Megadungeon: A Model for Media Complexity

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Abstract   The essay aims to propose the diagrammatic structure of the megadungeon as a metaphor to represent the complexity, interconnectedness, and multi-layered nature of the current media scenario, including its active branches such as new media art and Digital Humanities. The reference is drawn from the concept of the dungeon, which has been successfully introduced into the realm of role-playing games since the 1970s. Conventionally, a dungeon refers to a complex, multi-level maze of corridors, tunnels, rooms, and hidden chambers. The nature of dungeons is to be theoretically infinite floor plans that game designers have learned to produce algorithmically: when they cross a certain size threshold, they are known as megadungeons. In this article, I propose the megadungeon as a productive topological model that intersects different sociotechnical aspects of digital media, drawing on shared characteristics such as a layered structure, labyrinthine exploration, game-derived grammar, and an affinity with computational domain. Additionally, the essay proposes comparisons with similar representation models that challenge outdated cartographic metaphors and addresses specific connections between new media and the concepts of verticality and stratification.

Keywords   New media art. Dungeon. In-game worldbuilding. Digital media. Geology of media.

Summary   1 What Expendable Space? On the Geological Production of the Dungeon. – 2 A Postmodern Dungeon. – 3 Digital Crawling. – 4 Stacked and Vertical, a Diagrammatic Application.

1   What Expendable Space? On the Geological Production of the Dungeon

In an article a few years ago, Patricia Reed (2019) used as a starting point the famous song and attraction *It's a Small World*, a Disney powerhouse that debuted at the 1964 New York World's Fair. Based on an optimistic view of the spatial and cognitive reductions caused by globalization, she argued that the idea of the world becoming smaller and more manageable is an oversimplification. Instead, sixty years later, time has unfolded to reveal increasingly powerful global images, which have replaced the closeness once promised by the then-new telecommunication technologies with an immense vastness and multidimensional complexity. As Reed argues, it is now impossible to think in terms of 'small worlds': "the seemingly harmless expression obfuscates the ill-reasoned assumption that heightened interconnectivity yields proximity and closeness," leading to an unprecedented "big-world condition of coexistential *nth* dimensionality".[1]

The 'dimensionality' produced by the use of communication technologies has shifted the focus to the consistency of those infrastructures, real or imagined, that form the vectors of the trajectory. These infrastructures can self-generate and interconnect through what can be described as machinic intelligence (Johnston 2008), traversing various disciplines such as computer science, arts, logistics, and economics. In essence, what initially seemed central to the process – close interaction – has now been overshadowed by its growing spatiotemporal sophistication.

When Actor-Network Theory (ANT) began to emerge in the 1990s as a way of representing social theory, discussing human and non-human actors and the construction of infinite agencies through their connections, it drew attention to complexity, mobility, and continuous production (Law, Hassard 1999; Latour 2005). These connections no longer seemed to evoke a solid and compact dimension, and the mere existence of a network necessitated questioning a 'space in which to be produced' (Murdoch 1998; November, Camacho-Hübner, Latour 2010). Perceptually, these relational spaces should be vast, numerically inconceivable, and multidimensional, presenting an image far from that of a small world. The 'spatial turn' in the humanities, underway since the late 1980s (Falkheimer, Jansson 2006; Warf, Arias 2009), has championed this perspective, reworking the insights of the Marxist geographer Henri Lefebvre in *The Production of Space* ([1974] 1991), as interpreted by Edward Soja (1989; 1996,

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[1] The purpose of Reed's article is to propose a scale-based framework for addressing themes such as ubiquitous computing and the technological impact on the terrestrial environment.

53-82). Soja's 'postmodern geographies' announce a revision of Lefebvre's triadic dialectic (perceived, conceived, and lived spaces), including a proper 'thirdspace', a space that is at once real and imagined, offering an alternative to both subjectively perceived space and the objectively and conventionally abstract space of cartography. In the thirdspace, representation is turned upside down: it is no longer the human theoretical effort attempting to recreate the perimeters of the real, but rather cultural representations themselves creating new collective, asymmetric, symbolic spaces, "radically open to additional otherness, to a continuing expansion of spatial knowledge" (Soja 1996, 61).

This spatial turn also impacted media studies, envisioning spaces of representation as a subset of communication theories that continually contest their own limits (Falkheimer, Jansson 2006, 7), exemplified by developments such as wireless networks, mobile Internet, and smart cities. As Reed (2019) writes, navigation is a "synthetic operation", in which different spaces must be associated. For instance, navigating through cities entails a continuous symbolic interaction with the urban environment, mediated by mobile apps or digital advertisements. Similarly, engaging in location-based games or augmented reality experiences blurs the line between the 'real' city and its 'represented' counterpart (Leorke 2019).

Today, it is easy to associate imaginary dimensional spaces and active participation with gaming-related scenarios (Nicholls, Ryan 2008; Günzel 2019). Shortly after Soja's clarifications, Espen Aarseth pioneered research in this domain, applying Lefebvrian structuring to video games to achieve what his work "Allegories of Space" (2001) suggests: an in-game spatial resolution of the aesthetic-allegorical moment (Günzel 2019). However, with the proliferation of virtual open worlds, massively multiplayer online role-playing games (MMORPGs), and sandboxes, traditional rules for representing these spaces are becoming less relevant. This shift is further amplified by increasing connections to the real world through gamification, sensory applications, micropayment economies, blockchain, and secondary markets. Viewing video games as mere allegories is no longer enough (Fraser 2011). Stephan Günzel, analysing Nelson Goodman's *Languages of Art* (1968), argues that games, despite their lack of 'the flesh of reality', must become a symmetrical representation of the theory of space, thus giving them a 'thirdspace' position that can be grasped through lived experience. In this perspective it is indifferent to recognize certain spaces as 'real' or 'false', while it is essential to consider them as cultural products (Günzel 2019, 171-4). The actual question might be more probing: when digital game experiences step out into the outside world, do they encounter anything other than an additional layer influenced by playful, digitally hybrid and cross-linked areas? This seems to be the message of those game-like

spaces that organise data within a spatialised sensorium, incorporating a layering of reality. Sometimes this interplay is *a priori*, as in the arrangement of information typical of MMORPGs ironically adopted as an explanatory model by Wikipedia – arguably the most famous crowdsourced public database. Drawing inspiration from alternate reality games, the most active contributors have created a page that equates the satisfaction derived from compiling pages to completing quests in role-playing games:

> Wikipedia has an immersive gameworld with 46,459,720 players and 6,743,683 unique locations, including 69,542 undiscovered secret areas, 38,745 fully excavated dungeons, and 6,398 legendary dungeons. Magical items and powers can be found scattered over these locations, whose navigation is aided by maps of the game world.[2]

This analogy reimagines users as players, and articles as dungeon locations, categorizing them into undiscovered areas (orphaned articles), fully explored dungeons (good articles), and legendary dungeons (featured articles), employing a system where experience points and levelling up serve as gameplay mechanics linked to article editing. Sometimes, this crossover occurs *a posteriori*, as seen in recent RPGs integrating links to web3 payment systems tied to personal wallets, or backend APIs that interact with the outside world. An early example is the video game *Diablo II* (2000), where legendary items from endlessly generated dungeons were sold on grey market platforms like eBay, creating a direct link between in-game gold farming and its commodification in real-world markets (O'Brien 2016; Stein 2021).

