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A PATTERN LANGUAGE FOR CINEMA: SPATIAL SEMIOTICS IN VILLENEUVE'S DUNE

The article explores the possibility of applying Christopher Alexander's Pattern Language to the analysis of film architecture, using Denis Villeneuve's *Dune* (2021) as a case study. The research examines whether architectural patterns can function as a visual language that conveys relationships, hierarchies, and power dynamics within cinematic storytelling. Through diagrammatic mapping of Alexander's patterns across three scales—city, building, and construction—the study identifies their recurrence within *Dune*'s narrative structure. The findings suggest that architecture in the film acts not merely as decor but as a semiotic and narrative agent, shaping the viewer's perception of space, emotion, and ideology. By linking spatial design with interpersonal and political relationships, the film's built environment becomes an expressive system that supports storytelling. The study concludes that Alexander's framework offers a valuable analytical tool for interpreting cinematic world-building and suggests directions for further research across other science fiction films to assess the universality of this approach.

Keywords: film architecture, Pattern Language, psychology of architecture, relations, cinematic space, visual storytelling, science fiction cinema, *Dune* (2021)

1. INTRODUCTION, DEFINING THE RESEARCH PROBLEM

Christopher Alexander and his team in his book "The Language of Patterns" [Alexander, Ishikawa, and Silverstein 1977] wrote down archetypes that are encoded in the human psyche, patterns that already exist in consciousness – we perceive architecture emotionally [Lenartowicz 1992; 2010]. He also gave his proposed urban, architectural and interior design solutions to some social problems. The patterns are concerned with shaping urbanism (regions, cities, neighborhoods, settlements, relations between them), buildings, interiors and structures. Its patterns are intended to build good relations between people through architecture. In addition, these patterns offer a unique lens through which we can understand the interplay between built environments and human behavior, suggesting that architecture is not merely a physical construct but also a cultural narrative device.

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Architecture appears in virtually every film as a backdrop to the events unfolding. It is inherent in cinematography because it accompanies people in real life, including in experiencing emotions. Which is already used in a conscious manner in films [Chung 2024]. This omnipresence of architecture in films underscores its dual role as both a visual element and a carrier of symbolic meaning that can shape and reflect societal values. Research by Skoczylas [Skoczylas 2024] shows that film architecture, through the use of universal patterns, becomes a carrier of collective memory, which supports the thesis of the deeper importance of space in shaping social relationships. Kuhn [Kuhn 1999] notes that science fiction cinema has long relied on architectural space as a metaphor for power, control, and otherness, making it a critical site for ideological analysis. According to Christopher Alexander's thesis, these patterns are rooted in the human psyche and influence our emotional perception of space, which in a film setting allows viewers to identify with universal cultural archetypes. This approach emphasizes that architecture in film is not just a backdrop for the action, but actively participates in the construction of collective cultural memory and the formation of social relations. The repetition of patterns in many films, serving to portray similar emotions or relationships, points to the possibility of creating a catalog of film architecture archetype patterns or at least a partial use of Alexander's "Pattern Language". The potential of patterns as a tool for designing film spaces that appeal to universal values and experiences is pointed out.

Cinematic architecture is additionally more interesting, from the point of view of the article, when it is created specifically for a particular film. Utility, good layout of functions in a building or durability are not so important when building a set for a scene or frame. Its lifespan is very short, temporary, so its appearance, may be the result of what we want to portray in the scene [Bordwell 1985]. By focusing on the transient and highly stylized nature of film sets, we can explore how temporary architectural designs are imbued with enduring cultural and emotional resonances.

In movies, filmmakers don't always care about showing good relationships between people, but this pool of relationships is very wide (including intimate relationships, friendship, neutrality, formal relationships, showing power, hostility, rivalry, loneliness) – including in the film *Dune* itself [Hamnu 2024; Winston 2020]. Such a diversity of interpersonal dynamics demands that the cinematic space itself be versatile, capable of mirroring the multifaceted nature of human connections. The use of specific architectural elements to highlight certain emotional tones or narrative threads further enriches the viewer's engagement with the film's world.

