modified in the vertical axis, there are no such things as gravity rules. As mentioned before, all elements have collisions except for vegetation elements. The build space is constrained to 720x720 cells, or 5.76 x 5.76 kilometres (given that the game also uses a metric system).

Dynamics

In the case of Cities: Skylines, the blocks are incredibly specialised in modern cities, directing and even limiting the player's topic of representation. However, this does not limit players when coming up with new city concepts, such as player T4rget (2023) building a city with the shape of a ZELDA Triforce.

As it can be observed in the gameplay (T4rget, 2021), the player first plans out the main road network of the city. In this case, the player is trying to achieve a precise, ying and yang, geometric shape, which is why they use dirt roads as if they were doing a technical drawing on the surface. Once satisfied with the geometric proportions, dirt roads are replaced with highway road blocks, and dirt paths that were used as guidelines are erased.

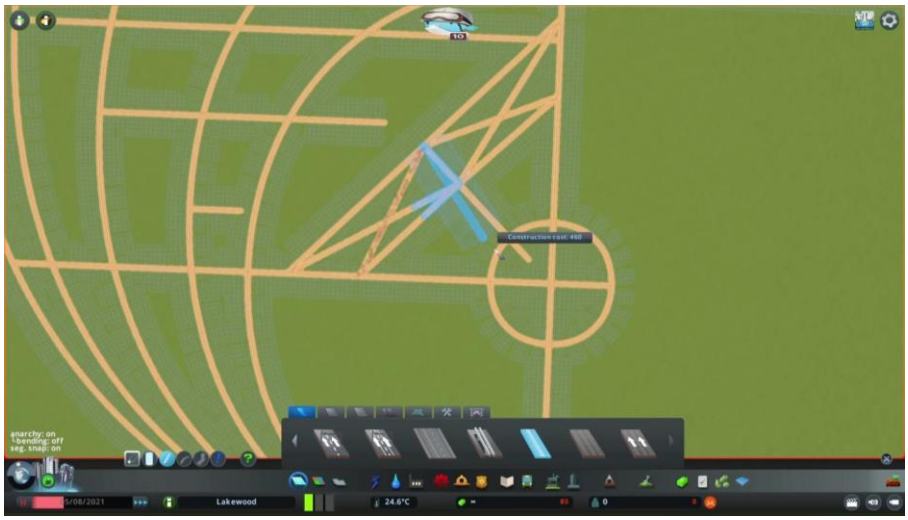

Figure 29. T4rget planning the road system by using dirt road blocks. Source: T4rget, 2021.

Afterwards, they proceed to sculpt the terrain around the road feature, and then place smaller, two-lane roads to subdivide the space before starting to place residential buildings. Once residential buildings are placed, which take most of the space, the player proceeds to place service buildings and leisure areas. The last step in the building process is to build the natural resource and public transportation networks and iterate on previous steps. The final stage is to add landscaping details such as trees or rock features (T4rget, 2021).

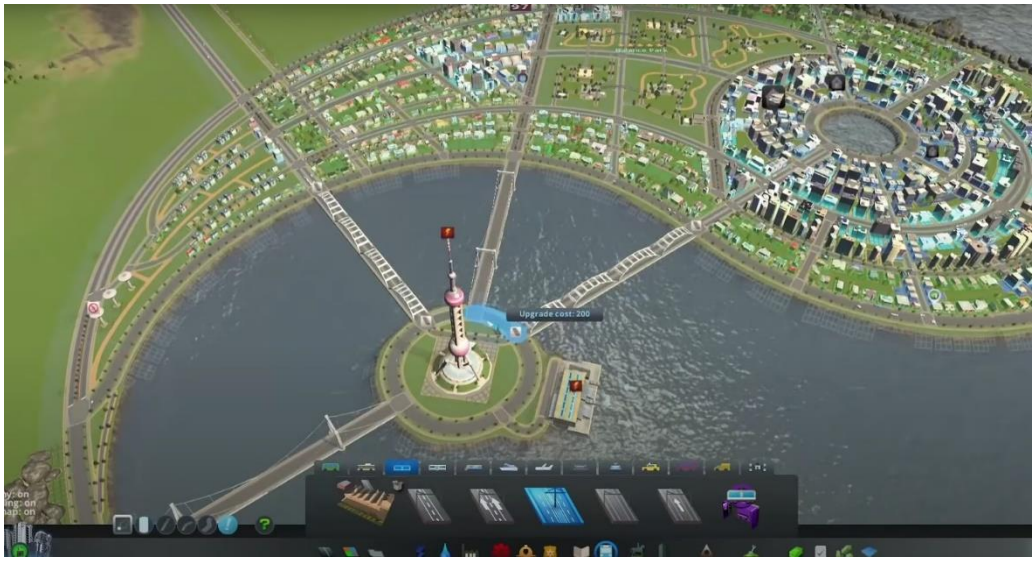

Figure 30. Gameplay of T4rget building their city. Source: T4rget, 2021

Conclusion

Cities: Skylines has proven to be a rather distinct building experience, compared to other games, due to its constrained topic of representation, and ability to build only in two dimensions. Most notably, it is challenging to conceptualise Cities: Skylines under a block classification, since most building elements are dynamic or procedural, or terrain modification tools. Additionally, block placement is directed by the simulation system’s rules, such as a recycling plant requiring to be placed away from residential areas, or water plants requiring a water source.

6.2.4 Animal Crossing: New Horizons (2020)

Space, mediation, mechanics, rules and blocks

Animal Crossing: New Horizons presents the player with a partly modifiable *initial state* that represents the terrain of an island. The *dimensionality* of the space is 3D, but the player's *intervention* is limited to two dimensions in each terrain height.

The game is perceived in 3D, with a perspective camera that follows the player character from a third person view. The camera's rotation is locked, except for the z axis rotation which can be controlled by the player, locking in three positions in order to see things from the front, mid or top-down view.

Figure 31. Example of top-down view perspective. Source: Own.

The *intervention* is *direct*. The building tools the player uses are represented *diegetically*, in the form of a shovel or a pickaxe that the player character holds. Some building tools, such as terrain modification, must be accessed through a *non-diegetic* UI.

Block placing and *block breaking* is made contextual, with the block being placed or broken in the tile adjacent to which the player character is oriented towards. Though invisible, New Horizons has a *regular*, *subdivided grid*. That is, blocks are at least one unit big, and the grid tile is *subdivided* in half.

New Horizons is notably complex in sub-mechanisms:

- Its block selection consists of three mechanisms: the *inventory* from which the player manages the blocks they're holding, the *library of blocks* that can be stored in the house storage, and the *library of unlocked blocks* which can be accessed via the Nook Shop.
- Block creation is achieved through crafting or by purchasing them. Such a crafting mechanism also allows the colours of blocks to be modified.
- An entirely different mechanism from the ones mentioned above is provided for *terrain blocks*, which are an infinite source and don't need to be crafted.

Figure 32. Showcase of terrain block mechanism. Source: Own.

Blocks can be divided into *furniture blocks* (*static*), *vegetation blocks* (*static*) and *terrain blocks* (*dynamic*). They're all *placeable* and *breakable*, and generally *unmodifiable* except for some furniture blocks whose colour and texture can be customised, and the vegetation's growth state which can be locked.