The purpose of this essay is to propose a diagrammatic representation of today's new media space, utilizing a culturally rich and playful object that can be understood through its numerous interconnected layers. This 'object' is the dungeon, a key element in the role-playing tradition: an often-subterranean maze-like topological model capable of symbolizing – through its theoretically infinite and self-generating nature – much more than a specific adventure space. Its larger counterpart, the megadungeon, effectively describes the 'total complexity' of an ever-expanding and evolving digital environment composed of creative activities, interacting media, operational passages, and layers of information (Graham 1998). The continuous stratification – a reiteration closely related to the concept of 'inner infinitude' which Hans Scheuerl associated with the unending recursion of ludic

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2 The page can be accessed at "Wikipedia: *Wikipedia* is an MMORPG", `https://en.wikipedia.org/wiki/Wikipedia:Wikipedia_is_an_MMORPG`; see also McGonigal 2011, 229-32.
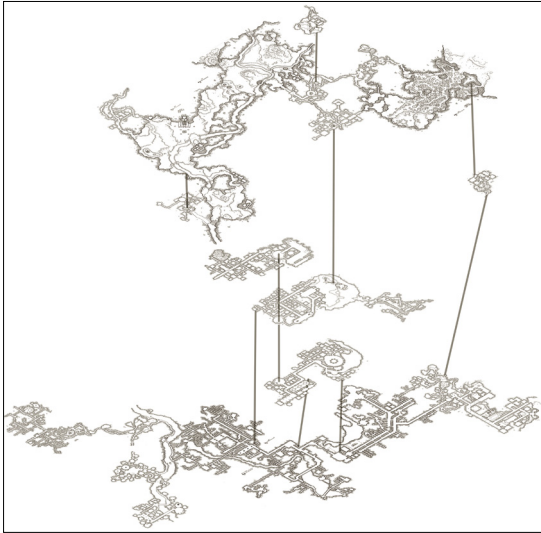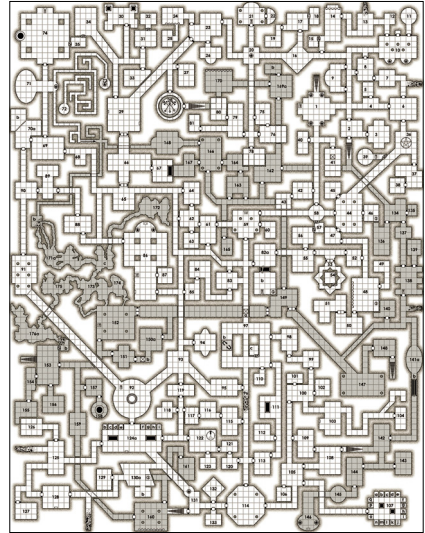
structures (Scheuerl 1954; quoted in Kwastek 2015, 76) – is precisely what gives it this character of vastness, justifying the use of the prefix 'mega' and contrasting with more Disneyesque small worlds **[figs 1-2]**.

The megadungeon aims to present itself as a third-spatial ecumenopolis; an imaginative representation of the infrastructure that constitutes our techno-cultural world; an "abstract geology" – to quote Robert Smithson (1968), one of the land artists who deeply understood the theoretical idea of excavation. In this, no politics of space applies, except for the infinite production of layers. The 'where' of the megadungeon, then, is necessarily dependent on the dimensions brought by technologies: every hertz on this planet has the potential to create new worlds, and every collaborative media project spawns new disciplines, artworks, worldbuilding, and personas. Thus, if the spatial mapping of contemporary techno-cultural production (and its associated data) is inadequate for distinguishing its elements, one might consider the concept of a diagrammatic fantasy game architecture as an arbitrary yet generative construct.

According to Johan Huizinga, it is *homo ludens* ([1938] 1949), not *homo faber*, who is primarily responsible for the recent development of human society. Huizinga mostly reflected on the pre-social nature of play, underpinning art, war, and religious rituals. However, he could not have foreseen how, in the latter half of the twentieth century, an intensified focus on games would significantly influence

education, interaction design, public services, and lead to a shift from play being perceived as a purely childish domain to encompassing a wide range of gamified experiences.[3] Echoing Roger Caillois' notion of "play without a game" (1961), the megadungeon of the ubiquitous computing era remains permeated by the Huizinghian play-behavior. The ubiquity of games has transformed our culture – and the spaces that give rise to it – into a deterritorialized space of engagement. A space that can only be understood by adding and connecting, rather than limiting, especially in a postmedia condition where "no single medium is dominant; instead, all the different media influence and determine each other" (Weibel 2012).

2 A Postmodern Dungeon

The success of the term 'dungeon' is attributed to the famous pen-and-paper role-playing game *Dungeons & Dragons* (hereinafter referred to as *D&D*), which was launched in 1974 by Gary Gygax and Dave Arneson. *D&D* differed significantly from the preceding generation of modern tactical wargames, which were based on strategic thinking influenced by chess and inspired by the nineteenth century Prussian tradition. Gygax and Arneson, hobbyists from the American Midwest area, drew from the historical wargames the concept of generating randomness through dice, the use of maps, and a focus on combat, but they matured these elements over decades of fantastical visions and readings, heavily influenced by the English medieval revival (G. MacDonald, C.S. Lewis, J.R.R. Tolkien) absorbed into American mass culture. This shift moved away from the 'science of armies' to an emphasis on solitary and Romantic heroes, transforming the game into a realm of imagination, storytelling, and player immersion (Peterson 2012; Laycock 2015). The dungeon is a crucial element of the game's functional aspect and its main adventure scenario, typically extending underground. Its interconnections, tunnels, vastness, uncertain boundaries, scalar level system, and the inexplicable presence of treasures contribute to making it a postmodern product in its abstract relationship to space (where does it extend, what architectural principles support it, how it was constructed?) and time (when was it built, what are the biographies of its inhabitants?). The dungeon is both scientifically – referring to the architectural functionality that derives from the logical-mathematical moment of miniature placement in wargames – and fantastically plausible as a literary product. Our megadungeon, unlike its regular counterpart,

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[3] For a deeper investigation of fantasy role-playing games as an object of popular culture through Huizinga's lens, see the introductory chapter of Laycock 2015.

extends beyond the boundaries of the game's 'magic circle' (Huizinga 1949; Waskul, Lust 2004) and bleeds into reality. While retaining its layered and networked structure, it merges with various disciplines, technologies, images, and data, to capture the ever-changing landscape of contemporary digital creativity. In his description of the megadungeon in the paper-based tradition of *D&D*, John Harris (2020) offers a flexible definition that can be applied to concepts of vastness and complexity beyond the game's scope:

> The word 'Dungeon' in the title of the game refers to what is now termed a megadungeon. It is not just the place where the orcs terrorizing town are hiding out, or where the drow base their assaults on the surface world, or where the mind flayers sit and brood. It is where all these things happen but is much more than any of those things. It is a huge space, stretching far down into the earth, its depths unplumbed, its age and origin beyond mortal knowledge. It is an archetypal setting, a meta-place. (69)[4]

An infrastructure well-suited for storytelling and random generation of monsters, objects, and challenges emerged as Arneson established the original dungeon in *Blackmoor* – the first and most widely imitated setting of *D&D*, which has become its archetypal topographic model. Between 1971 and 1972, adapting the rules of two previous wargames (*Braunstein* and *Chainmail*), the initial campaigns of *Blackmoor* came to life in the dungeons of the eponymous castle. These dungeons were presented as a distinct entity detached from the surface, extending downward in a labyrinthine map of six levels, each offering an incremental level of challenge (Peterson 2012, 64-71). As the characters delve into their quest to confront the malevolent wizard, they are not merely exploring a multi-level underground architecture; they are actively engaged in crafting an entire worldbuilding experience. Utilizing a volumetric and multi-level procedural approach, this experience has the potential for infinite expansion in both time and space. Arneson himself observed an increasing preference for subterranean settings (Svenson 2007), likely attributable to the prolonged and steady assimilation of the underground notion in modern times (Williams 2008). The concept of excavation as a usable space played a significant role in emphasizing the underground's importance in the advancement of modern technology – what Lewis Mumford (1934) called 'paleotechnics'. Additionally, the development

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[4] The term megadungeon is a common expression in the field of role-playing games. It refers to an extremely vast dungeon that can be crafted either by human agency, as in pen-and-paper dungeon crawlers, or by machines, as seen in procedurally generated digital ones (Hancock 2000).

of subways and the emergence of bunker culture during the Cold War further highlighted the significance of subterranean spaces. It could even be argued that the basements of urban middle-class neighbourhood in the United States, where hobbyists often gathered, contributed to this association.

