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Modern Board Games: Can They Be Geogames?

Micael Sousa [1], **Ítalo Sousa de Sena** [2], **Chiara Cocco** [2], **Gabriel Mota** [3],
and **Grace Houser** [2]

[1] CITTA—Research Centre for Territory, Transports and Environment, Department of Civil Engineering, University of Coimbra, Portugal
[2] Spatial Dynamics Lab, School of Architecture, Planning and Environmental Policy, University College Dublin, Ireland
[3] Graduate Program in Physical Geography, Faculty of Philosophy, Languages and Literature, and Human Sciences, São Paulo University, Brazil

Correspondence: Ítalo Sousa de Sena (italo.sousadesena@ucd.ie)

Abstract

This article addresses the evolving concept of geogames, traditionally focused on digital and location-based experiences, and explores the potential of modern board games as an analogue form of geogame. While geogames have been defined by their use of real-world spatial information, often through GIS technology, there is a recognized need to include more abstract and imaginative representations of space, particularly in analogue formats. This study investigates how modern commercial entertainment board games, characterized by innovative game mechanics and spatial representation, connect with the concept of geogames. It employs a bibliometric analysis of geogame literature and a descriptive analysis of modern board games from the BoardGameGeek database. Key findings indicate a lack of research on analogue games within geogame specific literature, while revealing that modern board games effectively utilize spatial units, territory representation, and game mechanics to create virtual spatial worlds. The study concludes that modern board games align with the definition of geogame, advocating for their inclusion in the geogame research agenda.

Keywords

analogue games; bibliometric analysis; game design; geo-information; location-based games; serious games

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1. Introduction

The broad concept of geogames—games in which the mechanics have a geographic context, often facilitated by digital means—has profited from the development and ease of digital technologies. However, as we enter the post-digital age, this concept is evolving. In this new age, some authors claim that analogue media are gaining popularity, as they are an escape from screens (Cramer, 2015; Lhowe, 2018). As such, to broaden the genre and concept of geogames—and inspired by the emergence of new game systems and experiences in analogue games (Arnaudo, 2023)—a fundamental design revolution is needed in the field. This revolution would transition from purely GIS-based or location-based to include more abstract and imaginative representations of space in geogames. Modern board games, in contrast to classic board games, employ game systems to deliver complexity through a combination of game mechanisms. As we will detail, there is currently limited broader exploration of new systems in modern board games, such as those supporting geogames, for non-entertainment purposes.

Ahlqvist and Schlieder (2018) define location-based games (LBGs) as those that use real-world space and location as a key element, yet they also acknowledge that geogames can be location-based while using non-spatial elements—like simulations and abstracted realities—to represent geographical information. This idea broadens the possibilities for geogames, extending them to include analogue games that represent geographical information through specific game mechanics. Furthermore, although the same authors explored converting a digital geogame into a traditional board game, there is a gap in the literature exploring modern board game design and how new techniques can both deliver engaging interactive systems to explore geographic context and facilitate how spatial abstraction takes place in analogue platforms.

Initially, Schlieder et al. (2006) worked on LBGs and referred to them as geogames, focusing on the use of positioning technology like GPS to integrate the player's physical location into a game logic. A broader concept was explored by Ahlqvist et al. (2012), who considered geogames to be those that use real-world spatial information and are mediated by GIS, with a focus on the creation of replicas of the real world based on geospatial data. In its essence, geogames overlaps with the concept of serious games (Abt, 1987) and pervasive games (Adanalı, 2021), as they are designed to achieve outcomes beyond purely entertainment.

While there is overlap and sometimes interchangeable use of terms in the literature, the concept of geogames evolved from an initial focus on LBGs involving physical movement and specific classic board game mapping constraints to a broader definition encompassing any game using real-world spatial information, often mediated by GIS technology. However, studies on analogue geogames, such as board games, are less common in the literature. Thus, we propose exploring manifestations of "geo" in modern commercial entertainment board games—especially in tabletop, card, and board games—to explore new play experiences.

Our primary objective is to examine the existing literature in geogames to understand the role of analogue games in defining geogame systems. Our second objective focuses on analysing modern board games to describe their connection with the concept of geogames. This study considers published scientific literature that specifically mentions "geogame" as a term, and commercial entertainment analogue games—in particular, the modern board games from the BoardGameGeek (BGG) database. In our results, we present a description of the trends within geogames studies through a bibliometric analysis and a comprehensive

summary of the design elements, mechanics, and physical components that underpin modern analogue geogames, thereby contributing to a redefinition of the overall concept of geogames to include non-digital applications.

2. Modern Board Games

A board game design revolution has occurred in the last two decades (Arnaudo, 2023). Despite the continuous innovations in digital game technologies, analogue games are changing how people play in person and with tangible game pieces. There is a fascination for game pieces and how to use them in interactive playable systems. Modern board gaming has elevated these engaging experiences to a new level (Rogerson et al., 2016, 2020). Besides the material dimensions, mechanical design innovations are core elements of modern board gaming. New game mechanics and mechanisms emerged in the last 20 years that allow game designers to mimic complex playable models (Engelstein & Shalev, 2019; Sousa, Oliveira, & Zagalo, 2021). We can identify recurring elements that contribute to success across highly regarded hobby board games, as selected by experts and hobby players (Sousa, 2023a).

These design trends build upon other hobby games (Woods, 2012) which niche publics have played, and they have gained popularity due to the rise of geek culture (Booth, 2021; Trammell, 2023). The popularity of narrative games like Dungeons & Dragons influenced how modern board games are built today. Within all the variety, there is a concern about the narrative and thematic coherence between mechanics and narratives (Shipp, 2024). Narrative analogue tabletop games have been exploring virtual and imaginary spaces without digital technologies (Arnaudo, 2018; Mizer, 2019), sometimes collectively (Nikolaidou, 2018). Modern board games have been exploring these virtual imaginary spaces while proposing elegant mechanical systems. Despite their robust mechanical characteristics, modern board games build consistent narratives that players can explore with more visual support (e.g., Pandemic Legacy Season 1; Sleeping Gods; Robinson Crusoe: Adventures on the Cursed Island) compared with purely narrative games which reply primarily on books as game materials (Arnaudo, 2023). These new designs go beyond the abstraction and ludonarrative (Hocking, 2009) of mass market and non-modern games, avoiding the disconnection of narrative and mechanical systems.