Furniture blocks (static)	Houseware		Any block unit in-game that is not miscellaneous or carpet.
	Miscellaneous		They can be placed on top of houseware elements, and generally take up a single block unit.
	Carpets		They can be placed underneath any furniture or decorations, but carpets cannot overlap other carpets. Carpets can only be placed inside the player's house
	Textures	Wallpaper	Can only be placed on the interior walls of the player's house.
		Floor	Can only be placed on the floor of the player's house.
Vegetation blocks (static	Vegetation grows over time having three different visual states. Players can lock vegetation growth to achieve the desired visual state.		
Terrain blocks (dynamic)	Cliffs	Infinite, dynamic blocks that connect when placed next to each other. Can only be placed on empty grid tiles.	
	Rivers		
	Terrain textures	Default	The set of terrain textures provided by the game behaves dynamically, connecting with adjacent textured terrains.
		Custom	These are textures created by the player and cannot be dynamic.

Table 2. Clasification of block unit types in Animal Crossing: New Horiozons. Source: Own.

The system is not subject to gravity or physics, since the game does not allow blocks to be placed mid-air and it is not possible to build vertically. Blocks have collisions and can't overlay one another. As mentioned before, build height is constrained to three height tiers determined by the terrain. The build space is also limited to the bounds of the island.

Dynamics

The camera and terrain in Animal Crossing: New Horizons generates fascinating dynamics unique to the game. Thanks to the camera's lock position, together with the proper blocks, and different terrain heights, the player can achieve a desired creative representation by creating a visual illusion, coined as *forced perspective* amongst the community (Polygon, 2022).

Figure 33. Example of forced perspective. Source: Polygon.

As mentioned in the previous section, some furniture items allow their colours and textures to be modified. This generates practically infinite possibilities when it comes to topics of representation when players texture panel-like items. In the picture below, it can be observed how the faces of the laundry machines are in fact painted textures. Paired with a closet furniture block behind to give it some depth, it is a perfect example of the dynamics that block texturing can create.

Figure 34. Example of block modification dynamics. Source: User @imotarez on Twitter.

Building in Animal Crossing: New Horizons is generally a tedious process due to the inventory mechanics and player character movement. For that reason, we can see players such as Ferngully Crossing (2024) who put a lot of focus on the *argumentative* phase of design, by planning and imagining beforehand the imagined result, especially when building big areas at a time. In this video (Ferngully Crossing, 2024), the creative process the player follows can be seen:

1. Choose the theme and blocks that will be used.
2. Place the main buildings.
3. Adapt the terrain if necessary.
4. Place terrain textures.
5. Place big vegetation, such as trees, which determine the visual composition.
6. Place furniture blocks and small vegetation to fill the space.
7. Iterate with decorative elements.

Conclusion

Animal Crossing: New Horizons is unique in its 3D space which is limited to 2D modification in each terrain height available, meaning that vertical placement of block units is limited to 3 height tiers. Additionally, it has two completely different building systems, one for furniture and the other for terrain modification.

The camera's z-axis locked rotation and perspective view means that players can overlay objects playing with perspective in order to achieve unique results, since the camera's perspective is always fixed, never breaking the visual illusion.

All in all, it is a much more constrained system than the rest of games presented in this analysis, and yet it does not fail to be challenged by the players to achieve unforeseen creations and topics of representation.

6.2.5 Townscaper (2020)

Space, mediation, mechanics, rules and blocks

Townscaper is a software toy developed by Oskar Stålberg and published by Raw Fury, released in 2021. It presents the player with a completely flat *initial space*, which is *unmodifiable*. It is an entity of its own, and is not composed of *block units*. The space is in three dimensions and *block units* can be placed in three dimensions as well.

Regarding *perception*, the camera is in 3D perspective, since the distance of the block units can be perceived as smaller the further they are from the camera. The player has full control of a free camera. The *intervention* within the world is *direct*, as player actions have an immediate effect on the world.

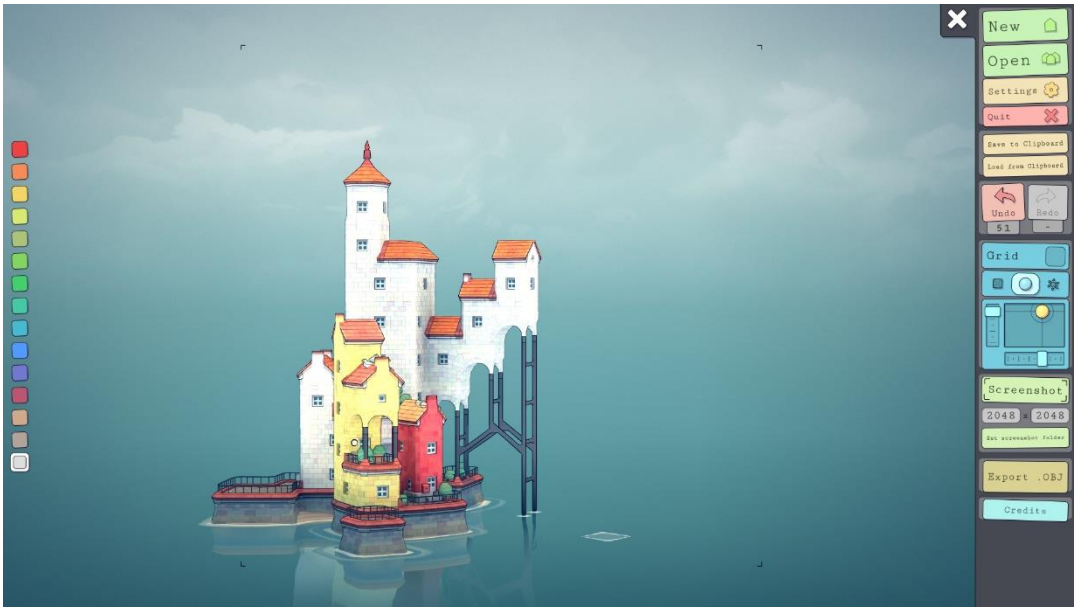

Figure 35. Screenshot of Townscaper's space and navigation. Source: Own.

The *navigation* is very simplified, with a *non-diegetic* sidebar for the selection of colours, and a spatial white silhouette that previews where blocks will be placed as the cursor moves over a unit. Alternatively, players can toggle a *spatial*, permanent grid displayed over the flat space. Additionally, the settings menu offers the user visualisation tools to customise the way the game looks, such as setting the time of day and light direction, toggling shading and toggling textures.

When it comes to *mechanisms*, the *primary* are *block placing* and *block breaking*, which are achieved by left and right mouse click respectively, making up the entirety of gameplay controls. The secondary mechanism is an *irregular unitary grid*, supporting such block placement. That is, a block is equal to a unit of the space.

As *sub-mechanisms*, there is *a palette of colours* on the left side of the user's screen, as described previously, which allows the user to select the colour with which they desire to build. This *sub-mechanism* will be referred to as *colour palette.* If a block placed in the virtual space is clicked with the middle mouse button, the game automatically selects the button of such block. This sub-mechanism will be referred to as *colour picker* and is an addition to the *colour palette* mechanic.

Townscaper does not have blocks per se, but a single unit that is placed by default when the player interacts with the virtual space. It could be argued that colours, instead of being variations of the default unit, make up different blocks, being visually different. However, since all colour blocks share the exact same *dynamic* properties, as in all blocks can take any shape at any time, and connect regardless of colour, we can conclude that Townscaper is entirely made up of a single *dynamic block*, with colour variations, that is *placeable* and *breakable*, and indirectly *modifiable* by the player. Additionally, the *unitary grid* is composed of *irregular* squares, turning every block unit into a different polygonal shape, which is another *indirect modification* tool of the block at hand.