'Dungeon' is an architectural term derived from the French *donjon*, which referred to a fortified tower used for both defensive and residential purposes, typical of the early Middle Ages, especially in Norman culture. In contrast to its later interpretation influenced by role-playing games, the term originally denoted something characterized by verticality, standing tall on the surface, not located underground. The shift towards a downward connotation likely arose from a linguistic evolution and extended use among Anglo-Saxon speakers, where 'dungeon' came to refer to an oubliette, or an underground or lower fortified prison at the base of the tower. This definition gained prominence in the novels of the eighteenth and nineteenth centuries as a counterpart to the Enlightenment values that favoured the clarity of heights, as seen, for example, in Samuel Taylor Coleridge's 1798 poem *The Dungeon*, which portrayed prisons as sources of mental distortion. The descent into the unknown and into the depths of the Self, mirroring the regressive stairs of the psyche, ties into a broader Romantic motif that includes the high fantasy revival of myths and the idea of the solitary hero. In role-playing games, this progression leads players towards a deeper identification with their characters, in contrast to the abstract role of commanding an army in wargames. Gygax and Arneson's inspirations were infused with the postmodern practice of blending past and present influences. The dungeon appears in Tolkien's works, most notably in *The Hobbit*, with its networks of tunnels beneath the Misty Mountains, the Halls of Moria, and the "endless dungeon" – as the author describes it – of Angband, but it is also present in the 'weird tales' of Conan the Barbarian, which Arneson loved, and in other more recent media, such as horror films like *House of Dracula*, set in a multi-level recess beneath the vampire's mansion (Boggs 2018). Among the influences from the mass culture of the time, they also brought in a mathematical affinity, derived from the 'science of war' in wargames and the burgeoning computer industry of the time. Contrasting with the narrative aspect, this 'algebraic' element manifests not only in the game's necessary calculations, like dice rolls, skill checks for combat, grid-based movement, and level progression, but also in the practice of 'dungeon crawling' (the continuous exploration and delving into the dungeon) immediately establishing a natural connection with the digital realm.

3   Digital Crawling

Shortly after *D&D*'s debut, programmers began creating digital versions of similar role-playing games. As of the early 2020s, the game design tropes that evolved from these origins remain dominant, with countless video games featuring key elements such as levelling, skill acquisition, character customization, and environmental interaction: "*D&D* helped create video games; video games almost destroyed *D&D*; and now video games were leading people back to *D&D*" (Ewalt 2013, 183).

This highlights the megadungeon as a spatial metaphor relevant to an environment shaped by digital cultures, with the practice of crawling symbolizing the intricate expansion of the thirdspace through interaction. On the other hand, the term 'crawling' also evokes the meticulous and detailed approach required to explore and chart dungeons, spread across rooms, corridors, passages, geometries.

The success of *D&D* quickly united communities of enthusiasts who had access to sufficiently powerful and flexible computer systems in universities or research centres. These passionate individuals began developing their own amateur versions of dungeon crawling (Barton, Stacks 2019; Harris 2020; Craddock 2021). *D&D*'s two primary features, the narrative-driven theatrical aspect (the adventure) and the arithmetic-mechanical dungeon exploration (crawling, battling, levelling, and looting), evolved into distinct yet equally successful subgenres: while the first drew inspiration from literary adventures, targeting adolescents as seen in gamebooks but also in the experimentation with hypertext in the 1960s, the latter showcased the procedural, expansive essence of the dungeon, revealing its inherently algorithmic nature (Reed 2023, 27-31). These amateur video games began appearing as early as 1975 on PLATO (Programmed Logic for Automatic Teaching Operations), which was the first generalized computer-assisted instruction system, initially developed by the University of Illinois, confirming the Midwest's central role in this story. PLATO comprised remote terminals connected to a central mainframe, allowing multiple users to access a wide range of learning resources, instructional materials, and collaborative tools. Despite its educational purpose, it was also used to develop small algorithmic dungeons for *D&D* devotees to simulate dungeon crawling sessions.[5] The programming language, straightforward and well-suited for graphics, facilitated this process.

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[5]   While this might appear curious today, it is essential to consider how the early versions of *D&D* heavily emphasized arithmetical mechanics, including randomization effects on items and creatures.

The first known computer role-playing game (CRPG), initially disguised as a program for the Population and Energy Group, was named *pedit5* and later renamed *The Dungeon* (Harris 2020, 363-9; Reed 2023, 63-73). Its purpose was simple: digitally streamline the experience of dungeon crawling, which involved traversing rooms and corridors, fighting the creatures that inhabit them, and improving character stats. The mechanization of the dungeon also occurred from a semiotic perspective, utilizing icons made available by the system: the hero, the monster, the treasure chest... initiating a process of visually reducing the dungeon architecture to its underlying substructures. Soon after, an updated version was programmed, known succinctly as *dnd* (also referred to as *The Game of Dungeon*). This version featured gameplay and character development enhancements, placing the player in a multi-level dungeon with seemingly unlimited replayability. As Aaron A. Reed notes, this design emphasized the game's longevity:

> By the end of 1976, according to Dirk Pellett, Whisenwood Dungeon had claimed the virtual lives of over 100,000 characters. If this number is accurate, it's a telling testament to *dnd*'s addictiveness, since only a few thousand PLATO IV terminals existed in the world – some of which were presumably still used for teaching, on occasion. (70)

The addictive nature of the game was undoubtedly fuelled by the engaging gameplay, which kept players deeply involved, but it also had something to do with the setting of the dungeon itself. The dungeon's verticality, more than other topographies, perfectly captured the thrill of delving into a dark, libidinal world. To confirm the importance of the gameplay mechanics, as advanced as PLATO was for the mid-1970s, its graphics alone could not create the game's ambiance, so that what could be described as the underground culture of the dungeon was not experienced through visual aesthetics but through its raw mathematical procedures.

Still crafted in an amateurish manner, a later spin-off of *pedit5* was *Orthanc* (1978). This game was notable for introducing rudimentary multiplayer features and a self-generating dungeon that reconfigured itself every 180 days (70). *Moria* (1975), on the other hand, was the earliest 3D wireframe CRPG with a first-person view, a highly advanced game for its time: featuring large and dynamic maps, multiplayer capabilities, and a variety of interactions, with worldbuilding extending beyond the dungeon's limits (Barton, Stacks 2019, 42-9). Shortly after, *Beneath Apple Manor*, for Apple II (1978) **[fig. 3]**, popularized pure procedural dungeons, focusing on the crude collection of statistics and numbers for the crawling aspect. This determination to push the 'generativeness' of the dungeon to its extreme consequences eventually led to the birth of the new subgenre called

Figure 3 *Beneath Apple Manor*. 1978. The Software Factory. Apple II, screenshot by Chester Bolingbroke, *CRPG Addict*. https://crpgaddict.blogspot.com/2012/12/game-79-beneath-apple-manor-1978.html. Courtesy of the Chester Bolingbroke
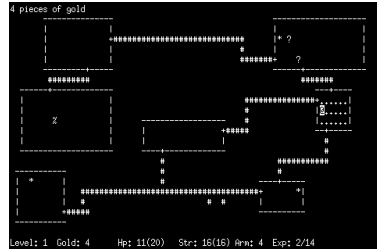
Figure 4 *Rogue*. 1980-82. BSD Unix, screenshot by Thedarkb. Creative Commons 4.0