Exploring how modern board games are built, what mechanical game systems they rely on, and how they help create narratives that immerse players in the virtual world they propose is a necessary step to advance the discipline. These new systems allow the building of new games and forms of analogue simulation. Similar game mechanisms appear among the top games listed in the BGG database. BGG is the world's biggest and most prestigious board game platform, systematizing information about all analogue games. Recent studies indicate a trend away from certain game mechanisms, once common and dominant in older designs, suggesting their gradual abandonment. One example is the mass market games' roll and move mechanism (Samarasinghe et al., 2021). Among modern games, these mechanisms tend to be avoided by players (Nguyen et al., 2024). This change means this revolution is tightly connected to the mechanisms and ways games materialize space. Modern board game design engages a growing number of players worldwide. Among the reasons for this identified by players is the social interaction during engaging game experiences (Booth, 2021), highlighting that the overall game system—encompassing mechanical and narrative—is crucial in delivering new experiences that foster joyful interaction among participants.

As we have seen, board games have changed. However, despite this novelty and innovation, there seems to exist a lack of application of the new designs into spatial components in games (including serious games) like geographical space (Sousa et al., 2022b; Sousa & Bernardo, 2019). Modern board game design can help develop serious game approaches, where the games are used as engaging planning support tools, either for simulating complex systems where stakeholders can interact and test decisions or just as game-based learning methods to teach various related topics such as climate change and adaptation approaches (Sousa, 2023b, 2024). The use of analogue games has limitations and advantages. The limited number of participants and the need to be played in person can foster social interaction, and eases the development and adaptation of the games for specific applications (Ham, 2015; Sousa et al., 2022a). They are cost-effective and allow real-time adaptations. Considering the huge amount of board games published each year (Nand, 2021; technavio, 2022), we aim to find if significant and relevant modern commercial entertainment board games address geographical and spatial dimensions and can be considered a form of analogue geogames. Our proposal demonstrates how the current state of the art in modern board games can be applied to future geogames for purposes beyond entertainment, such as serious games and other bespoke applications related to geographic or spatial topics.

3. Methodology

To explore the context at the intersection of geogames and analogue modern games, a combination of bibliometric analysis and descriptive analysis was employed, using two data sources. For the first, a search on Scopus provided insights on the current trends in geogames research, while the second source was the online database of commercial board games BGG.

3.1. Bibliometric Analysis

In terms of databases for bibliometric analyses, two options are widely used: Scopus (Elsevier) and Web of Science Core Collection (Clarivate Analytics). It is worth noting that there are studies aimed at comparing the results obtained in the two databases. For example, Archambault et al. (2009) indicated R^2 correlation indices of 0.99 regarding the number of articles and the number of citations received by country. In any case, it is essential to consider that there are limitations in the catalogue of both platforms, especially with regard to publications prior to the 1990s (Mota et al., 2025).

The bibliometric analysis was conducted using the Scopus database, considering scientific articles and other documents published between 1900 and 2024. For the search routines, all the Scopus database was considered, without restricting it to specific scientific journals. The search routines included keywords with a direct or indirect relationship to geogames, LBGs and board games, identified through a previous qualitative literature review. The Boolean operators (e.g., "AND," "OR") were used to restrict or expand the search by combining keywords. The asterisk (*) was used to comprise variations of the words created by the addition of new characters from the original keyword. The selection of keywords was based on well-known literature about geogames intended to narrow our scope and allow for a more focused bibliometric analysis of how the term "geogame" has evolved since its first appearance. The search prompts applied to this research routine are presented below:

#1 TITLE-ABS-KEY = ("location-based gam*")

#2 TITLE-ABS-KEY = ("serious gam*")

#3 TITLE-ABS-KEY = (geogam*) OR TITLE-ABS-KEY = (geo-gam*) OR TITLE-ABS-KEY = (geogaming) OR TITLE-ABS-KEY = (geo-gaming)

The resulting data were exported from the Scopus database (in .csv format file), and the dataset was analysed using VOSviewer software from Leiden University (Eck & Waltman, 2010). According to the definition on the tool's official website (vosviewer.com), VOSviewer is a software for constructing and visualizing networks. In this specific case, it was used to design bibliometric networks. These networks can include keywords, journals, researchers, or countries with a construction based on citation, co-occurrence of keywords, bibliographic coupling, co-citation, or co-authorship relations. The data are spatially organized in the graph so that their distance indicates thematic affinity between the authors and keywords. In this research, the software's default configuration was used, considering an analysis focused on the co-occurrence of keywords.

The analysis of co-occurrence of keywords focuses on the content of publications (title, abstract, and/or author's keywords), establishing relationships between the occurrence of terms and enabling the delimitation of conceptual structures (Zupic & Čater, 2015). Resulting in semantic networks, the limitations of the technique are mainly linked to the subjectivity of choosing the terms used in the search and the fidelity of the indexers in recording the keywords. Considering such operational limitations, the use of keywords gives us clues about subfields of a discipline or research problems that are most prevalent within a sample.

In terms of graphical representation, VOSviewer allows three data visualization options: network visualization, overlay visualization, and density visualization. In this study, the presentation of the first option was prioritized. In network visualization it is possible to perform a cluster analysis (groups that are formed by affinity/proximity) where the thickness of the lines and the size of the points indicate the relevance of connections and occurrences, respectively.

To expand our results based on bibliometric analysis (quantitative), we also analysed the publications under a qualitative perspective, considering all the documents of the sample. We classified the documents in the sample by type of publication (article, conference proceedings, book chapters), type of study (theory, development, application), and definition of geogame. These classifications were performed by analysing the documents' metadata, such as used as an input in VOSviewer, and abstract screening. When the qualitative information to classify the type of study or the conceptual definition of geogame used in the document was missing from the abstract, a search in the full document was performed. To analyse the sample in relation to the research question of the present study, a general analysis of references to analogue games was performed within the sample.