The research asks whether the architecture in *Dune* functions not merely as scenic decor, but as a structured visual language that articulates relationships, hierarchies, and power dynamics across multiple narrative levels. Can Alexander's patterns operate as archetypal, semiotically charged forms in the context of speculative cinema? If so, might they serve as a visual grammar that enhances narrative coherence and emotional resonance? This case study uses diagrammatic mapping of architectural patterns and relational structures within *Dune* to test this hypothesis.

By foregrounding architecture as a narratively functional system, this study contributes to growing interdisciplinary dialogues between film studies, design theory, and spatial semiotics. It also raises a broader methodological question: can architectural pattern languages offer new analytical frameworks for understanding the visual logic of world-building in science fiction cinema?

2. SELECTION OF FILM FOR RESEARCH – DUNE

To test the validity of this concept, I chose a film that meets the following conditions:

- it is in the science-fiction or fantasy genre
- its production was after the publication of Alexander's book (after 1977)
- the place of action takes place on a planet (not in space on a ship) and resembles conditions on Earth (people can go outside from buildings in a free way, without imposing anything more on themselves than if they left their homes on Earth)
- its audience includes people from many cultural backgrounds
- it is appreciated in the film community for its setting

These conditions are met, among others, by the 2021 film *Dune* from Legendary Pictures / Warner Bros studio [Villeneuve 2021]. The film's production design has been awarded, among other prizes, by the Scenographers Guild of America in 2022 for best production design in a fantasy film, a BAFTA award and an Academy Award (also in 2022) [Filmweb 2024a; 2024b]. The accolades received by *Dune* underscore its significant contribution to the field of film production design, highlighting how architecture and set design are integral to the storytelling process.

The choice of *Dune* as a subject of research is also grounded in the immense influence that the film has had on modern cinematic architecture. Its groundbreaking approach to production design not only reflects the narrative of the film but also helps to convey its philosophical and political undercurrents, making it a suitable case study for this analysis.

Denis Villeneuve (director and writer), Patrice Vermette (production designer) were responsible for creating the film vision of Arrakis, the city of Arrakeen and its architecture. Villeneuve's approach to the film was one of highly stylized realism, aiming to create a world that felt both timeless and grounded in the physical laws of nature, despite its fantastical setting. They wanted to reflect the plot through architecture [Conklin 2024; Koç 2024]. The creative team used a mix of real-world references, futuristic elements, and symbolic design principles to imbue the sets with cultural and political meaning. The architecture of Arrakeen, for example, is not just a physical structure but a tool for conveying the complex relationships between power, colonialism, and resistance, which are central to the film's narrative.

The film *Dune* and the world created for it is an adaptation of Frank Herbert's 1965 book. In the article I will deal only with the film version, I will omit the description

from the book for the sake of clarity of the article. While the novel is a cornerstone of science fiction literature, the film's visual interpretation offers a new layer of meaning, particularly in how the environment and architecture serve as metaphors for the larger themes of the story. Describing all the architecture present in the film, and analyzing it, is a very broad topic, so I have chosen one area for research.

In this article, I will focus on exploring the patterns used to build the architecture of the governor's palace (the Arrakeen Residency) and the city of Arrakeen in order to illustrate the characteristics of the relationship between the Fremens (indigenous people) and the Emperor represented by the ruling family on the planet (the colonizers, the Harkonnen family and the Atreides family). The architecture of Arrakeen was designed to reflect the social dynamics between these groups, with the grandeur and coolness of the Harkonnen structures standing in stark contrast to the more humble and inscribed environmental spaces of the Fremens. An extended description of the accounts showing anti-colonial attitudes in *Diune* is included in Zrníková's thesis [Zrníková 2024]. The architecture becomes a silent yet powerful player in this political drama, shaping how the characters move through space and how they interact with each other and their environment.

A deeper exploration of the colonial aspects of the film can be drawn through the architectural choices made by the production designers. The imposing, brutalist structures of the Harkonnen family exemplify the oppressive power dynamics at play, while the organic, flowing design elements associated with the Fremens reflect their resistance and adaptability.

I will look at this using the scale proposed by Alexander and according to his understanding of these designations:

- towns scale
- scale of the buildings
- scale of the constructions

It is impossible to give all the patterns covered in the book that the creators used (in one article), so this will be a subjective selection of those that most shape a given space while telling a story. This selection focuses on key elements that play a direct role in the portrayal of the political and social tension within the narrative, offering a focused lens through which to examine how architecture, even in a science fiction setting, can serve as a powerful storytelling tool.