'roguelike'. The name derives from a subsequent game: *Rogue* (1980) **[fig. 4]**, freely playable on multiple platforms and highly successful, but, in fact, its foundations can be traced back to *Beneath Apple Manor* (Garda 2013). According to David Craddock, who has meticulously reconstructed the history of these 'dungeon hacks', this was essentially a process of convergent evolution, through which different organisms, not necessarily informed by one another, developed common traits in response to the environment (Craddock 2021, 1-9). Without the latter knowing the former (Bolingbroke 2012), *Beneath Apple Manor* and *Rogue* did just that, and they did it in an identical way, presenting a paroxysmal but apparently necessary depiction of the dungeon. During the era of the graphical revolution in gaming, the success of roguelikes, characterized by their extreme focus on procedurally generated abstract maps and mechanical complexity, with no interest in aesthetic embellishment, is a unique phenomenon that deserves consideration. As mentioned earlier, the graphical construction was extremely simple: in a top-down view, rooms revealed themselves as the player moved from one to the next, with characters, monsters, and objects represented simply as small, coloured squares. This subgenre achieved incredible success, reaching its peak between the late 1980s and the early 1990s (with the most renowned titles being *NetHack* in 1987, *Angband* in 1990, inspired by Tolkien's fortress dungeons, and *Ancient Domains of Mystery* in 1994) and still thriving to this day (Harris 2020).

The definition of a roguelike, a topic of debate for decades, was finally formalized at the 2008 International Roguelike Development Conference. During the event, a list of nine high-value and six low-value factors was established to define the genre's canon (Berlin Interpretation 2008); key factors include "random environment generation" and "complexity", along with a sub-definition for dungeons as

"levels composed of rooms and corridors". While interesting observations can be made about various strategies for proceduralization or randomization – such as cellular automata, generative grammar, genetic algorithms, and hybrid approaches (Van der Linden, Lopes, Bidarra 2014; Parker 2017; Viana, Dos Santos 2021) – the crucial point here is recognizing the dungeon as a site for specific hidden criteria of complexity, tied to the thematic symbolism of the underground. The megadungeon merges a literary symbol of an irrational and non-Euclidean subconscious with the 'Cartesian grids' referred to in Berlin's roguelike interpretation, forming its precise mechanics. This combination evokes an undefined, non-linear temporal moment, blending the digital automated productivity with the pre-modern archetype of the cave – as seen in the subterranean adventures of Ludvig Holberg's *Niels Klim's Underground Journey* or Jules Verne's *Journey to the Center of the Earth*, or with the living subterranean entity in Conan Doyle's tales of Professor Challenger, which Deleuze and Guattari discuss in their "geology of morals" (Deleuze, Guattari 1987, 39-74). In the roguelike *Ancient Domains of Mystery* (1994), for example, the overworld map remains fixed, while procedural generation occurs only once the hero descends into the dungeon, embodying how the theoretical movement of the dungeon within the earth is represented by its own architecture, an inherently original symbolic space.

4 Stacked and Vertical, a Diagrammatic Application

In fields like critical design theory, media studies, and contemporary art, metaphorical representations of vertical and interconnected spatiality have become increasingly prevalent since the postmodern era **[fig. 5]**. As society has embraced radical informatization, conceptual forms have evolved to encapsulate the 'precision of complexity'. For instance, the multi-level architectures of megalopolises and the sharp geometries in modern cities appear to embody and rationalize a densely complex array of forms. At the same time, as Lev Manovich has observed, a notable shift has occurred in our visual culture: from the twentieth century's focus on cinema, which unfolds through the narrative of moving images, to the database, a system characterized by its organizational capabilities:

> After the novel, and subsequently cinema, privileged narrative as the key form of cultural expression in the modern age, the computer age introduced its correlate – database. Many new media objects do not tell stories; they don't have a beginning or an end; in fact, they don't have any development, thematically, formally or otherwise, which would organize their elements into a sequence. Instead, they are collections of individual items, where every item has the same significance as any other. (Manovich 1999, 80)
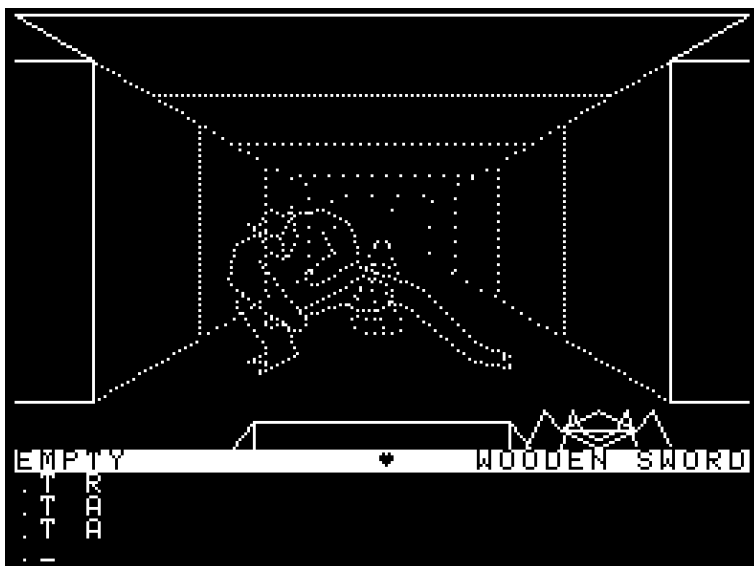
In the same way that Erwin Panofsky saw linear perspective as the symbolic form of the modern era, Manovich proposes the database as the symbolic form of the computer era, describing it as "a new way to structure our experience of ourselves and of the world" (81). This definition alone sufficiently encompasses the potential space of the 'mega', defining the structural framework of the experience within a world dominated by the digital. However, the parallels extend further: the focus on mechanics, as opposed to poetic narration, is also prevalent in roguelikes, which are typical digital artifacts that prioritize the structured organization of databases. Furthermore, Manovich's reference to objects that do not tell stories and have no beginning or end echoes the idea of "non-modality" as defined in the Berlin Interpretation of roguelike games, implying that actions like movement, battle, and item collection can be consistently performed at any time and place on the map, similar to the way data is managed in databases.

From an ANT perspective, Levi R. Bryant (2012) even identifies the game construct of *D&D* as exemplary in representing complex relational networks of actors, including layers, objects, stats, weapons, and dungeon inhabitants. In these networks, everything is active, nothing is passive, production and contamination are constant. In the proposed megadungeon model, these agencies of continuous modification are replicated at each level and intersection, such as

in the corridors leading to higher or lower levels, allowing nomadic pathways to expand. Curtis Carbonell, in his writing "Tabletop Role-Playing Games, the Modern Fantastic, and Analog 'Realized' Worlds" (2016), examines the theoretical creation of dungeons as fantasy 're-alized worlds', drawing inspiration from Deleuze's concept of the virtual and models of entanglement:

> Deleuze's 'virtual' can handle the complexity of 'realized' worlds, and its use rejects the naïve idea that the fantastic only works in a text because the world is supposedly knowable in a simple fashion. Indeed, these 'realized' worlds multiply day by day as more and more are produced, massive assemblages of both real and imaginary parts. The material and digital objects of a 'realized' world form an intensely complex network that can help in understanding the connected communications systems of today as well as the place of the human subject within them. (Särkijärvi 2017)