3.2. Board Game Database Analysis

BGG is a website created in January 2000 by Scott Alden and Derk Solko (BGG, n.d.) as a community for players. The website has a database of more than 100,000 games and extensions, along with a rating system for users to contribute to the creation of a ranking. It is a widely recognized and comprehensive online

database and community for board game enthusiasts, making it a suitable source for analysing trends in modern board games.

To analyse the BGG database, we followed the Mechanics for Engagement Design Protocol (Sousa, Oliveira, Cardoso, et al., 2021), adapted to geospatial-related topics. The inclusion criteria were the top-ranked 100 games, based on a ranking system derived from the average of user-submitted ratings on BGG. Within this sample, another inclusion criterion was considered: games relating to one or more of the following context categories—Environmental, Exploration, Territory Building, and/or Travel. We considered these categories as most relevant to the broader scope of geogames. This selection ensures that the most popular games in the database relevant to the research question are included in the analysis.

The games were analysed based on their representation of geographical space and systems and the application of game mechanics and mechanisms in a spatial context. We considered the following geographical characteristics: spatial unit (e.g., hexes, networks, zones), type of map (e.g., abstract, realistic), scale (e.g., building, land plot, country), economy and social dimension, natural resources, and climate.

## 4. Results and Discussion

4.1. Bibliometric Analysis of Geogames

While exploring keywords for this study, based on common concepts used among well-known publications in the field of geogames, we noticed that when including solely "location-based game" in the search, 550 publications were available, which would be a large sample to analyse. When narrowing it by adding "serious games" to the search it reduced the total number of publications to 56. However, when adding "geogame" OR "geo-game" to the search, only one result was available. Therefore, to focus the search on capturing existing literature in the field we use the word "geogame" or its variations (geo-game, geogaming, geo-gaming), which yielded a total of 48 results, with three items being excluded from the sample after abstract screening, as being descriptions of conference proceedings. The final sample is 45 documents. Of this sample in question, 22 documents are conference papers, 16 articles, and seven book chapters. Eighteen of these documents discuss the use of LBGs as geogames, approximately 40% of the total documents in the sample.

While 11 documents refer to or discuss the use of analogue games (specifically classic board games) as a base to develop geogames, only one document focuses on board games as a core element of the study, which is the seminal paper written by Schlieder et al. (2006) who were among the first researchers to introduce the concept of "geogames." It explains that a straightforward mapping of board games onto the real world does not work, and introduces a framework based on player locations and resource distribution.

Regarding the publication date of the documents in the sample (Figure 1), the oldest document is from 2006, including the previously discussed work of Schlieder et al. (2006). The series remains stable, with one or two publications annually until 2016. In 2017 there was a significant increase in the number of publications, with six documents registered. However, the maximum in the sample would occur the following year, with 13 documents in 2018 potentially associated with the publication of *Geogames and Geoplay* (Ahlqvist & Schlieder, 2018). Publications have been decreasing since then, reaching a relative stability that extends until 2024, with values of four annual documents up to the date of this research.

Regarding the number of citations of the documents in the sample (Figure 1), the trend found is different. The highest citation values are more recent, reaching a maximum in the year 2023 (a year with a low number of documents published within the scope of this bibliometric research). Regarding the country of origin of the documents (Figure 2), there is a predominance of documents from Germany (15 documents), followed by the United States (13), Spain (4), Czech Republic (4), Ireland (3), Netherlands (3), and Portugal (3). Nine other countries are included in the sample, with representatives from South America, Africa, Asia, and Europe.
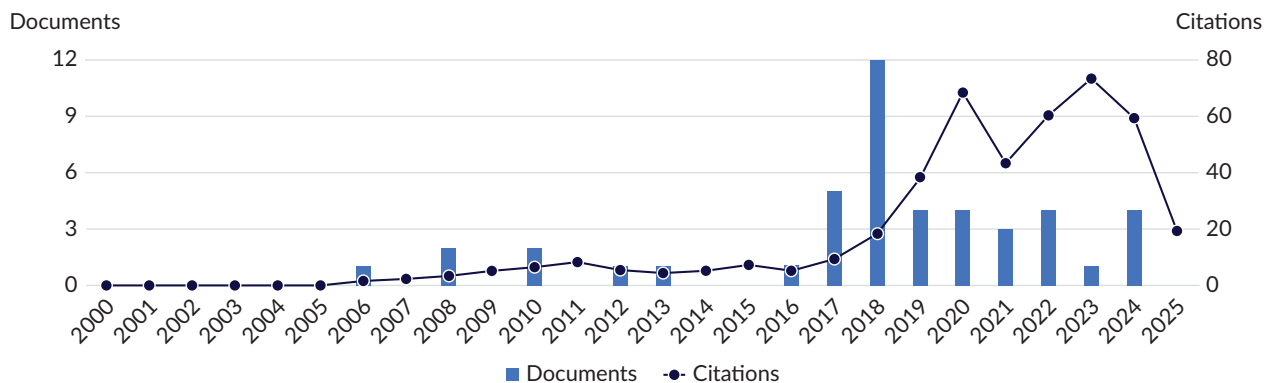
Figure 1. Citations over time compared with published documents per year ($N = 45$). Source: Scopus.
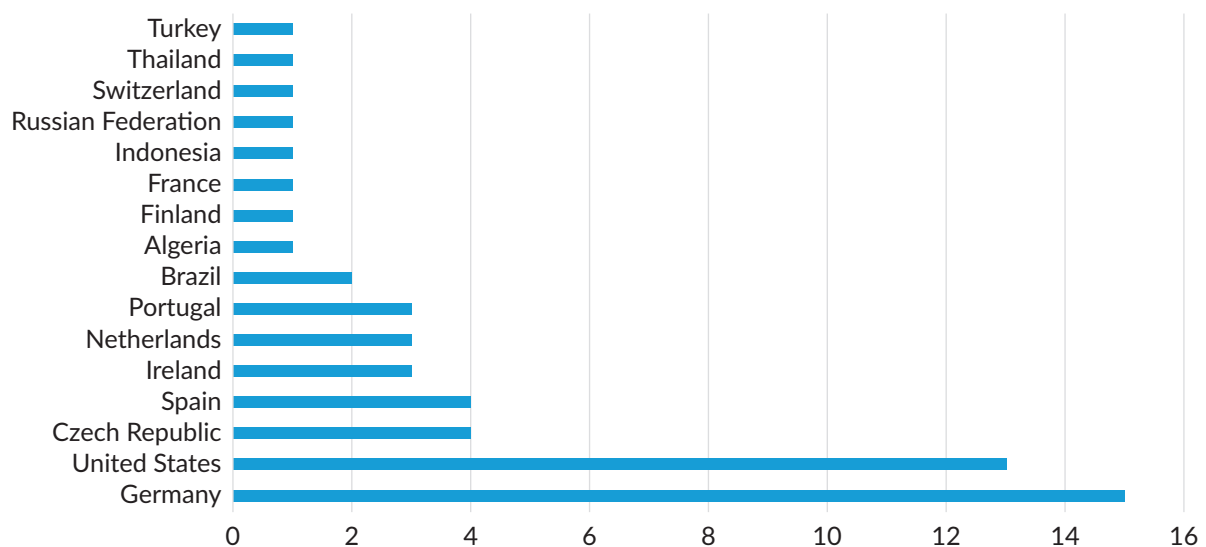