Regarding rules, blocks are not affected by any gravity or physic *mimic* properties. If a block is placed in a structurally challenging position, its *dynamic* modification includes scaffolding and other elements to make it appear as visually supported. That scenario is one of the many *systemic relations* the block of the game is subject to. Blocks do however have collisions and can't overlay one another. There do are limitations of the medium, such as a build height limit of 255 blocks.

Dynamics

Topics of representation in Townscaper are limited, given that there's only one type of block. This implies that a variety of topics of representation is achieved through the scenery lighting, block colours, shape of the build and recurrent use of certain block states, such as propeller block states and scaffold block states in order to achieve a steampunk feel, for instance.

Figure 36. Example of a steampunk-style creation in Townscaper.
Source: @kilter2 in Reddit.

As it can be observed from the gameplay by user ScapeGoat (2022), the player follows the presented creative process:

1. Plan dimension of the build, according to the irregular grid shape.
2. Cover area with one layer of blocks (or two), delimiting the planned area where building will take place.
3. Focus on creating one main structure at a time.
4. Define general shape and size.
5. Add and subtract blocks to achieve a desired dynamic state.
6. Change colour of blocks.

Given the non-existent *mimic* properties, and system dynamics, the system allows for a fast iteration between *constructive* and *argumentative* phases, with plenty of room for mistakes, low need for planning, and highly adaptable to change.

Conclusion

Townscaper is a procedural software toy characterised by a building system entirely made up of a single, *dynamic block*, that is *indirectly modified* by the player when placing more blocks. Additionally, the system is ruled by a *unitary* yet *irregular grid*, meaning that even the placement of the block in the space becomes a modification mechanic. Not being subject to *systemic mimics*, it is the perfect building system for mindless building.

6.2.6 Summerhouse (2024)

Space, mediation, mechanics, rules and blocks

Summerhouse is a small-scale building toy developed by Friedemann Allmenröder and published by Future Friends Games, released in March 2024. The game offers players 4 possible *initial spaces*, with a different nature theme each, all of them *unmodifiable*. Summerhouse's virtual space is in 3D, and *modifiable* in 3D. However, the *perception* of such space is rather different, as the camera is 2D orthographic and can be moved freely in the vertical and horizontal axis, with the ability to zoom in. All *navigation* is composed of *non-diegetic* UI elements, through which players can select the several tools that are offered.

Figure 37. Initial state selection menu. Source: Own.

Summerhouse allows *placing* and *breaking* block units as a *primary*, *core mechanism*, and has a *subdivided grid* since placement is not completely freehand. If vertical and horizontal block placement is simply achieved by dragging the block upwards or sidewards, the scroll wheel is used to determine the depth in which a block will be placed. As part of the *grid mechanism*, there's an automatic snap to the surface when placing blocks one in front of the other.

Figure 38. Screenshot of Summerhouse gameplay. Source: Own.

As *sub-mechanisms*, Summerhouse offers a set of *block library* menus from which to select the block types, being divided into the following categories: walls, roofs, doors, windows, decoration and vegetation. Additionally, there's a search bar, a *block picker*, *block flipper*, *block cycling* function and undo and redo sub-mechanisms available.

Figure 39. Block selection menu in Townscaper.
Source: Own.

Blocks in Summerhouse are entirely *static* but can be *modified* by the player with the flip function, being inverted in the vertical axis. Additionally, the colour of the blocks is different depending on which of the four initial states the player selected, with the colour palette fitting with the environment, meaning that players *indirectly modify* the colour property of the blocks.

Summerhouse is not subject to any *system mimics*: blocks can be placed anywhere, not being affected by gravity, physics or collisions whatsoever. Since all blocks are *static*, it does not possess any *systemic relations* either. It does however have clear medium limitations, in depth, vertical and horizontal building limit, achieved by setting camera bounds.

Dynamics

In the gameplay of player Fixxxer (2024), they player starts by placing big, wall blocks, in order to plan the buildings that will take up the space. They define the depth as well as the height of the building. They also pay attention to textures and colours when placing bigger blocks, to create contrast between buildings. The process is followed by completing the buildings with roof blocks. Afterwards, the focus moves to placing doors, windows, decorations and vegetations in that exact order.

It is notable that this player in particular never opens the *block library* menu, and instead uses the *sub-mechanism* of *block cycling* to go through the available blocks. Therefore, the natural order of the blocks in the game follows the real-life process of building a house, and so does the player. The *block cycling sub-mechanism* is also afforded, in preference to the *block library* menu, as it is mapped to the right mouse button, being intuitive to use.

Given the lack of block collisions, a *dynamic* is created in which players can overlay blocks to create new textures or break up texture consistency. In the gameplay (Fixxxer, 2024), the player brings up the concern of wall textures feeling like a pattern and solves this by placing multiple blocks on top of each other to break up the texture.

This *dynamic* also opens the doors to more topics of representation, or rather aesthetics, beyond the blocks offered in the game. This can be achieved with a combination of overlaying of blocks, choice of the *initial state*, and lighting choice. Take, for instance, this example of a cyberpunk-style street, achieved with the *initial state* of a cityscape, night lighting, heavy use of pipes and corrugated metal blocks, and overlay of decoration blocks and windows to create visual details particular to a cyberpunk aesthetic.

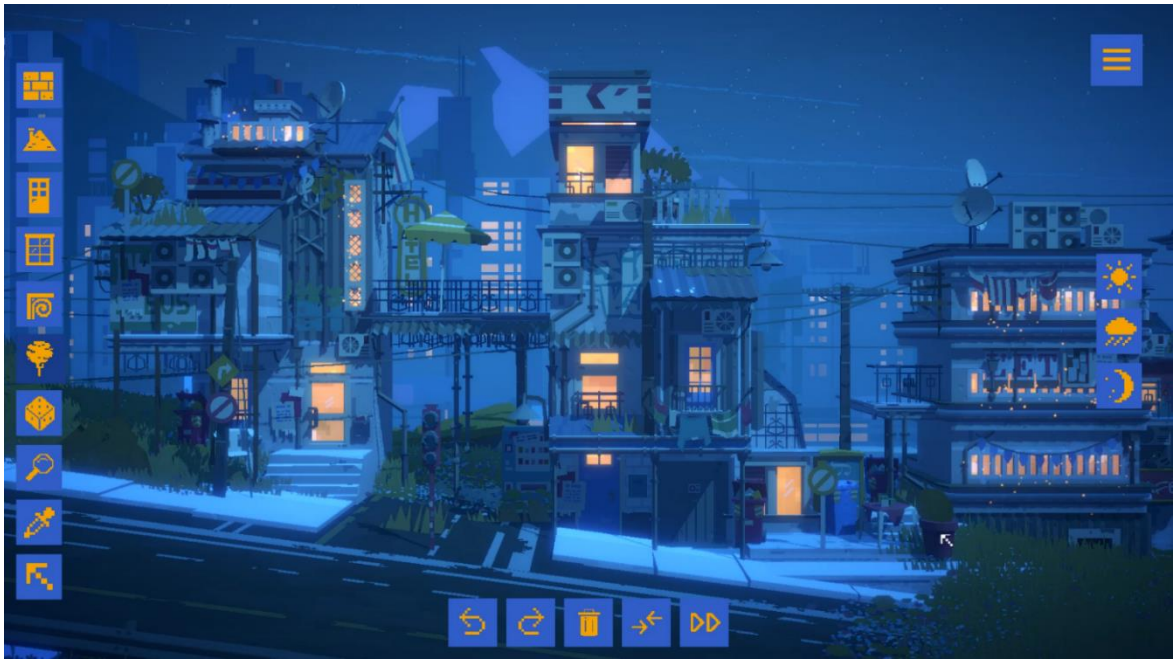

Figure 40. Example of a cyberpunk aesthetic in Townscaper. Source: Own.