3. DESCRIPTION OF THE CITY AND THE ARRAKEEN RESIDENCY

3.1. Towns

The planet on which the city of Arrakeen is built is a desert planet. It is characterized by a harsh and unforgiving desert environment. The view of the planet from space shows nothing but the color of sand. There are no patches of

vegetation or water on its surface. The water is confined inside the planet. In this desert world there is a valuable spice that the colonizers (a family chosen by the Emperor who rules the entire universe) extract. However, due to the lack of water, it is the most valuable resource. [Dune Wiki, 2024; Villeneuve, 2021 Hilburg, 2021]

The city of Arrakeen is built on and surrounded by rocks. The rocks form a barrier against threats from nature and the Fremens, the indigenous people. The wall completes the places where the lack of continuity of the rocks does not create a safe barrier. The rocks primarily protect cities from attack by maggots – huge desert animals that are a threat to humans. Places where rocks are absent are practically inaccessible for development. The planet cannot be surrendered to itself, but it is possible to cooperate with it, as evidenced by the Fremen sichs, however, this is not the subject of this article.

Buildings in the city are built very close to each other. In fact, it is hard to see the spaces between them. The buildings have no unnecessary openings. They are of similar height with irregularly occurring towers throughout the city. The massiveness of the city, with its dense urban fabric, creates a sense of permanence, making it clear that the city is both a place of habitation and defense. The lack of openings in the walls of buildings, coupled with the geometric shapes, evokes a sense of utility and functionality rather than comfort. The architecture is minimalist, with an emphasis on stability and security rather than ornamentation.

The governor's residence towers over the city. The seat of power still has representative, military, residential functions. The palace is the largest building in the city by volume, and is the tallest and most extensive (but lower than the surrounding rocks). Its proportions are designed to overwhelm the viewer, showcasing the scale of the empire's dominance over the planet. The architecture of the palace reflects its dual role as both a place of power and a military stronghold. Its form is imposing, with long, horizontal lines and heavy, angular shapes. The materials used for the construction are raw and solid, enhancing the brutalist aesthetic. The palace's bulkiness contrasts sharply with the surrounding city. Its terraces and flat roof offer panoramic views of the surrounding desert.

3.2. Buildings

In the Arrakeen residence one can see inspiration from brutalism [Li 2022], Mayan architecture, Egyptian pyramids, Vilanova Artigas or Frank Lloyd Wright designs. The shape of the building resembles a zikkurat. It is shaped vertically, with horizontal planes of roofs – terraces. On one of them 20 trees are planted.

The verticality of the building was achieved through stepped layers, as in the ziggurat, but primarily through the use of vertical, narrow and regular slits in the façade and vertical “razor blades” protruding from the façade of different heights, arranged increasing towards the building's centerline.

The palace is built of simple geometric forms, with walls sloping towards the center of the building. Narrow slots for windows are planned only where needed, often without direct opportunity to infest the world, but only to illuminate the interior.

3.3. Constructions

The material used to construct the building is concrete. It can be seen both outside and inside the palace. The concrete surfaces are raw and textured, giving a sense of unfinished solidity.

The interiors of the mansion are illuminated by light coming in through small openings, mostly without a direct view of the outside. However, the main areas are well lit. Spaces that do not need it are left in semi-darkness.

There are at least two bas-reliefs in the palace. The walls show traces of planking forming mostly straight horizontal lines. The bas-reliefs, along with the textural walls, add a sense of history and gravitas to the interior of the palace, suggesting a connection to ancient traditions and a continuous legacy of power. The interiors are austere with minimal furniture. The sparse, functional furniture adds to the feeling of coldness and isolation within the building, reinforcing the idea that this is a space meant for work and governance rather than comfort. The lack of decoration emphasizes the utilitarian purpose of the space, where every element serves a function, from the placement of windows to the arrangement of furniture.

Tab.1 provides a brief summary of these descriptions.