Figure 2. Total number of documents published per country that have "geogame" or its variations in the title, abstract, or keywords. Source: Scopus.

Finally, regarding the co-occurrence of keywords, only the keywords selected by the authors were considered, reaching a total of 140 terms recorded in the sample. However, only 19 of these keywords occur at least twice in the sample, demonstrating the diversity of approaches even in the face of a specific methodological theme and a relatively small sample of documents. The variants "geogame" and "geogames" are the most dominant in the sample, with seven records each, reinforcing the search parameters used. "Location-based games" (five records) can also be found among the most cited terms, followed by a larger list of those terms whose occurrence is three records: "game design," "education for sustainable development," "digital game-based learning," "Minecraft," and "education."

When the keyword co-occurrence metadata is graphically represented through VOSviewer bibliometric networks, four clusters are formed (Figure 3), represented by distinct colours. While "geogame" assumes a central position related to the "GPS" record, "serious games" and "urban planning" form an adjacent and restricted cluster. The two largest clusters are represented at opposite ends of the graph with "location-based games," "Minecraft," "geodiversity," "education," and "point of interest" (in red), and "game-based learning," "environmental education," "education for sustainable development," "game design," and "mobile learning" (in green). The opposing positions of "location-based games" and "game-based learning," two of the main approaches related to the use of games in education, are noteworthy. Being in different clusters and with different connections, the two keywords are directly linked to the central concept of "geogame." The connections between terms, forming clusters, allow the observation of conceptual and methodological affinities in the scientific documents selected by the sample. However, the small size of the sample is a limiting factor for a definitive correlation analysis.
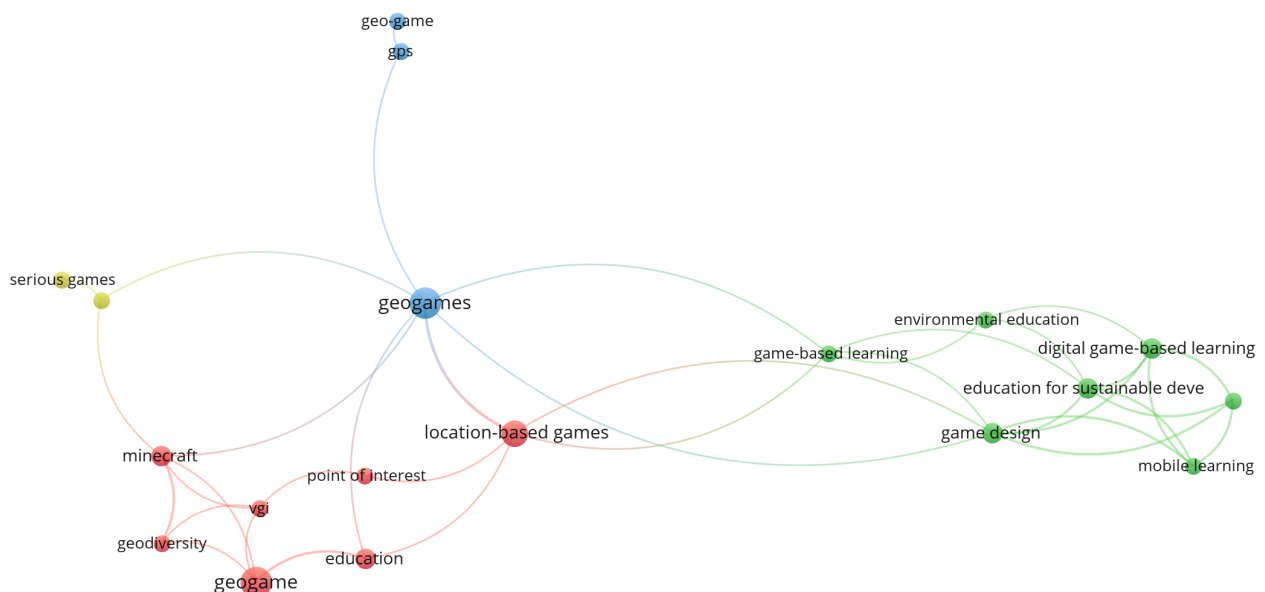
Figure 3. Identified links between keywords considering their co-occurrence ($N = 45$). Each colour represents clustering keywords departing from links to the word "geogames."

In general, 12 documents in the sample have a particular focus discussing the theory or foundations of the geogames concept, by presenting examples or defining the concept in the context of their studies. Many of the documents cite two other documents present in the sample to contextualize the definition of geogame, namely Schlieder et al. (2006) and Ahlqvist et al. (2012). These documents primarily define "geogame" itself and discuss related theoretical concepts or frameworks (like core geographic concepts, game patterns, pedagogical theories, GIS methodologies, modelling approaches) that inform geogames rather than defining different types of games and differentiating them. However, the sources do highlight that the term "geogame" is not used with perfect uniformity.