Conclusion

Summerhouse is a software toy unique to many other building games since the *perceived space* is two dimensional but can be *modified* in three dimensions. Unlike other games, blocks have no physical collisions, meaning that they can be overlaid to achieve new shapes and textures. Blocks are also subject to player modification by inverting them, but the colour of all the blocks themselves is also modified depending on the *initial state* the player chooses. Most notably, Summerhouse can be played without the need of a *block library* menu, given the intuitive use of a *block cycling sub-mechanism*.

6.2.7 Enshrouded (2024)

Space, mediation, mechanics, rules and blocks

Enshrouded is an open-world, co-op survival game with a voxel-based building system, developed by Keen Games GmbH and released in 2024. It introduces the player to a modifiable initial space, composed of a terraneous world designed for an exploration and RPG experience. The space is and can be *modified* in three dimensions.

The player *perceives* such space in 3D, with a perspective camera in third person. *Intervention* in the building system is always *direct*, as player actions have an immediate effect on the world. The *navigation* of the system occurs in big part *non-diegetically*, mainly because of its complexity, as it has an *inventory bar* which holds the blocks and various settings of the tools. A very important *spatial* element is the blueprint overlay, representing the block group that is about to be placed, which appears blue if the block can be placed and red when it cannot. The overlay also indicates to which face the new block is placed against. The player also has visual, diegetic feedback of the animations for when a block is being placed or broken.

Figure 41. Building gameplay in Enshrouded. Source: Gamespot.

Block placing and *block breaking* is controlled with left and right mouse click respectively, being clearly the main action. Such actions are restricted by a *unitary*, *regular grid*, characteristic of voxel games. Additionally, Enshrouded offers a *snapping sub-mechanism*, undo action, block rotation, move block forwards and move block backwards functions, simplifying the manipulation of the 3D space.

Blocks units in Enshrouded are either *blocks* or *block decorations*. Blocks are 1x1 units, and are *dynamic*, visually merging with each other when connected, whereas decorations are standalone, *static* blocks. Such 1x1 blocks can be a single block or a ramp block, and they have the same palette of materials.

Figure 42. Ramp blocks in Enshrouded. Source: Chiselchip, 2024.

The players use *blueprint* pieces, which are groups of blocks that can be placed with a single action. These *blueprints* can be used for both placing and destroying blocks, and can be 2x2 wall panels, 2x3 stairs, inverted stairs, etc. This makes building, specially planning grand structures, more straightforward, while allowing a single unit to be small enough for added detail to the build. These *blueprints* work with any block type. In other words, *blueprints* are geometric information to which a block type is assigned.

Figure 43. Blueprint menu in Enshrouded. Source: Chiselchip, 2024.

Though it has a realistic aesthetic, Enshrouded does not have gravity or physics, since any block can be placed as long as they are annexed to another surface. However, they do have clear collision rules (except for decorations), as blocks can't be placed if they don't meet the required conditions. Restriction to building area is exceptionally tight, only being able to build inside the radius of a Flame Altar. Such item can be placed up to 8 times in the world, habilitating a build space of up to 160x160x160 block units. This is due to the areas not bound inside a Flame Altar being reset to the initial game state every 30 minutes. This is a case in which we see other mechanic systems of the game constraining the *building system*, not limitations of the medium.

Dynamics

In their house building video gameplay, Chiselchip (2024) sometimes places a temporary block mid-air to gain an advantageous position from which to observe and *argument* on the build. Chiselchip also defines a "decorating and trimming stage" in their own building process, in which they build over the building shell to add volume and depth to the structure with pillars, beams and trims.

In this gameplay from SmittySurvival (2024), their process in building a Hobbit-inspired house can be observed. The first stage is to create the hill in which the house will be inserted. The player then builds the outer walls and decorates the exterior. The interior of the house is done afterwards, first by hollowing the stone, then placing floor and walls, and finishing with the furnishing blocks.

Since decoration blocks such as windows can be overlaid, a *dynamic* is created in which the player overlays window panels to create more intricate window frame. This helps the window fits the circular shape the player is trying to achieve.

Figure 44. Building of a circular window in Enshrouded. Source: SmittySurvival

Conclusion

Enshrouded is unique from other games since it considers blocks (excluding decorations) as geometric shapes, which have 1x1 cubes as the fundamental unit, being able to adopt any of the material textures thanks to their dynamic nature. This means that most of the time the player is placing block groups, made up of smaller fundamental blocks, and modifying such block groups, creating a rather distinctive creative process.

In this case study, we also see how, despite the building system providing ample tools for creativity, it is restrained in space by other mechanic systems that dominate the genre of the game.

6.3 Analysis review

The digital spaces of all the analysed building games exist in three dimensions, even if they are *perceived* or can only be *modified* in two dimensions. Those which were limited to a 2D space of modification (Animal Crossing: New Horizons and Cities: Skylines) were limited in the Z axis. However, they did do have blocks of different heights with which the player can play with to achieve variety in verticality.

All games had cameras which could be controlled in some way or another, except for PC-BLOX, which was completely static. Those who had a limited rotation were Summerhouse, given that it has a 2D camera, and Animal Crossing: New Horizons, which locks the rotation in 3 positions, creating unique *dynamics*. Generically, cameras tend to be in 3D and fully controllable for the player to have a better spatial perception, especially if the space of modification is three dimensional.

Primary core mechanisms are present in all the games. Many make *block placing* and *breaking* the main game action, and are mapped to mouse controls, while some others make *block placing* the default action and *block breaking* a toggled option. *Secondary core mechanisms* are also characteristic, except for Cities: Skylines, which does not have a grid, and Summerhouse, whose *grid subdivision* is practically free hand. Townscaper is the only instance of irregular grid amongst the analysed games. However, most of the available building games in the market are voxel-based, meaning that *regular*, *unitary grids* are the most common type of secondary mechanisms.

Sub-mechanisms are varied but typically include some *non-diegetic* menu to navigate the available *block library* or *block palette*, and some control-mapped *sub-mechanisms* such as *block pickers*, *colour pickers* and *block cycling* function.

Block units are diverse in every single system, and perhaps the hardest attribute to formalise in one framework. However, a conclusion can be reached: if games have a *grid mechanism*, blocks tend to be to be *unitary* or proportional to the basic unit of dimension, whereas games without grid tend to have irregular blocks. Or rather, if there is no grid, blocks have no need to comply with a unitary system.

All games overlook *system mimics* of real-life properties such as gravity, in favour of creative freedom, except for PC-BLOX 3 which, as one of the first attempts at the digitalisation of building games, came up with a unique design workaround. It is also frequent for blocks to ignore collisions, which makes possible the creation of unique textures and shapes.

Finally, the most relevant and common observation of *dynamics* is that, if the system allows it, players tend to favour a creative process that contains some form of planning step, by placing temporary blocks, starting from bigger blocks, or drawing the layout. This leads to a faster iteration between *argumentation* and *construction*.

7. Conclusions

7.1 Consolidation of knowledge

One of the goals of this project was to delve deeper into building systems as a unique type of play, transcending the knowledge of LEGO as the standardised analogue building toy and Minecraft as the building videogame of the decade. This was achieved by researching history on building toys and games, how they compare to a design process, a unique tool for creative expression entailing a unique and challenging form of player motivation, and the different ways in which they can be represented in video games.

Before this research it was believed that building games, especially analogue, were a form of *paidia*. However, as it was discussed, when a system is put in place for the systematisation of creativity, this play type is considered *ludus*, meaning that undirected building in itself may be *paidia*, but building games are most definitely *ludus*.