In this context, the intrinsic complexity of the megadungeon can also be ascribed to the domain of contemporary media history: it is stratified not only spatially but also temporally (with medieval references yet originating in science fiction and thriving in the digital realm) and in terms of practices (with game design as a fundamental interface referent in the current digital scenario). As observed, the world of cables, transmissions, and data packets in which humanity now exists – and from which media art draws inspiration – is evolving into an oversized spatiality that is no longer quantifiable. The same goes for time, where contemporary categories are compelled to accept the exclusion of a clear linearity. This argument, primarily debated and developed within German media theory, is most notably encapsulated in Siegfried Zielinski's concept of the "deep time of media" (2006), which has been incorporated by Jussi Parikka into a broader reflection on a possible media geology. In this context, the implied 'immateriality' of new media is rejected and linked to the subterranean materials offered by the earth as the 'geophysics of information technology', connecting the depths of extraction required for the construction of devices with the circles of orbiting satellites (Parikka 2015). Assuming that media are not just technical tools but also ways of organizing and understanding the world, they operate on vast temporal scales, shaping a kind of meta-archaeology composed of layers and different variations of mediation. As Koen Leurs and Philipp Seuferling write, "this perspective helps to denaturalize the present as the only possible outcome or the result of a natural progression (2022, 291), moving research away from a fixed teleological chronosequence towards "do not seek the old in the new, but find something new in the old" (Zielinski 2006, 3).

As a potential product of media 'variantology', the dungeon would be a meaningful apparatus that navigates historical circularity,

seeking geological space in an alternative subterranean realm. According to Zielinski, there are no fixed origins to be narrated, but rather a continuous historical stratification of internal anomalies within media history, sometimes unconventional, often existing in a time 'out of joint'. Matteo Pasquinelli, in a paper titled "Three Thousand Years of Algorithmic Rituals" (2019), presents a fascinating examination of how algorithmic culture predates modern technological forms by serving as the basis for a prehistoric reasoning related to the geometric thought abstraction. He quotes French mathematician Jean-Luc Chabert, who stated that

> algorithms have been around since the beginning of time and existed well before a special word had been coined to describe them. Algorithms are simply a set of step-by-step instructions to be carried out quite mechanically to achieve some desired result (1),

not unlike how parametric procedural crawlers have interpreted and diverged from the well-historicized medieval atmosphere of *D&D*.

Following this erratic historical trajectory, the 'generative geometry' that would lead to the intricate structures of artificial neural networks, and more recently to the layer-by-layer strata of deep learning – for which Pasquinelli himself uses the archaic expression *ars combinatoria* – seems to speak the same language as the mazes of the Renaissance tradition. These medium-like mazes comprise a system of intertwined paths that often extend into multi-level undergrounds of buildings, as exemplified in *Blackmoor*. Unlike the properly defined labyrinth, the maze does not present itself as an initiatory path in the classical sense, where the ritual of its single exit becomes a symbolic moment of death and rebirth (Kern 1981), instead, it embodies a pure whimsy of intersections, variations, and complications, where no Ariadne's thread can prove useful. It is more a journey through the spaces of generative architectures, from Giovanni Battista Piranesi's dungeons to the multi-scale complexities of Constant's Situationist 'drifting architecture' in *New Babylon*. Sometimes these intricate structures are confined to subterranean dimensions, echoing ancient claims by Catullus and Claudian who located the original labyrinth of Daedalus at Knossos not on the two-dimensional plane of the earth, but in the twists and turns of the underground caves beneath Mount Ida (Matthews 1922, 23). These intricate structures evoke an absolute sense of internal mobility and, above all, potentially infinite expansion, following a logic that is both abstract and mechanical, and thus potentially digital. On the other hand, according to Parikka, "depth means time" (2015, 37). Invoking the stratigraphic and mechanistic vastness of James Hutton's *Theory of the Earth* (1778), he writes:

The deep time metaphor acts as a passage to map different times and spaces of media art history. Even the term connotes the darker underground of hidden fluxes that surface only irregularly to give a taste of the underbelly of a deep media history. They offer variation in the sense Zielinski is after in media variantology: media do not progress from simple to complex, there are no blueprints for prediction, and we need to steer clear of the 'psychopathia medialis' of standardization and find points of variation to promote diversity. This is not meant to signal conservation but active diversification as tactics of a living cultural heritage of technological pasts in the present-futures. (Parikka 2015, 42-3)

He argues that the great sophistication achieved by the cultural theory of media art history is not the result of a linear temporal succession, but rather rooted in a geology characterized by temporal variance. In the same line of thought, in relation to the realm of video games, even though not with a pure dungeon crawler mechanics, it is worth mentioning the pioneering *Colossal Cave Adventure* (1976), considered the first text-based adventure in history, initially developed by Will Crowther. Crowther's background aligns closely with the themes discussed here: he was a caver based in the American Midwest, a programmer involved in ARPANET, a computer scientist at Xerox PARC – a Californian tech institution known for early collaborations between scientists and artists (Harris 1999) – and an avid *D&D* player. The game's textual exploration of an underground cave through narrow passages, galleries, and tunnels, spanning over 3,000 lines of code, was recreated based on the actual topography of a section of the Mammoth Cave system in Kentucky, which Crowther had personally explored (Reed 2023, 75-89). Later implementations by Don Woods, introducing elements like dragons, elves, and axe-wielding dwarves, added a rich blend of high fantasy to *Adventure*, giving it a distinctive mix of temporal and thematic elements. The caves, integral to human history for over five thousand years, were thus transformed through the cultural lens of role-playing games, eventually taking on a digital form.

Returning to the Lefebvrian terms introduced at the beginning of this essay, we might say that spatial relations are not only perceived but also culturally produced in relation to thirdspaces of representation. The spatial turn has recognized movement between these symbolic spaces: the 'small world' has expanded because these representational sites have claimed their own navigable and architecturally meaningful configuration. Critical theory and radical design have embraced practices of abstract topology for many years, and it is no coincidence that conceptual art and maps have been immediately associated. This relationship is evident in Alfred Korzybski's famous assertion that "the map is not the territory", as seen in Arts

& Language's celebrated artwork *Map to Not Indicate* (1967), or in Guy Debord and Asger Jorn's dissections of the psychogeographic map of Paris in *The Naked City* (1957). The famous red arrows, which mark the drifting passages between one area and another, cut out from paper and disassembled, reveal an interest in Paris' hidden topology – concealed sections, portals, threshold crossings, and urban levels shaped under the detournement influence of Situationist principles. These elements bear a resemblance to the Open Systems Interconnection (OSI) model that maps network infrastructures, the layers of neural networks, educational MUDs, and even the more general video game walkthroughs or other database-related visual culture.

An important model in this field, among the most cited of the last decade, is the Stack, as defined by media theorist Benjamin H. Bratton (2015), "an accidental megastructure [...] that is both a computational apparatus and a new governing architecture".