One of the most relevant sources is the book *Geogames and Geoplay*, edited by Ahlqvist and Schlieder (2018), which features 11 chapters discussing foundations and applications of game-based approaches in the context of geo-information. Three chapters appear in the sample collected from Scopus, namely chapters 2, 3, and 6. In chapter 2, the geogame genre is explored by providing a wide umbrella definition for geogames,

considering them as games and play using real geocontent mediated by geo-information technology (Ahlqvist et al., 2018). It examines elements that define the geographic and gaming dimensions of geogames, aligning spatial game patterns with core geographic concepts, while introducing the concept of GIS-MOG (Geographic Information System Multiplayer Online Games). In Chapter 3, Bartoschek et al. (2018) present the prototype of the OriGami, described as a mobile geogame developed for fostering spatial literacy. The authors also define mobile geogames as being based on player movement through real environments. In chapter 6, Schlieder et al. (2018) use the idea of a competitive LBG as a primary definition of geogame, played in an urban or natural environment. The focus on LBGs is shared among the three chapters, corroborating the trend identified in the bibliometric analysis of co-occurrence of keywords (Figure 3).

The term LBG is sometimes used interchangeably with geogames in the literature. Schlieder et al. (2006) present an initial "geogames" concept as a specific case of LBGs, characterized by the spatial and temporal coherence constraints from classic board games. Other documents mention LBGs in the context of using mobile, location-aware devices (Bartoschek et al., 2018) and designing them for learning (Oppermann et al., 2017). Similarly, the term "location-aware games" appears as a synonym for LBG in the context of the sample.

In regard to the relationship of board games and geogames in the documents, these are discussed in several contexts but primarily presented as historical precursors and foundational inspirations for geogames and related concepts. A key connection is highlighted by the work of Schlieder et al. (2006), who introduced the term "geogames" and discussed designing LBGs based on classic board games. Classic board games are used to illustrate fundamental game design concepts. For instance, chess and checkers are mentioned as examples of games that exhibit a full information pattern, where there is no hidden information, which can increase the combinatorial complexity and encourage strategic reasoning (Schlieder et al., 2018). In the context of modern board games, a few documents mention this. One example is the "genesis" of the GIS-MOG framework discussed by Ahlqvist et al. (2018), which originated from an independent study assignment to design a new board game map of Canada for the popular map game Ticket to Ride[TM]. Matyas et al. (2008) describe how the design of the LBG CityExplorer was inspired by Carcassonne, a famous tile placement board game that uses modern game mechanisms. The CityExplorer adopted game rule features from Carcassonne, such as placing tokens on predefined categories of locations not known in advance. This highlights a direct link between a prominent modern board game and the design of a geogame.

In essence, the literature demonstrates that the term "geogame" has a broader scope than "location-based games." Geogames are defined as games that use or are mediated by geoinformation technology, with "geo" referencing "land" or "Earth." This genre includes games that heavily rely on geospatial data for their core mechanics, incorporating elements such as modelling, visualization, and simulation of real-world processes. The term can also apply to online games that utilize geographical information without requiring physical interaction from players. This key distinction allows for the inclusion of games where physical movement is not a prerequisite. Consequently, while all LBGs can be considered geogames, the latter term represents a wider genre that does not necessarily require real-world player movement. However, the consulted literature does not clarify if analogue games such as modern board games can be considered geogames.

4.2. The "Geo" Component in Modern Board Games

Thirty games emerged after applying the exclusion criteria in the sample collected from BGG. Although the sample supported the identification of games with spatial or geographical-related systems or contexts, we need to analyse each game in detail to find specific patterns. Only seven games use realistic and similar maps associated with game boards. All others use simplification, either dividing the spatial units into hexagons (17) or establishing relationships between the elements with a network/relationships of points and arcs (7) and a minority, dividing the maps into limited regions/zones (4). The scale elements express considerable variation. Independent of using hexagons, networks/relationships, or zones, there are games representing galaxies (3), continents (6), countries and regions (13), worlds (3), and facility/building/land plots (5). Fifteen games directly include natural and physical resources for the players to manage in their game economy and mechanical system. Considering other human geographic dimensions, 13 games identify human economic and social development as part of the game mechanical system. Other elements, like climate effects, are presented in six games.

In the game sample, we realized that most games rely on representing a territory, even those in categories like Environmental, Exploration, and Travel. The exception is Arkham Horror (Charlie et al., 1987), a card game with no clear physical world representation. All others represent territory, connections, and relationships between locations with distorted scales. In the case of Lost Ruis of Arnak (Elwen & Mín, 2020), the locations are only defined by their distance to the shore and the transportation you need to get there (representing accessibility). One of the standard ways to mimic other dimensions such as climate-related topics is the use of track bars. In Terraforming Mars, players play cards that allow them to modify the planet, adding and removing hexagon tiles and collecting resources, which then are tracked in bars representing the temperature, oxygen level and availability of liquid water (available ocean tiles). Terraforming Mars (Fryxelius, 2016) is an example of the complexity of a world and its geographical manifestations and elements resulting from the combination of different game mechanisms that complement the world map, demonstrating one of the typical manifestations of modern board games where the designers combine sets of mechanisms to simulate parts of reality (Engelstein & Shalev, 2019).

In a conventional geogame, players travel to a real location, motivated by the digital game system. In these analogue games, players can travel into real or imaginary territories, e.g., Tolkien's Middle Earth which is represented in War of the Ring (Di Meglio et al., 2011). The game represents a geographical world where players can move by activating game mechanisms. There are many different ways in which this world can be represented. Dividing it into spatial units is the most common way (hexagons, zones, points). These units can have characteristics like resources, events, or size. They can be defined to allow additive elements in an easy and mechanical/mathematical way (hexagons) or divided to represent geographical entities, assuming different shapes. These mountains, rivers, oceans and other entities can delimit these zones. Some games use maps and establish a network/relational system between the zones (areas or points with individual information) in which they divide the territory. Barriers and easier connections allow asymmetric relationships and interconnections that better simulate territories. For example, the river crossings and the natural constraints that make transport hard, like mountains, deserts or others. Popular games like Pandemic Legacy (Daviau & Leacock, 2015) use this extensively (Figure 4).