Building video games started as software tools that replicated LEGO, and eventually sprawled into bigger worlds thanks to voxel technology, hence why they started as open-ended games, without defined goals, and later became systems, part of other genres. Nowadays, we find building games in dollhouse-like games, social sims, open-world survival games and simulation games. In recent years, the cultural tendency of slow gaming has drawn interest to software building toys, which include procedural blocks, making them a mindless yet satisfying creative experience.

Though largely undiscussed from a design standpoint within game studies, building games can be understood as a digital *magic circle*, in which the presented *game state* is modified one and only by the player through the manipulation of the space. Such manipulation is achieved through the use of blocks (*nouns*) which are subject to the system’s rules (*grammar*) and systemic relations (*adjectives*).

Though one may think these systems present limitations, due to systematised digital rules which do not necessarily exist in a physical environment, it is limitation itself that creates a challenge for the player and incentivises divergent thinking, a problem solving that transcends those of puzzles, leading to unpredictable results. In fact, it is established and simplified rules that democratise creativity, facilitating the choices of creative expression. At the same time, the more one exerts their mind with a rule system, the more adept they'll become to its use. This makes building systems an incredibly unique artistic tool, with a low entry barrier while allowing room for its mastering, as players iterate between *argumentation* and *construction* phases.

Still, player experiences in building games are largely different, as each individual player seeks their own goals, fantasies and purposes to explore within the limitations and capabilities of the system. It has been determined how, more often than not, current player motivation models fail to describe *free building* or creation altogether.

Although this research has explored the notion of toy, the conclusion is to refer to this type of player experience *building games*. A standalone building experience may very well be a toy, but most of the time building is one of the many mechanic systems within a game. This implies that, in practice, building cannot be analysed as a standalone element, and rather is a system that contributes to the experience of a complete *building game typology*. Given that, nowadays, building exists within games of many different, industry-established genres, this research will refrain from calling building a *game genre* and rather a *game typology*.

Through the development of a framework for the empirical analysis of building games, an analysis was performed on radically different examples, which revealed the similarities and differences between such systems of play. Building games all have as a base *core mechanics* of *placing* and *breaking blocks*, as the most accessible and primary controls, which are generally supported by a *grid* that rules placement of *block units*, be it visible or not, *regular* or not, or *unitary* or *subdivided*.

Building games, though often conceived in 3D, can exist in 2D *perception* spaces and 2D *intervention* spaces, proof of that being Summerhouse and Animal Crossing: New Horizons respectively.

Block units, the main character of building systems, are unique in video games since they can be *dynamic*, unlike in analogue pieces, changing state according to annex blocks and player's design choices. They can also be subject to *systemic rules*, overlooking real-life physical constraints, and systemic relations between blocks which create unexpected behaviours. However, the dimension of the digital space will inevitably be constrained, in more or less capacity, due to software limitations or constraints from other mechanic systems in the game.

7.2 Next steps

Though this research opened a new door for a field of study, there is still much to be comprehended regarding building games, both horizontally and vertically, and looking towards the future of the games industry.

Horizontally, it would be of interest to analyse as many game examples as possible, to challenge the bounds of building systems and iterate on this very framework, for no definition of game type has even been complete and safe from the scrutiny of evolution.

Newly released games, such as The Legend of Zelda: Tears of the Kingdom, include core mechanisms of a building system (block breaking and block placing). Even if building is not intended as the main system of mechanics, the sole existence of core mechanisms is enough for players to turn the game into a playground. Such edge cases are especially interesting since their potential is brought to light thanks to UGC.

Vertically speaking, the framework could be expanded with more fields of analysis such as block unit size in relation to the player or visual properties of blocks, such as level of detail and abstract versus realistic representations. Functional blocks, which can automatise player actions and even aid in building (for example, redstone in Minecraft),

were mentioned yet not taken into account in the analysis, since they're not present in many games. Such blocks can't be categorised as dynamic, since their own state doesn't change despite affecting surrounding blocks. This means that a new typology of block would need to be defined to include them. Another undefined method of space intervention are terrain modification tools, as observed in Cities: Skylines or Enshrouded. Given that they modify an unplaceable and unbreakable terrain element, they need to be considered as a new form of *game space* modification aside from blocks.

An interesting step up would be to define a framework of analysis, or rather a design guideline, for every typology of building game, which as the research suggests can roughly be divided into sandbox, simulation systems, software toys, and digital dollhouse. This would require a previous phase of standardisations of such sub-typologies.

Additionally, further research would benefit from an expanded analysis of gameplay. Dynamics are a result of a user's unique interaction with the system, meaning that there are as many dynamics as players. This would certainly open doors to unique and unexplored creative uses of the building system. Moreover, the study of dynamics can be complemented with the analysis of *satisficing* (as proposed by Fischer et al. (1989)), and the *codes for creativity* proposed by Rahimi et al. (2002).

The end goal of this research would be to spread the use of the term of *building games* and *building systems*, as a substitute for terms such as *LEGO-like* or *Minecraft-like*, to describe these types of player experiences.

8. References

8.1 Bibliography

Aarseth, E. (2003, May). Playing Research: Methodological approaches to game analysis. *Proceedings of the Digital Arts and Culture Conference*. https://doi.org/10.7238/a.v0i7.763

Ackermann et al. (2009). *Defining systematic creativity*. LEGO Foundation. http://davidgauntlett.com/wp-content/uploads/2013/05/LEGO_LLI09_Systematic_Creativity_PUBLIC.pdf

Ackermann et al. (2010) *Defining systematic creativity in the digital realm*. LEGO Foundation. http://www.legofoundation.com/en-us/research-and-learning/foundation-research/

Adams, Ernest W. (2014). *Fundamentals of construction and simulation game design*. New Riders.

Amabile, T. M., & Gitomer, J. (1984). Children's Artistic Creativity: Effects of Choice in Task Materials. *Personality and Social Psychology Bulletin*, *10*(2), 209–215. https://doi.org/10.1177/0146167284102006

Apperley, T. H. (2006). Genre and game studies: Toward a critical approach to video game genres. *Simulation & Gaming*, *37*(1), Article 1. https://doi.org/10.1177/1046878105282278

Arsenault, D. (2009). Video Game Genre, Evolution and Innovation. *Journal for Computer Game Culture*, *3*(2), Article 2.

Bartle, R. (1996). Hearts, clubs, diamonds, spades: Players who suit MUDs. *Journal of MUD research*, 1(1), 19. https://www.researchgate.net/profile/Richard-Bartle/publication/247190693_Hearts_clubs_diamonds_spades_Players_who_suit_MUDs/links/540058700cf2194bc29ac4f2/Hearts-clubs-diamonds-spades-Players-who-suit-MUDs.pdf

Bateman, C., Lowenhaupt, R., & Nacke, L. E. (2011, September). Player Typology in Theory and Practice. In *DiGRA conference* (pp. 1-24). https://www.researchgate.net/profile/Chris-Bateman-5/publication/265450412_Player_Typology_in_Theory_and_Practice/links/5639d91e08ae4624b7601a8a/Player-Typology-in-Theory-and-Practice.pdf

Bertolotti, T. (2017). *Legosofia: Apologia filosofica del Lego*. Melangolo.