The Stack is a topological model of computation on a global scale, schematically represented as a vertical diagram consisting of different layers that combine to form a complex system. Each stratum serves a specific function in the geography of the digital world and in the interdependence of technological platforms. The overlapping six layers are sequenced: Earth, Cloud, City, Address, Interface, User, the first of which denotes the solid evidence of material resources and energy developed in terrestrial spaces, and the last of which identifies the internal population inhabiting the multi-layered circuits of the Stack. The term 'megastructure' attributed to the Stack stems from an ICT evolution of Mumford's 'megamachines', focusing on infrastructure sovereignty (such as devices, data centers, suboceanic cables, and human-side agencies) and its interplay with geopolitical jurisdictions. Essentially, it represents a structure that symbolizes the entire Earth. What is particularly interesting is the abstraction of its form: Bratton opts for a multi-layered diagram to metaphorize the 'mega' – implying wholeness yet remaining conceptually expandable – of the planetary computational scenario. Thus, the mazelike complexity among the agencies that populate it seems to be effectively described as parts of a simple geometric figure:

> Today, as the *nomos* that was defined by the horizontal loop geometry of the modern state system creaks and groans, and as 'Seeing like a State' takes leave of that initial territorial nest – both with and against the demands of planetary-scale computation – we wrestle with the irregular abstractions of information, time, and territory, and the chaotic de-lamination of (practical) sovereignty from the occupation of place. For this, a *nomos* of the Cloud would, for example, draw jurisdiction not only according to the horizontal subdivision of physical sites by and for states, but also according to the vertical stacking of interdependent layers on top

of one another: two geometries sometimes in cahoots, sometimes completely diagonal and unrecognizable to one another. (Bratton 2014, 1)

In the author's clarifying lines, the Stack model is revealed as a response to the challenge of depicting the blackboxing of the media framework. The precise dimensionality of the Stack, well divided into overlapping layers that evoke the optimization of design in digital processes, is, of course, only apparent. In fact, the continuous interconnection and reproduction of its intertwining elements are utterly labyrinthine, to the point of 'eating up space'. Returning to the references posed at the beginning of this essay, we might rhetorically ask, 'where' do these layers of cold and hot storages, data, and informational abstractions extend? To answer this question, we must move beyond mere numerical reduction and explore a topology of computation that definitively transcends the confines of a small world model. Similarly, procedural digital dungeons structure themselves with rigid geometric directives – like a "striated space" to use Deleuze and Guattari's vocabulary –, only to open up to a typically post-structuralist space, 'smooth', nomadic, and self-generating, non-metric, and thus no longer computable. Yet in *A Thousand Plateaus* – a title that already hints at an abstract system of non-hierarchical stratification – and specifically in the fourteenth plateau (Deleuze, Guattari 1987, 39-74), it is observed that the two spaces (smooth and striated) are not separate segments but rather categories intersected by an exploratory movement that establishes a constant dynamic tension between them. In a geopolitical system that appears to be represented in a strictly striated manner, such as the Stack, the lines of flight that create smooth spaces of resistance are essential components of its core. In the realm of role-playing games, the procedural mechanics of digital dungeons rely on similar creative praxis, marked by the hybridization of cultural references. Luciana Parisi (2013), discussing the convergence of these two spaces, has proposed the concept of architecture produced by algorithms as 'contagious'. Over the past thirty years, computation has emerged as a powerful generator of new architectural forms and, consequently, new forms of thought organization.[6]

The new centrality of generative algorithms (but also cellular automata, L-systems, and parametricism) in digital design has led to

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[6] Historically, one of the first instances in which the scientific community acknowledged creativity in connection with algorithms occurred in the field of architecture. This recognition was marked by the awarding of the Architectural Association Prize in 1969 to John Frazer for his pioneering work in computer-generated environments (Audry 2021).

the construction of various topological geometries and curvilinear shapes that have come to be known as blob architectures. While the gridlike architecture of striated space (or digital mapping) places discrete unities at the center of a design made of points connected by lines, the topological curves of smooth space (or blob architecture) starts from the generative power of a point, the meshing and folding of which becomes the condition for the emergence of a new form. [...] Contagion describes the immanence of randomness in programming. This irreversible invasion of incompressible data into the digital design of space has led to the production of digital spatiotemporalities that do not represent physical space, but are instead new spatiotemporal actualities. (XI)

According to Parisi, the solution lies in combining the smooth and striated space categories with Alfred North Whitehead's mereotopology, the science of relations between part and whole, which the author defines "a schema that is a concrete abstraction" (XI-XII). This would explain the continuous transformation and movement within the digital grid space, where an "infiltration of randomness" (in our case, the dice that triggers randomness in wargames or the random procedural elements) occurs within "finite sets of rules" (the multi-layered structure or the game rules according to Huizinga) (XI).

To explain this quantitative indeterminacy, Parisi does not consider the gaming culture but rather delves into the domain of ontology. Still, it is evident how the practices of metamodeling can be applicable elsewhere. If we metaphorically conceive the megadungeon with its infinite layers, depths, interdisciplinary connections, and theoretical objects that constitute and relate to each other, it might be fruitful to think of mereotopology as the space where "wholes (continuities) become parts (discontinuities), and how parts can be bigger than wholes" (XII).

By geometrically considering the "big-world condition of coexistential *nth* dimensionality" (Reed 2019) mentioned at the beginning of this essay, might provide valuable insights.

The planetary-scale computing architecture of the Stack is defined by its author as a "new *nomos* rendered now as vertically thickened political geography" (Bratton 2014, 1-2).
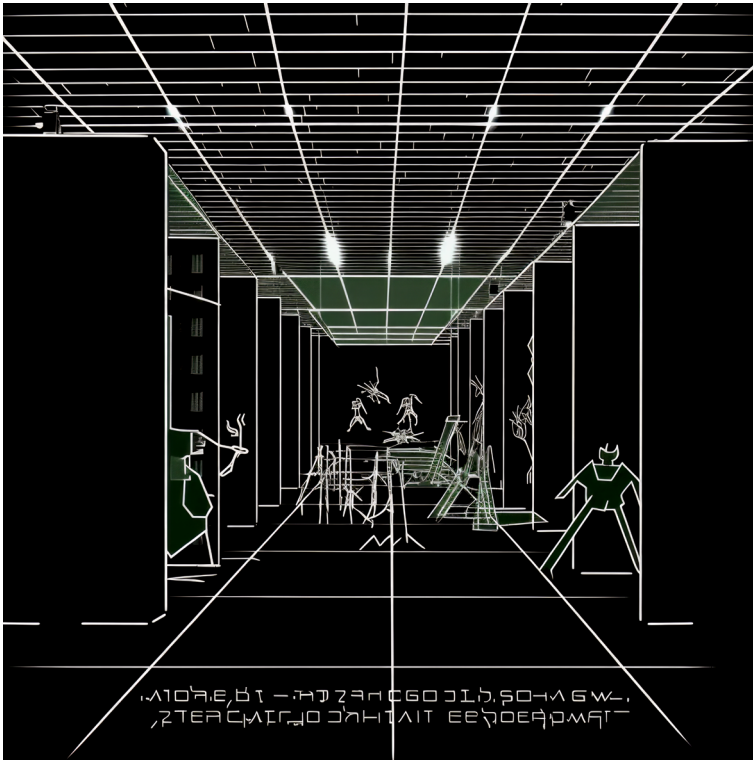
Figure 6 Jon Rafman, *Data Center*. 2023. Courtesy of the artist and Sprüth Magers

The explanation provided is intriguing. On one hand, there's a geo-political representation of sovereign spaces in the Schmittian sense, where the world would be divided. On the other hand – and more pertinent to defining the megadungeon model – is the metaphorization of the stack diagram for the classic multi-layered structuring of software protocols "in which network technologies operate within a modular and interdependent vertical order" (Bratton 2015, XVIII).

The Stack is thus a model that presents itself as global but thrives on mereotopological passages from one layer to another. For instance, from the User layer (agents not necessarily human, such as machines and minerals), it is possible to transition to the Earth layer (representing the terrestrial body, including subterranean operations) through dynamic connections. Another example could involve locative-based practices transitioning from the Interface layer to the City layer (Leorke, Wood 2019). Characteristics reminiscent of the non-modal approach of the *Berlin interpretation* in rogue-like games, where "movement, battle and other actions take place

in the same mode. Every action should be available at any point of the game" (2008).