Figure 4. Network/relationship map (points and arcs) in Pandemic Legacy: Season 1. Source: Dicebreaker (https://www.dicebreaker.com/games/pandemic-legacy-season-1).

Depending on the complexity, the spatial units, either geographically adapted to be regular forms like hexagons or just points and zones connected in a network of arcs, can include extensive information. This information can be printed in elements like hexagon cardboard tiles or coded in side tables/tracks and maps, which allow quantifying the system's dynamics as a playable model (Figure 5). In a way, players are transported to this analogue world if they are immersed in the game. This effect has been described as the magic circle, where time and space change when players are engaged (Huizinga, 2014; Salen & Zimmerman, 2004). In this sense, we argue that modern board games with spatial units and systems are geogames, allowing players to interact with worlds similarly to those games created with real-world data. We are not suggesting that these experiences are the same as going into an actual location. However, it offers a more effortless and cost-effective way to explore geographical content using readily accessible materials, making the potential of geogames easily available to schools and low-income communities.
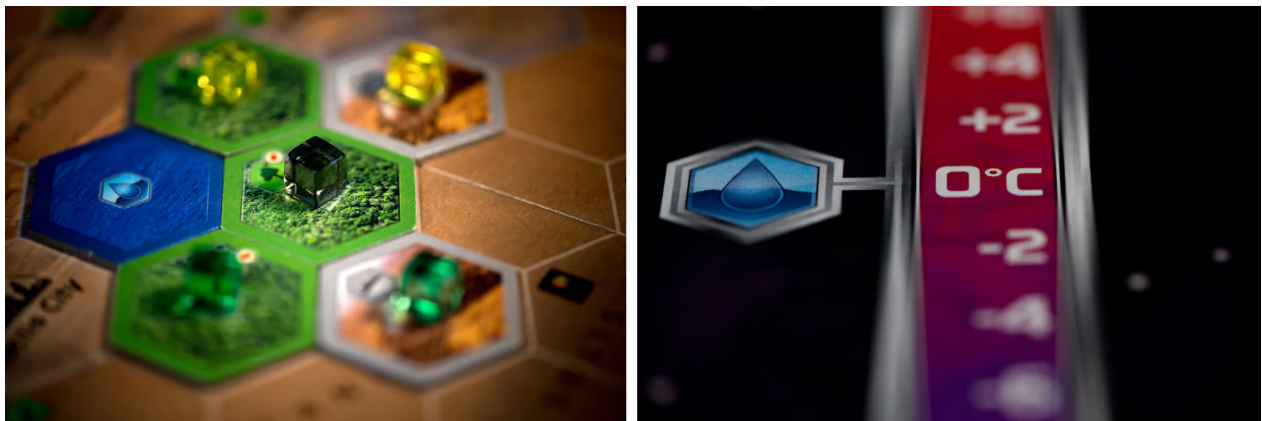
Figure 5. Spatial hexagon representation of a territory and the track of temperature in Terraforming Mars. Source: Fryxgames (https://fryxgames.se/product/terraforming-mars).

4.3. From Location-Based and Geospatial-Based Games to Imaginative Spaces in Geogames and Modern Board Games

Revisiting the book *Geogames and Geoplay* and exploring beyond the bibliometric analysis sample, various chapters discuss the expansion of the concept of real spaces within games. In chapter 2, Ahlqvist et al.

(2018, p. 26) present the concept of GIS-MOG and distinguish space between the real world and the game world, where game elements and items can "only exist in the game world and do not correspond to real world features." In the meantime, they refer to the combination of real-world and game-world elements as a "hybrid space" game pattern. This involves mixing physical and virtual interactions, where cyberspace is extended to geographic places and objects, and vice-versa. This blending creates a mediated space that exists beyond the strictly physical (Scheider & Kiefer, 2018).

The idea of simulations and abstracted realities in geogames is viewed as "instantiations of real-world systems, abstracted to some thematic focus," capable of providing insights into that system's behaviour (Ahlqvist & Schlieder, 2018, p. 14). Games can provide a "safe space" in which players can experiment with "different realities, interventions, and changes in the represented space" (Poplin & Vemuri, 2018, p. 86). This highlights the use of games to create simulated environments or alternate scenarios based on real geography while still allowing for imaginative manipulation.

Urban planning games, for example, occur in a "virtual space" where different solutions can be simulated. When dealing with LBGs, these are described as having different conceptual layers, including the "ludic" (game rules, mechanics) and "narrative" (scripts, story) layers, which deploy or implement concepts of the underlying "environmental" layer (Scheider & Kiefer, 2018). A building in the environment (environmental layer) can "play the role of a castle on the narrative layer" and be a place for resources (ludic layer; Scheider & Kiefer, 2018, p. 135). Game localization involves the design of a "spatial narrative," where roles or story points are fixed to locations, objects, or activities in environmental space.

Geogames can "defamiliarize" players with places, breaking routines and encouraging them to "look at the world anew" (Mathews & Holden, 2018, p. 168). Narrative and role-based play help players "experience and see familiar places in new ways" and "re-inhabit the world, often in a playful manner" (Mathews & Holden, 2018, p. 168). Taking on roles (e.g., environmental historian or wildlife ecologist) allows players to view a real place from different perspectives, supported by virtual characters and data.
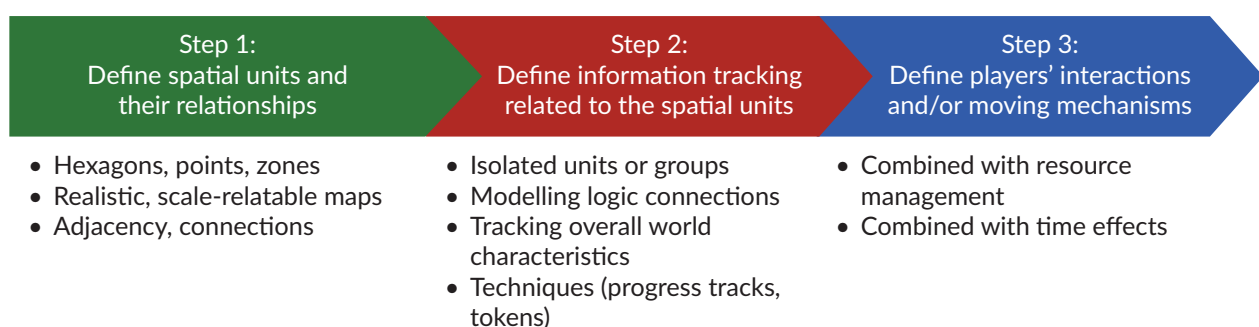
The idea of Places of Gameplay is presented by Schlieder et al. (2018) to describe how some LBGs, like certain live-action role-playing games, create imaginative spaces such as a "magic forest, which may have little resemblance with features of the geographic environment" (p. 113). This is contrasted with serious games that link players to existing places; here, the concept of creating game spaces with imaginative characteristics is present.