Bowman, N. D., Kowert, R., & Ferguson, C. J. (2015). *The impact of video game play on human (and Orc) creativity*. In G. P., Green,J. C., Kaufman(Ed.), Video games and creativity. (pp. 39–60). Cambridge, Massachusetts: Academic Press / Elsevier. https://doi.org/10.1016/B978-0-12-801462-2.00002-3

Bremer, M. (1990) *SimEarth User Manual*. Maxis. https://oldgamesdownload.com/wp-content/uploads/SimEarth-Manual-DOS.pdf

Buerkle, R. (2014). Playset Nostalgia: LEGO Star Wars: The Video Game and the Transgenerational Appeal of the LEGO Video Game Franchise. Wolf, M. J. (Ed.). (2014). *LEGO studies: Examining the building blocks of a transmedial phenomenon* (pp. 94-119). Routledge. https://www.routledge.com/LEGO-Studies-Examining-the-Building-Blocks-of-a-Transmedial-Phenomenon/Wolf/p/book/9780415722919

Caillois, R. (2001). *Man, play, and games* (Barash, M., Trans.) University of Illinois Press. (Original work published 1958)

Canossa, A., Martinez, J. B., & Togelius, J. (2013). Give me a reason to dig Minecraft and psychology of motivation. *2013 IEEE Conference on Computational Intelligence in Games (CIG)*, 1–8. https://doi.org/10.1109/CIG.2013.6633612

Cipollone, M., Schifter, C. C., & Moffat, R. A. (2014). Minecraft as a Creative Tool: A Case Study. *International Journal of Game-Based Learning*, *4*(2), Article 2. https://doi.org/10.4018/ijgbl.2014040101

Clark, N. (2022, January 28). *Animal Crossing New Horizons design illusions to inspire your island build—Polygon*. Polygon. Retrieved 3 June 2024, from https://www.polygon.com/22906555/animal-crossing-new-horizons-design-ideas-item-illusions

Cox, Matt. (2022, November 28). *Plop down cities in Gourdlets' free demo, a Townscaper-like with cute visitors*. *Rock Paper Shotgun*. https://www.rockpapershotgun.com/plop-down-cities-in-gourdlets-free-demo-a-townscaper-like-with-cute-visitors

Cook, R. T., Bacharach, S. (Eds.). (2017). *LEGO and philosophy: Constructing reality brick by brick* (First edition). Wiley Blackwell.

Csikszentmihalyi, M., & Csikzentmihaly, M. (1990). *Flow: The psychology of optimal experience* (Vol. 1990, p. 1). New York: Harper & Row.

Engelstein, G., & Shalev, I. (2022). *Building Blocks of tabletop game design: An encyclopedia of mechanisms*. CRC Press. https://www.routledge.com/Building-Blocks-of-Tabletop-Game-Design-An-Encyclopedia-of-Mechanisms/Engelstein-Shalev/p/book/9781032015811

Fagerholt, E., & Lorentzon, M. (2009). *Beyond the HUD-user interfaces for increased player immersion in FPS games*. https://www.researchgate.net/publication/277202228_Beyond_the_HUD_-_User_Interfaces_for_Increased_Player_Immersion_in_FPS_Games

Fernández-Vara, C. (2019). *Introduction to game analysis* (Second edition). Routledge. https://www.routledge.com/Introduction-to-Game-Analysis/Fernandez-Vara/p/book/9780815351849

Fischer, G., McCall, R., & Morch, A. (1989). Design Environments for Constructive and Argumentative Design. *Human Factors in Computing Systems (CHI'89)*, 269–275. https://doi.org/10.1145/67450.67501

Fischer, G., & Girgensohn, A. (1990). End-user modifiability in design environments. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems Empowering People - CHI '90*, 183–192. https://doi.org/10.1145/97243.97272

Fullerton, T. (2024). *Game design workshop: A playcentric approach to creating innovative games* (Fifth edition). CRC Press, Taylor & Francis Group.

García, R. (2023). *Juguetes en la Era Digital: Rol de los Juguetes Digitales en el Diseño de Videojuegos para Niños* (Treball de fi de Grau, Tecnocampus, Catalunya). https://repositori.tecnocampus.cat/handle/20.500.12367/2349

Gauntlett, D. (2014). The LEGO System as a tool for thinking, creativity, and changing the world. Wolf, M. J. (Ed.). *LEGO studies: Examining the building blocks of a transmedial phenomenon* (pp. 159-171). Routledge. https://www.routledge.com/LEGO-Studies-Examining-the-Building-Blocks-of-a-Transmedial-Phenomenon/Wolf/p/book/9780415722919

GDC. (2019, September 3rd). *A Deep Dive into the 12 Motivations: Findings from 400,000+ Gamers* [Video]. Youtube. https://www.youtube.com/watch?v=gxJUPfKtg_Q

Giddings, S. (2014). Bright Bricks, Dark Play: On the Impossibility of Studying LEGO. Wolf, M. J. (Ed.). *LEGO studies: Examining the building blocks of a transmedial phenomenon* (pp. 190-200). Routledge. https://www.routledge.com/LEGO-Studies-Examining-the-Building-Blocks-of-a-Transmedial-Phenomenon/Wolf/p/book/9780415722919

Guilford, J. P. (1956). The structure of intellect. *Psychological Bulletin*, 53(4), Article 4. https://doi.org/10.1037/h0040755

Grace, L. (2005). *Game type and game genre*. https://www.researchgate.net/publication/262250061_Game_Type_and_Game_Genre

Gray, Kate. (2021, March 18). *Townscaper Is An Idyllic Toy-Like Game That'll Melt All Your Worries Away. Nintendolife*. https://www.nintendolife.com/news/2021/03/townscaper_is_an_idyllic_toy-like_game_thatll_melt_all_your_worries_away

Heintz, S., & Law, E. L.-C. (2015). The Game Genre Map: A Revised Game Classification. *Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play*, 175–184. https://doi.org/10.1145/2793107.2793123

Hewitt, K. (2001). *Blocks As a Tool for Learning: A historical and contemporary perspective*. *Young Children*, *56*(1), 6–14.

Iversen, S. M. (2005, June). Challenge balance and diversity: Playing the sims and the sims 2. *In Proceedings of DiGRA 2005 Conference: Changing Views–Worlds in Play*. Vancouver, Simon Fraser University.

Jenkinson, H. (2006). *Convergence culture: Where old and new media collide*. New York University Press.

Jeon Kim, Y., & J. Shute, V. (2015). Opportunities and Challenges in Assessing and Supporting Creativity in Video Games. In *Video Games and Creativity* (p. .99-117). Elsevier. https://www.sciencedirect.com/book/9780128014622/video-games-and-creativity

Kim, A. J., Koster, R., & Kim, S. (2018). *Game Thinking: Innovate Smarter & Drive Deep Engagement with Design Techniques from Hit Games*. gamethinking.io. https://books.google.es/books?id=7wXItwEACAAJ

Kücklich, J. (2002, June). The Study of Computer Games as a Second-Order Cybernetic System. *Proceedings of the Digital Arts and Culture Conference*.

Landay, L. (2014). Myth Blocks: How LEGO Transmedia Configures and Remixes Mythic Structures in the Ninjago and Chima Themes. Wolf, M. J. (Ed.). (2014). *LEGO studies: Examining the building blocks of a transmedial phenomenon* (pp. 51-68). Routledge. https://www.routledge.com/LEGO-Studies-Examining-the-Building-Blocks-of-a-Transmedial-Phenomenon/Wolf/p/book/9780415722919

Lastowka, G. (2012). Minecraft as Web 2.0: Amateur creativity and digital games. In *Amateur Media* (pp. 153-169). Routledge.