In both the Stack and the megadungeon, the initial assumption revolves around verticality, which, as seen in the previous paragraphs, does not necessarily imply order or hierarchy (or purely mechanistic sedimentation, as Descartes imagines the formation of the Earth in the *Principia Philosophiae*). Instead, it signifies nomadic movement, passages, and exploration. As Matthew Fuller argues in *Media Ecologies* (2005) – a book that takes on the not-so-easy task of clarifying what media ecology is –, in this field topological analysis and function often coincide, opening up a multiplicity of connections (and thus 'sub-ecologies') that can only be represented through an aesthetics of stratification. From the preface:

> Nonlinear, selforganizational, and transpositional systems behavior combine autopoietically at the intersection of media collisions. Complementing Manuel De Landa's reading of the phase space model and Gilles Deleuze and Félix Guattari's poetics of the machinic phylum, Fuller directs our attention toward aesthetics of layering composed of multiple relations of media dimensionality. (X)

Indeed, the concept of verticality is not solely linked to the logical diagrams of computing but also extends to metaphorical aspects concerning art, architecture, and creativity **[figs 6-7]**. While verticality in the contemporary context appears to distance itself from hierarchies, and the Deleuze-Guattari plateaus mark a crucial shift in this regard, there still exists a fundamental challenge in the relationship between humanity and its habitat. The underground is the oldest refuge, but virtually, the opposite scale towards the sky still represents an idea of levels, as the original etymology of dungeon, from the French *donjon*, reminds us: a fortified tower that rises above the surface and not below. In his web piece "Verticality, Part II: The Seeds of Verticality", Christopher James Botham notes that while humans are natural surface-dwellers and naturally inclined to reach for the sky, from climbing trees to constructing architectural floors, the first idea of a surface originates underground, the dark place of birth and the return of mortal remains. This results in a desire for verticality, structured by a progression of levels ("they are below the surface, but they still have a surface of their own, so in a way the underground is still under us even when we're inside a cave"), which also applies to contemporary architecture (Botham 2023). In addition to the expected historical references to skyscrapers, the most interesting recent example Botham proposes is the Dutch Pavilion from the 2000 World Expo in Hanover, which, just like Bratton's Stack, is divided into six distinct layers that correspond to various types of high-tech spaces. The lowest level represented an underground-like rocky cave, while

the highest level featured wind turbines, evoking a direct technical connection to the sky. In a closer context to new media art and its theory, a recent example of representation explicitly inspired by the 'software sovereignty' of the Stack is the publication *Vertical Atlas*,

> with the mission to create an atlas to help navigate the worldwide digital transformation and its complex effects at different locations and on a variety of scales (Dellanoce et al. 2022, 11),

making those paths of collective exploration explicit, and contributing to a diagrammatic visualization of new digital world. In this case too, the curators ask similar questions, recognizing the inadequacy of traditional geographies to navigate the mazes that connect tangible elements like rare stone mines or server farms to performative aspects like immersion, interface management, and recent trends in visual art:

> How to map the digital realities? [...] How then to navigate the non-universal, fractal scape of altered realities with non-local borderlands? (12-13)

What seems to be happening in visual culture is not unlike what mentioned about early experiments with roguelike games, where the

convergence into similar forms was not encouraged by agreements or manifestos but rather by the simple sociotechnical scenario. In that case, it was the spontaneous encounter between *D&D* enthusiasts and digital culture; now, that same digital culture is turning its gaze to the interdisciplinary nexus between art-science and a new vision of the Earth. Current new media artists such as Trevor Paglen, Jamie Allen, Marko Peljhan, Joshua Portway, Lise Autogena, and others share common languages with various disciplines as they explore alternative geologies in their own unique ways. The same can be said for a renewed interest in the 'world below', where the roots of anti-anthropocentric cohabitations are increasingly being retraced. Dungeons of treasures and bacteria, as demonstrated by recent exhibitions such as *Hollow Earth: Art, Caves & The Subterranean Imaginary* (2022) at Nottingham Contemporary, or *Subterranean* at Amos Rex in Helsinki – which also dedicates a section to "Fictional Depth" –, or the prototypical *The Deep of the Modern* (2012) at Manifesta 9, which addressed the theme of multi-layered intrusion into the underground through coal mining, extraction, and megamachines.

Bibliography

Aarseth, E. (2001). "Allegories of Space. The Question of Spatiality in Computer Games". Eskelinen, M.; Koskimaa, R. (eds), *Cybertext Yearbook 2000*. Jyväskylä: Research Centre for Contemporary Culture, 152-71.

Audry, S. (2021). *Art in the Age of Machine Learning*. Cambridge (MA): MIT Press.

Barton, M.; Stacks, S. (2019). *Dungeons and Desktops: The History of Computer Role-Playing Games*. Boca Raton: CRC Press.

Berlin Interpretation (2008). `https://www.roguebasin.com/index.php/Berlin_Interpretation`.

Boggs, D.H. (2018). "Thoughts on the Cinematic Inspiration for Blackmoor Castle". *Hidden in Shadows*. `https://boggswood.blogspot.com/2018/08/thoughts-on-cinematic-inspiration-for.html`.

Bolingbroke, C. (2012). "Game 79: Beneath Apple Manor (1978)". *CRPG Addict*. `https://crpgaddict.blogspot.com/2012/12/game-79-beneath-apple-manor-1978.html`.

Botham, C.J. (2023). "Verticality, Part II: The Seeds of Verticality". *On Verticality*. `https://www.onverticality.com/blog/verticality-part-ii-seeds`.

Bratton, B.H. (2014). "The Black Stack". *e-flux*, 53, 1-12.

Bratton, B.H. (2015). *The Stack: On Software and Sovereignty*. Cambridge (MA): MIT Press.

Bryant, L.R. (2012). "Substantial Powers, Active Affects: The Intentionality of Objects". *Deleuze Studies*, 6(4), 529-43. `https://doi.org/10.3366/dls.2012.0081`.

Caillois, R. (1961). *Man, Play, and Games*. New York: Free Press of Glencoe.

Carbonell, C. (2016). "Tabletop Role-Playing Games, the Modern Fantastic, and Analog 'Realized' Worlds". *Analog Game Studies*, 14. `https://analog-gamestudies.org/2016/11/tabletop-role-playing-games-the-modern-fantastic-and-analog-realized-worlds/`.

Chabert, J.-L. (1999). *A History of Algorithms: From the Pebble to the Microchip*. Berlin: Springer.

Craddock, D.L. (2021). *Dungeon Hacks: How NetHack, Angband, and Other Roguelikes Changed the Course of Video Games*. Boca Raton: CRC Press.

Deleuze, G.; Guattari, F. (1987). *A Thousand Plateaus: Capitalism and Schizophrenia*. Minneapolis: University of Minnesota Press.

Dellanoce, L. et al. (eds) (2022). *Vertical Atlas*. Arnhem: ArtEZ Press.

Ewalt, D.M. (2013). *Of Dice and Men: The Story of Dungeons & Dragons and the People Who Play It*. New York: Simon and Schuster.

Falkheimer, J.; Jansson, A. (eds) (2006). *Geographies of Communication: The Spatial Turn in Media Studies*. Gothenburg: Nordicom.

Fraser, B. (2011). "Why the Spatial Epistemology of the Video Game Matters: Metis, Video Game Space and Interdisciplinary Theory". *Journal of Gaming & Virtual Worlds*, 3(2), 93-106. `https://doi.org/10.1386/jgvw.3.2.93_1`.

Fuller, M. (2005). *Media Ecologies: Materialist Energies in Art and Technoculture*. Cambridge (MA): MIT Press.

Garda, M.B. (2013). "Neo-Rogue and the Essence of Roguelikeness". *Homo Ludens*, 1(5), 59-72.