As we have seen, modern board games are delivering geo-spatial experiences through low-tech and simplified materials. The limitations of using boards, cards, tokens, and physical pieces rely on the players to fill in the gaps and build imaginary spaces (Rogerson & Gibbs, 2018). However, this is not a pure sandbox experience. Even the most minimalist narrative games propose a game framework to support the narrative development and achieve coherence. Traditional tabletop narrative games tend to depend on a game master to set the narrative, while modern board games rely more on the mechanical system. In either case, supported by the game master or the game system itself, players enter these imaginary spaces, making decisions that change the game world. To use these design characteristics to build geogames, serious games, or other game-based approaches beyond pure entertainment, it is necessary to master these game design elements.

Through our sample retrieved from BGG, it is possible to identify some patterns. More than a ludemic approach, we identified a process. One of the first steps is to represent the world, usually with a map. The most common approach is to divide it into spatial units. Hexagons are the best solution to model multidirectional distances, since the centres between adjacent units are all equidistant. These hexagonal grids are used to model adjacency effects and travel distances in all directions. However, non-scale maps are standard, representing points, arcs, and regions when asymmetric spatial relationships are a better fit.

After representing space, there is a need to track the characteristics of the spatial units, usually by staking pieces over the spatial units or using track bars. Each location can have special characteristics to complement the previous elements that might require text. The overall world characteristics can be represented on side boards, not directly on the spatial units' material and graphical representation. Some of the games introduce the travel system. In these cases, there is a need to define a mechanism that controls the movement cost and directions, considering the narrative of what entities are moving, by what means, and considering the territory's characteristics, even when arcs and other logical connections between regions abstract them.

Figure 6 presents a three-step simplified version of this process of defining a world in an analogue territory, following modern board game design trends to support the imaginary spaces and narratives. Since geogames tend to propose traveling through the virtual world, we specifically define the player interactions aiming for movement. In step 1, we can specify if we are using hexagons or any other geometrical shape grid, or a more realistic and scale-relatable map with regions, points, and arcs. Besides the shape, we need to define the relationships between the spatial units, like adjacency and connections. In step 2, we need to define how to track the information of the spatial units as isolated units or groups, according to their characteristics. This might require modelling the logic connections between the spatial units or the overall world characteristics. A common technique is to use progress tracks or the placement of different tokens and objects that represent various things over the spatial units and their relationships. Step 3 is concerned with how players interact with the game world and each other, in the case of a multiplayer game. Movement mechanisms tend to be combined with resource management and time effects. All these mechanisms can be consulted in the latest work by Engelstein and Shalev (2019), *Building Blocks of Tabletop Game Design: An Encyclopedia of Mechanisms*.

| Step 1: Define spatial units and their relationships	Step 2: Define information tracking related to the spatial units	Step 3: Define players' interactions and/or moving mechanisms
• Hexagons, points, zones • Realistic, scale-relatable maps • Adjacency, connections	• Isolated units or groups • Modelling logic connections • Tracking overall world characteristics • Techniques (progress tracks, tokens)	• Combined with resource management • Combined with time effects

Figure 6. Summarized process of defining a world based on territorial and spatial representation in modern board games.

To illustrate the process outlined in Figure 6, we apply the guidelines from Sousa (2025) for spatial and urban planning analogue games. This framework details game mechanisms and their interpretations, which align with our proposal. Figure 7 offers a complementary visual scheme for future research. We use Suburbia, Scythe, and Terraforming Mars as examples. All three use hexagons to represent territory, but with varying

scales. The functional representation in Suburbia contrasts with the scaled, planetary representation in Terraforming Mars, exemplifying step 1 of Figure 6. All three games also use icons to supplement the hexagons, establishing adjacency and connection effects (step 2). The hexagons act as spatial units that set the framework for movement, area control, and occupation. Additionally, all games use integrated tracks to monitor urban, spatial, and environmental indicators, while game components simulate economic development and player interactions (step 3).
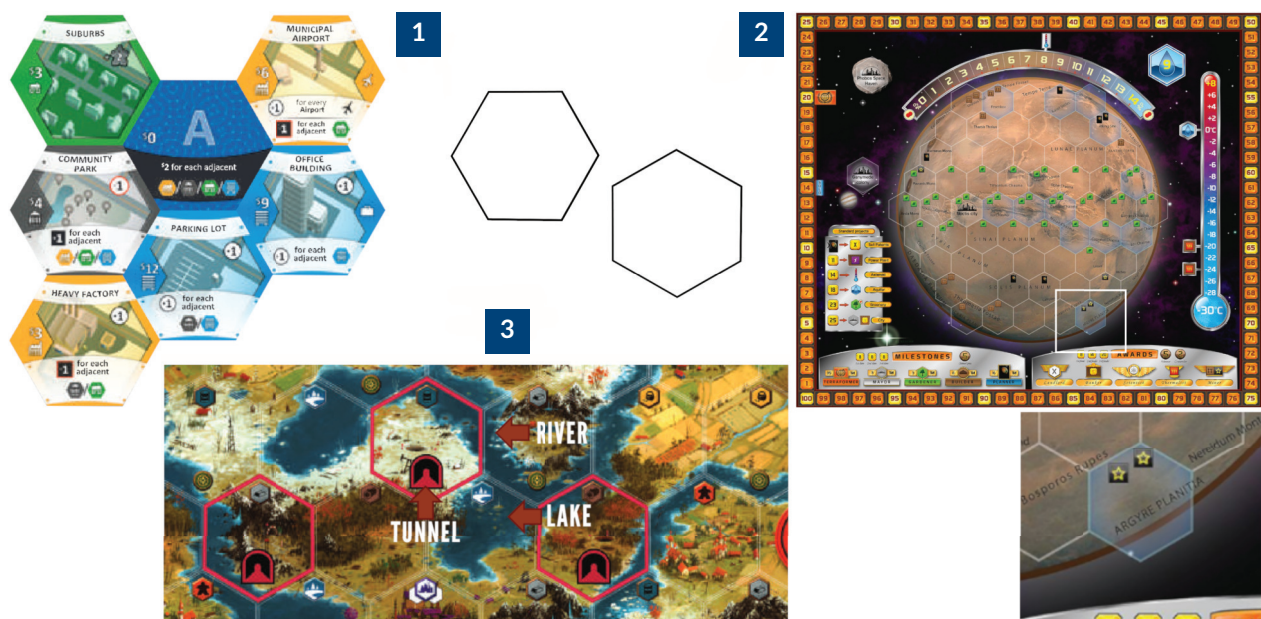
Figure 7. Screenshots from the board game rulebooks (available at the publishers' website): (1) Suburbia, (2) Scythe, (3) Terraforming Mars.