Lauwaert, M. (2008). Playing outside the box – on LEGO toys and the changing world of construction play. *History and Technology*, *24*(3), 221–237. https://doi.org/10.1080/07341510801900300

Lazzaro, N. (2009) Why we Play: Affect and the Fun of Games. Sears, A., & Jacko, J. A. (Eds.). *Human-computer interaction. Designing for diverse users and domains*. CRC Press. https://www.routledge.com/Human-Computer-Interaction-Designing-for-Diverse-Users-and-Domains/Sears-Jacko/p/book/9781138115057

Lee, J. (1997). Design Rationale Systems: Understanding the Issues. *IEEE EXPERT*, *12*(3), Article 3. https://doi.org/10.1109/64.592267

Lloyd, B., & Howe, N. (2003). Solitary play and convergent and divergent thinking skills in preschool children. *Early Childhood Research Quarterly*, *18*(1), Article 1. https://doi.org/10.1016/S0885-2006(03)00004-8

Marsh Davies. (2012, November 10). *Blockbuster - the making of Minecraft*. PCGAMER. https://www.pcgamer.com/the-making-of-minecraft/

McGregor, G. L. (2007). *Situations of Play: Patterns of Spatial Use in Videogames*. DiGRA Conference. http://dl.digra.org/index.php/dl/article/view/315

Melián Díaz, D., Saorín, J. L., Carbonell-Carrera, C., & De La Torre Cantero, J. (2020). Minecraft: Three-dimensional construction workshop for improvement of creativity. *Technology, Pedagogy and Education*, *29*(5), 665–678. https://doi.org/10.1080/1475939X.2020.1814854

Montes, R. M., & Campbell, A. A. (2013). Dismantling the Digital Dollhouse: Will Wright's *The Sims* and Virtual Consumption. *Quarterly Review of Film and Video*, *30*(1), 41–49. https://doi.org/10.1080/10509208.2010.544980

Moran, T. P., & Carroll, J. M. (Eds.). (1996). *Design rationale: Concepts, techniques, and use*. L. Erlbaum Associates.

Mørch, A. I., & Thomassen, I. (2016). From Wooden Blocks and Lego to Minecraft: Designing and Playing with Blocks to Learn in a 3D Virtual World. *CoPDA 2016: Cultures of Participation in the Digital Age, (1776),* 61-67. https://ceur-ws.org/Vol-1776/

Morton, Lauren. (2024, February 6). *This Townscaper-like building game on 'the dark side of cozy' is the perfect lock screen photo designer*. *Pcgamer*. https://www.pcgamer.com/this-townscaper-like-building-game-on-the-dark-side-of-cozy-is-the-perfect-lock-screen-photo-designer/

Morton, Lauren. (2024, January 18). *Townscaper's developer on how its 'radically casual' design is inspiring a new wave of low-stress builders to adapt the blueprint*. *Pcgamer*. https://www.pcgamer.com/townscapers-developer-on-how-its-radically-casual-design-is-inspiring-a-new-wave-of-low-stress-builders-to-adapt-the-blueprint/

Navarro, V. (2015). Diseño de juegos orientado al jugador. Daniel Aranda. (Ed.). *Game & Play: diseño y análisis del juego, el jugador y el sistema lúdico* (pp. 37-79). Editorial UOC. https://www.editorialuoc.com/game-play

Navarro, V. (2016). *Libertad Dirigida: Una gramática del análisis y diseño de videojuegos*. Shangrila Ediciones. https://shangrilaediciones.com/producto/libertad-dirigida/

Navarro, V. (2020) Meditaciones. Modos Zen, contemplación y lentitud en el videojuego. Navarro, V. (Ed.). *Pensar el juego: 25 caminos para los Games Studies*. Shangrila Ediciones. https://shangrilaediciones.com/producto/pensar-el-juego/

Nguyen, J. (2016). Minecraft and the Building Blocks of Creative Individuality. *Configurations*, *24*(4), 471–500. https://doi.org/10.1353/con.2016.0030

O'Connor, Alice (2020, July 1). *Lovely town-building toy Townscaper is out in early access*. Rock Paper Shotgun. https://www.rockpapershotgun.com/lovely-town-building-toy-townscaper-is-out-in-early-access

Paulk, C. (2006). Signifying Play: The Sims and the Sociology of Interior Design. *The International Journal of Computer Game Research*, *6*(1). https://www.gamestudies.org/0601/articles/paulk

Piaget, J. (1952). *Play, Dreams And Imitation In Childhood*. W W Norton & Co. https://www.taylorfrancis.com/books/9781136318030

Prensky, M. (2001). Simulations: Are they games. *Digital game-based learning*, *9*(5), 1-6.

Rahimi, S., Walker, J., Lin-Lipsmeyer, L., & Shin, J. (2022, June). In Pursuit of Creativity in Minecraft: A Mixed-Method Approach. *International Society of Learning Sciences Conference*. International Society of Learning Sciences conference, Online. https://www.researchgate.net/publication/362609886_In_Pursuit_of_Creativity_in_Minecraft_A_Mixed-Method_Approach

Ralph, P., & Wand, Y. (2009). A Proposal for a Formal Definition of the Design Concept. In K. Lyytinen, P. Loucopoulos, J. Mylopoulos, & B. Robinson (Eds.), *Design Requirements Engineering: A Ten-Year Perspective* (Vol. 14, pp. 103–136). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-92966-6_6

Salen, K., & Zimmerman, E. (2004). *Rules of play: Game design fundamentals*. MIT Press. https://mitpress.mit.edu/9780262240451/rules-of-play/

Salter, B. (2011). *Building Toys: Bayko and other systems*. Osprey Publishing Ltd.

Savina, M., Eggert, B. M., Bidwell-Steiner, M., Reininghaus, S., & Burger, F. (2020). *The Sims: Digital Puppets and the Afterlife of a Dollhouse*. https://doi.org/10.25819/ubsi/5623

Sawaya, N. (2014). LEGO: The imperfect art tool. Wolf, M. J. (Ed.). *LEGO studies: Examining the building blocks of a transmedial phenomenon* (pp. 206-215). Routledge. https://www.routledge.com/LEGO-Studies-Examining-the-Building-Blocks-of-a-Transmedial-Phenomenon/Wolf/p/book/9780415722919

Schut, K. (2014). The virtualization of LEGO. Wolf, M. J. (Ed.). *LEGO studies: Examining the building blocks of a transmedial phenomenon* (pp. 190-200). Routledge. https://www.routledge.com/LEGO-Studies-Examining-the-Building-Blocks-of-a-Transmedial-Phenomenon/Wolf/p/book/9780415722919

Shores, T. (2017). Building Blocks of Thought: LEGO® and the Philosophy of Play. In W. Irwin & R. T. Cook (Eds.), *LEGO® and Philosophy* (1st ed., pp. 17–26). Wiley. https://doi.org/10.1002/9781119194033.ch2

Sicart, M. (2008). Defining Game Mechanics. *The International Journal of Computer Game Research*, *8*(2). https://www.gamestudies.org/0802/articles/sicart

Sicart, M. (2014). *Play matters*. The MIT Press. https://mitpress.mit.edu/9780262534512/play-matters/

Sousa, M., Zagalo, N., & Oliveira, A. P. (2021). Mechanics or Mechanisms: Defining differences in analog games to support game design. *2021 IEEE Conference on Games (CoG)*, 1–8. https://doi.org/10.1109/CoG52621.2021.9619055

Stenros, J., & Montola, M. (2024). *The rule book: The building blocks of games*. The MIT Press.