Goodman, N. (1968). *Languages of Art: An Approach to a Theory of Symbols*. Indianapolis: Bobbs-Merrill Company.

Graham, S. (1998). "The End of Geography or the Explosion of Place? Conceptualizing Space, Place and Information Technology". *Progress in Human Geography*, 22(2), 165-85. http://dx.doi.org/10.1191/030913298671334137.

Günzel, S. (2019). "The Lived Space of Computer Games". Gerber, A; Götz, U. (eds), *Architectonics of Game Spaces: The Spatial Logic of the Virtual and Its Meaning for the Real*. Bielefeld: Transcript, 167-81.

Hancock, M. (2000). "Ecology of a Dungeon". *Polyhedron*, 144(5), 32-5.

Harris, C. (ed.) (1999). *Art and Innovation: The Xerox PARC Artist-in-Residence Program*. Cambridge (MA): MIT Press.

Harris, J. (2020). *Exploring Roguelike Games*. Boca Raton: CRC Press.

Huizinga, J. (1949). *Homo Ludens: A Study of the Play-Element of Culture*. London: Routledge & Kegan Paul.

Johnston, J. (2008). *The Allure of Machinic Life: Cybernetics, Artificial Life, and the New AI*. Cambridge (MA): MIT Press.

Kern, H. (1981). "Labyrinths: Tradition and Contemporary Works". *Artforum*, 19(9), 45-8.

Kwastek, K. (2015). *Aesthetics of Interaction in Digital Art*. Cambridge (MA): MIT Press.

Latour, B. (2005). *Reassembling the Social: An Introduction to Actor-Network Theory*. Oxford: Oxford University Press.

Law, J.; Hassard, J. (eds) (1999). *Actor Network Theory and After*. Oxford: Wiley-Blackwell.

Laycock, J.P. (2015). *Dangerous Games: What the Moral Panic over Role-Playing Games Says about Play, Religion, and Imagined Worlds*. Oakland: University of California Press.

Lefebvre, H. (1991). *The Production of Space*. Oxford: Wiley-Blackwell.

Leorke, D. (2019). *Location-Based Gaming: Play in Public Space*. Singapore: Palgrave Macmillan.

Leorke, D.; Wood, C. (2019). "Alternative Ways of Being: Reimagining Locative Media Materiality through Speculative Fiction and Design". *Media Theory*, 2(3), 63-102.

Leurs, K.; Seuferling, P. (2022). "Migration and the Deep Time of Media Infrastructures". *Communication, Culture and Critique*, 15(2), 290-7. https://doi.org/10.1093/ccc/tcac019.

Manovich, L. (1999). "Database as Symbolic Form". *Convergence: The International Journal of Research into New Media Technologies*, 5(2), 80-99. https://doi.org/10.1177/135485659900500206.

Matthews, W.H. (1922). *Mazes and Labyrinths: A General Account of Their History and Development*. London: Longman, Green and Co.

McGonigal, J. (2011). *Reality Is Broken: Why Games Make Us Better and How They Can Change the World*. New York: Penguin.

Mumford, L. (1934). *Technics and Civilization*. London: Routledge & Kegan Paul.

Murdoch, J. (1998). "The Spaces of Actor-Network Theory". *Geoforum*, 29(4), 357-74. https://doi.org/10.1016/S0016-7185(98)00011-6.

Nicholls, B.; Ryan, S. (2008). "Gameplay as Thirdspace". Swalwell, M.; Wilson, J. (eds), *The Pleasures of Computer Gaming: Essays on Cultural History, Theory and Aesthetics*. Jefferson: McFarland, 147-166.

November, V.; Camacho-Hübner, E.; Latour, B. (2010). "Entering a Risky Territory: Space in the Age of Digital Navigation". *Environment and Planning D: Society and Space*, 28(4), 581-99. https://doi.org/10.1068/d10409.

O'Brien, N. (2016). "Skins, Chips, and Stone of Jordans. Searching for the Value of Emergent Video Game Economies".

Rhizome. https://rhizome.org/editorial/2016/dec/14/searching-for-the-value-of-video-game-economies/.

Parikka, J. (2015). *A Geology of Media*. Minneapolis; London: University of Minnesota Press.

Parisi, L. (2013). *Contagious Architecture: Computation, Aesthetics, and Space*. Cambridge (MA): MIT Press.

Parker, R. (2017). "The Culture of Permadeath: Roguelikes and Terror Management Theory". *Journal of Gaming & Virtual Worlds*, 9(2), 123-41. https://doi.org/10.1386/jgvw.9.2.123_1.

Pasquinelli, M. (2019). "Three Thousand Years of Algorithmic Rituals: The Emergence of AI from the Computation of Space". *e-flux*, 101, 1-12.

Peterson, J. (2012). *Playing at the World: A History of Simulating Wars, People and Fantastic Adventures, from Chess to Role-playing Games*. San Diego: Unreason Press.

Reed, A.A. (2023). *50 Years of Text Games: From Oregon Trail to AI Dungeon*. Oakland: Changeful Tales Press.

Reed, P. (2019). "Orientation in a Big World: On the Necessity of Horizonless Perspectives". *e-flux*, 101, 1-8.

Särkijärvi, J. (2017). "Dungeons&Dragons&Deleuze". *Tampere University PlayLab*. https://www.tuni.fi/playlab/dungeons-dragons-deleuze/.

Scheuerl, H. (1954). *Das Spiel. Untersuchungen über sein Wesen, seine pädagogischen Möglichkeiten und Grenzen*. Weinheim: Beltz.

Smithson, R. (1968). "A Sedimentation of the Mind: Earth Projects". *Artforum*, 7, 44-50.

Soja, E.W. (1989). *Postmodern Geographies: The Reassertion of Space in Critical Social Theory*. London: Verso Books.

Soja, E.W. (1996). *Thirdspace: Journeys to Los Angeles and Other Real-and-Imagined Places*. Oxford: Wiley-Blackwell.

Stein, S.M. (2021). "The Origins of Money in Diablo II". McCaffrey, M. (ed.), *The Invisible Hand in Virtual Worlds*. Cambridge: Cambridge University Press, 105-32. https://doi.org/10.1017/9781108884891.006.

Svenson, G. (2007). "The First Dungeon Adventure". *The Great Svenny*. https://web.archive.org/web/20050416005624/http://web.tampabay.rr.com/gsvenson/FirstDungeonAdv.html.

Van der Linden, R.; Lopes, R.; Bidarra, R. (2014). "Procedural Generation of Dungeons". *IEEE Transactions on Computational Intelligence and AI in Games*, 6(1), 78-89. https://doi.org/10.1109/TCIAIG.2013.2290371.

Viana, B.M.F.; Dos Santos, S.R. (2021). "Procedural Dungeon Generation: A Survey". *Journal on Interactive Systems*, 12(1), 83-101.

Warf, B.; Arias, S. (eds) (2009). *The Spatial Turn: Interdisciplinary Perspectives*. Abingdon: Routledge.

Waskul, D.; Lust, M. (2004). "Role-Playing and Playing Roles: The Person, Player, and Persona in Fantasy Role-Playing". *Symbolic Interaction*, 27(3), 333-56. https://doi.org/10.1525/si.2004.27.3.333.

Weibel, P. (2012). "The Post-Media Condition". *Mute*. https://www.metamute.org/editorial/lab/post-media-condition.

Williams, R.H. (2008). *Notes on the Underground: An Essay on Technology, Society, and the Imagination*. Cambridge (MA): MIT Press.

Zielinski, S. (2006). *Deep Time of the Media: Toward an Archaeology of Hearing and Seeing by Technical Means*. Cambridge (MA): MIT Press.