5. Closing Remarks

Our quest to explore geogames from an analogue perspective led us to explore the trend of modern board gaming and how they have changed how spatial models are represented. Besides the physical models, the ability to enter an imaginary world, even without a graphical representation, is a powerful experience. Tabletop narrative games have been delivering these experiences since the 1970s. Modern board games in the last two decades have mixed the graphical representations with narrative development in new ways. Having examined some of these games and their characteristics, it is clear that many incorporate geographic and spatial elements. We acknowledge that a vast body of literature exists on serious games and simulations that are highly relevant to geogames, including foundational work from the 1970s and extensive research published in journals like *Simulation & Gaming*. This study's primary focus on commercial entertainment board games with geospatial elements, while a deliberate choice to narrow our scope, represents a limitation that future research could address by including this broader body of literature. Yet, despite acknowledging the limitations of our analysed sample—including the subjectivity in keyword selection and the potential for indexing inaccuracies—the field of geogame research continues to neglect modern board games.

We argue that modern board games are geogames in the sense that they create a virtual spatial world where players can travel, combining their imagination with a solid game mechanical system that helps track and

build a spatial context that supports interaction. These games simulate complex geographical phenomena and represent spatial relationships using abstract systems like hexagonal grids, networks, or zones, which players navigate through meaningful decisions. Central to this experience is the player's imagination, which works in concert with the game's physical components to build an immersive "magic circle"—a safe space for experimentation and learning. This process not only facilitates a deeper understanding of spatial dynamics but also leverages the inherent social nature of board games to foster collaborative problem-solving and offer novel perspectives on geographical issues. Consequently, their accessibility and cost-effectiveness make modern board games a potent and inclusive tool for geographical education and engagement in diverse settings. We systematized these findings in a summarized process (Figure 6). However, we recognized that applying these approaches might not be as simple as it seems. Despite the low-tech ease of building these games from a material perspective, modern board games require considerable game design knowledge to be effective.

The inherent accessibility, low-tech requirements, and cost-effectiveness of modern board games present compelling advantages for educational and community-based applications, particularly in contexts with limited technological resources. Their ability to transport players into "magic circles" of imagined spaces, guided by tangible components and clear rules, offers a powerful and engaging medium for exploring geographical concepts. This study strongly advocates for the inclusion of modern board games within the broader scope of geogame research and design. Recognizing the "design revolution" within the board gaming world and the increasing sophistication of their spatial representation and mechanical systems opens new avenues for understanding spatial reasoning, simulating complex environments, and fostering engagement with geographical content in a tangible and imaginative way. However, we also acknowledge that effectively leveraging the potential of modern board games for serious applications requires a deep understanding of their intricate design principles. Mastering this design knowledge is crucial for harnessing the power of analogue geogames in education, community engagement, and other game-based interventions, ultimately enriching the field of geogames with a wealth of under-explored possibilities.

Conflict of Interests
The authors declare no conflict of interests.

Data Availability
Due to the nature of the research, data sharing is not applicable to this article.

LLMs Disclosure
The authors used Google NotebookLM to assist with grammar checking and the processing of literature metadata for the bibliometric analysis conducted with VOSviewer.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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About the Authors

Micael Sousa is chief game designer at the Centre for Advanced Preparedness and Threat Response Simulation (CAPTRS), researcher at CITTA—Research Centre for Territory, Transports and Environment, HEI-LAB, and ciTechCare, and invited teacher at several universities (University of Coimbra, Lusofona University, Polytechnic of Leiria, and others) where he lectures on serious games and game design.

Ítalo Sousa de Sena is an assistant professor in digital landscape design at University College Dublin. His research focuses on geographical virtual environments and immersive landscape visualization, particularly leveraging Minecraft for public engagement in urban planning and climate action. His expertise spans GIS, remote sensing, and geogames.

Chiara Cocco is an assistant professor in digital technologies and environmental design at the School of Architecture, Planning and Environmental Policy and member of the Spatial Dynamics Lab, University College Dublin. Her research focuses on participatory design/planning using digital technologies and GIS, geodesign, citizen science, and socially engaged architecture.

Gabriel Mota is a geologist who works in engineering geology, disaster risk reduction, urban planning, natural resources, education, and interdisciplinary environmental studies. With professional experience in public and private institutions, he holds a Master's degree and a PhD in research focused on the risk management of coastal cities and complexity/systems approach.

Grace Houser holds a B.A. in Computer Science with a Data Analytics minor from Furman University (2024, Cum Laude). Her research interests include geogames and website development. Since September 2025, she has been a computer science research intern at the Spatial Dynamics Lab, University College Dublin.