Thompson, C. (2016, April 14). The Minecraft generation. *The New York Times Magazine*. https://www.nytimes.com/2016/04/17/magazine/the-minecraft-generation.html

Tseng, T., & Resnick, M. (2012). Building examples: Media and learning affordances. *Proceedings of the 11th International Conference on Interaction Design and Children*, 176–179. https://doi.org/10.1145/2307096.2307119

Wittgenstein, L. (1968). *Philosophical Investigations* (Anscombe, G. E. M., Trans.) Basil Blackwell Ltd. (Original work published 1953) https://static1.squarespace.com/static/54889e73e4b0a2c1f9891289/t/564b61a4e4b04eca59c4d232/1447780772744/Ludwig.Wittgenstein.-.Philosophical.Investigations.pdf

Wolf, M. J. (Ed.). (2014). *LEGO studies: Examining the building blocks of a transmedial phenomenon.* Routledge. https://www.routledge.com/LEGO-Studies-Examining-the-Building-Blocks-of-a-Transmedial-Phenomenon/Wolf/p/book/9780415722919

Wolf, M. J. (2014). The Cultural History of LEGO. Wolf, M. J. (Ed.). *LEGO studies: Examining the building blocks of a transmedial phenomenon* (pp. 19-29). Routledge. https://www.routledge.com/LEGO-Studies-Examining-the-Building-Blocks-of-a-Transmedial-Phenomenon/Wolf/p/book/9780415722919

Wright, W. (2006, April 1). Dream Machines. *Wired*. https://www.wired.com/2006/04/wright-2/

Yee, N. (2015). *Quantic Foundry's Gamer Motivation Modell*. Quantic Foundry. Retrieved 1 June 2024, from https://quanticfoundry.com/#motivation-model

Yee, N. (2005, January). Motivations of play in MMORPGs. *In Proceedings of DiGRA 2005 Conference: Changing Views: Worlds in Play*. http://dl.digra.org/index.php/dl/article/view/239

Zubek, R. (2020). *Elements of Game Design*. MIT Press. https://mitpress.mit.edu/9780262043915/elements-of-game-design/

8.2 Ludography

2D Boy (2008). *World of Goo* (multiple platforms) [Videogame]. 2D Boy.

Ahola, Perttu (2010). *Minetest* (multiple platforms) [Videogame]. Minetest Team.

AuntyGames (unreleased). *Gourdlets* (multiple platforms) [Videogame]. AuntyGames, Future Friends Games.

Barth, Z. (2009). *Infiniminer* (Windows) [Videogame]. Zachatronics Industries.

Bay 12 Games (2006). *Dwarf Fortress* (multiple platforms) [Videogame]. Bay 12 Games.

Colossal Order (2015). *Cities: Skylines* (multiple platforms) [Videogame]. Paradox Interactive.

Crandall, C. M. (1867) *Crandall's building blocks* [Toy].

Crandall, C.M. (1870) *Wide-Awake Alphabet Blocks* [Toy].

Crane, D., Gold, R. (1985). *Little Computer People* (multiple platforms) [Videogame]. Activision.

Epic Games (2017). *Fortnite* (multiple platforms) [Videogame]. Epic Games.

Facepunch Studios (2006). *Garry's Mod* (multiple platforms) [Videogame]. Valve.

Favaro, Peter J. (1986). *Alter Ego* (multiple platforms) [Videogame]. Activision.

Fisher. H. (1944) *Kiddicraft* [Toy]

Friedemann (2024). *Summerhouse* (multiple platforms) [Videogame]. Future Friends Games.

Gryphon Software Corporation (1996). *Gryphon Bricks* (multiple platforms) [Videogame]. Gryphon Software Corporation.

Hartman, E. et al. (2007). Blockland (Windows) [Videogame]. Step 1 Games LLC.

Hornby, F. (1901) Meccano [Toy].

Iron Gate Studio (2021). *Valheim* (multiple platforms) [Videogame]. Coffee Stain Publishing.

Keen Games GmbH (2024). *Enshrouded* (multiple platforms) [Videogame]. Keen Games GmbH.

M2H (2010). *Cubelands* (multiple platforms) [Videogame]. M2H.

Maxis (1989). *SimCity* (multiple platforms) [Videogame]. Electronic Arts.

Maxis (1990). *SimEarth* (multiple platforms) [Videogame]. Maxis.

Maxis (2000). *The Sims* (multiple platforms) [Videogame]. Electronic Arts.

Mojang Studios (2011). *Minecraft* (Multiple platforms) [Videogame]. Mojang Studios.

Nintendo (2020). *Animal crossing: New horizons* (Nintendo Switch) [Videogame]. Nintendo.

Nintendo (2023). *The Legend of Zelda: Tears of the Kingdom* (Nintendo Switch) [Videogame]. Nintendo

Ole Kirk Christiansen (1958) LEGO [Toy]. Lego Group.

Oskar Stålberg (2021). *Townscaper* (multiple platforms) [Videogame].

Pounce Light (2024). *Tiny Glade* (multiple platforms) [Videogame]. Pounce Light.

Qube Software (2003). *Lego Digital Designer* (multiple platforms) [Videogame]. Qube Software.

Richter, F. Ad. (1899) Anchor Blocks [Toy] F. Ad Richter and Co.

Roblox Corporation (2006). *Roblox* (multiple platforms) [Videogame]. Roblox Corporation.

Siedhoff-Busher, A. (1923) *Bauspiel blocks* [Toy].

Sierra (1991). *Jones in the Fast Lane* (multiple platforms) [Videogame]. Sierra.

Square Enix (2016). *Dragon Quest: Builders* (multiple platforms) [Videogame]. Square Enix.

Tompkins, Ernest E. (1934) *Bild-O-Brick* [Toy] Rubber Specialities Company Inc.

Vic Slade Software (1993). *PC-BLOX 2* (DOS) [Videogame]. Vector Space.

Vic Slade Software (1998). *PC-BLOX 3* (DOS) [Videogame]. Vector Space.

Voids Within (2024). *Dystopika* (multiple platforms) [Videogame]. Voids Within, UNIKAT Label.

8.3 Gameplay references

BdoubleO100. (2024, March 31). *Minecraft Hermitcraft: Level 3*. [Video]. Youtube. https://www.youtube.com/watch?v=F6Yo9U6v-S0

Chiselchip. (2024, April 13). *Enshrouded: Building a Small Medieval House*. [Video]. Youtube. https://www.youtube.com/watch?v=BHbSq-MGPYA

Ferngully Crossing. (2024, January 2). *Able Sisters + Museum Yards* | *Speed Build* | *No Terraforming Island* | *ACNH*. [Video]. Youtube. https://www.youtube.com/watch?v=8he1zXikbqY

Fixxxer. (2024, March 8). *Summer House—Little town shops*. [Video]. Youtube. https://www.youtube.com/watch?v=o25op2R0KiA

T4rget (2021, March 22). *I Built a City Using Geometry* | *Cities: Skylines Timelapse Build* | *Port of Yin-Yang*. [Video]. Youtube. https://www.youtube.com/watch?v=6P3LB7L0TbE

T4rget. (2023, January 19). *I Built ZELDA in Cities: Skylines!* | *Triforce Town Timelapse Build*. [Video]. Youtube. https://www.youtube.com/watch?v=ESkYGUXc4vU

ScapeGoat. (2022, January 30). *Townscaper ASMR: 2 Hours of Building Session 39*. [Video]. Youtube. https://www.youtube.com/watch?v=MYi7iyMWWlg

SmittySurvival. (2024, February 12). *THE BEST Game For Building Hobbit Homes*. [Video]. Youtube. https://www.youtube.com/watch?v=Msgd_bL7cYo