Tab. 1. Summary of the architectural and urban features of Arrakeen

TOWNS	BUILDINGS	CONSTRUCTIONS
<ul style="list-style-type: none"> - Desert world - City built on rocks - Places between rocks enclosed by a wall - Buildings in the city are compact - The largest building – the governor’s palace 	<ul style="list-style-type: none"> - Zikkurat - Brutalism - Vertical shaped - Dominating the surrounding buildings - “Submitting” to the dominance of rocks - Simple, geometric forms - Narrow window slots - Purpose of building – bunker, protection, fortress – military and against nature; seat of ruler – showing prestige, hierarchy. 	<ul style="list-style-type: none"> - Strictness - Inside and outside the same material - Small number of windows giving a view - Shaping the space with light - Concrete - Reliefs

Source: own study

Reading the descriptions of the created world, the city and the building, one can expect the architecture to show the following relationships:

- indigenous people – colonizers
- colonizer – emperor
- nature – built world
- the family managing the planet – the previous administrator.

In order to structure the above-mentioned relationships, they were divided into three levels (relationship levels). These levels are not the same as the scales given by Alexander, although some correlations can be noted.

- macro level- relationships between the main characters of the analysis: Fremen, planet, colonizers. Although the colonizers are not one society, they are included here as one main character in relation to the other main characters.
- mezzo level – the internal relationships of each of the main characters. Here, due to the plot of the film, we see the internal relations of the colonizers (between the families, between current and former planetary administrator, families and the Emperor). In this part of the story, which has been adapted into a movie, we hardly see the relationship between the Fremen. At this scale, one could find relationships between different parts of the planet, but such an analysis already goes beyond the architectural patterns that are the subject of this article's research.
- micro level – these are the internal relations and histories of the families.

4. PATTERNS USED

The purpose of this article is not to list all the patterns named by Alexander – after all, each pattern could be considered to be present or absent as a procedure to present negative characteristics and highlight a social problem – but to review those patterns that are indisputably used to build a plot, tell a story or provide information that allows the viewer to learn more about the created world. Given the complexity of the design choices in the film, certain patterns are more directly linked to the narrative and emotional impact, while others may subtly shape the atmosphere and cultural backdrop without overtly influencing the plot. The patterns chosen for analysis are those that contribute most significantly to the unfolding of the story, helping to highlight key themes and relationships. Thus, this review of patterns is not just a technical analysis of architectural elements, but also an exploration of how these elements are employed to enhance the viewer's understanding of the world and the characters within it.

The selection of patterns is burdened by a subjective view of the patterns in the book "The Language of Patterns" and the reception of film architecture, also in a subjective way. As with any interpretative analysis, the identification of patterns is influenced by the context in which they are observed, the intentions of the filmmakers, and the viewer's personal experiences and expectations.

In parentheses are given the pattern numbers according to the numbering in the book.

4.1. Towns

- Subculture Boundary (13) – the pattern implies the requirement that different subcultures be separated by some physical barrier so that they can maintain their identities. In the film, the city of Arrakeen is built on rocks, even surrounded by them. Also built in accordance with the pattern and shown in the film are the meeting places of Fremen and colonizers on the seam that runs between the two subcultures.
- Four-story limit (21) – Alexander, for reasons of psychological well-being and the possibility of establishing unforced social relations, proposes to set the height limit for buildings at 4 stories. The city built around the residences basically follows this pattern. The entire city appears to be standardized in terms of height. The exceptions are irregularly placed taller buildings and the governor’s residence itself (which follows the pattern of High Places (62), which will be discussed later in the article). The pattern of a four-story limit is used to reinforce the character and importance of the function of the governor’s residence.
- Sacred Places (24) – the pattern emphasizes the importance of and the need to protect places that make us feel a stronger connection to the area, convey values related to the past and embody relationships with the land. The governor’s palace has a sacred garden with trees. It is a sacred place for the Fremen. Pilgrims come there. And the trees themselves are described by the gardener as an “old dream.” The scene where one of the characters conveying emotion is this garden, which is particularly poignant, is the moment when the palace and city are attacked by the Emperor’s forces – the burning palms of this “sacred place” for the Fremen, which was cared for by them, and respected and supported by all the colonizers up to that point, are then shown. The brutality, disrespect for life, force, contempt for others, domination, going for the goal at all costs, hatred, disrespect for culture on the part of the Harkonnen and the Emperor are then shown. [Durrani 2023]
- Men and women (27) – every building and space should be created and adapted by men and women. This pattern is strongly evident in the relationship between the families and the Emperor and the Bene Gesserit female order [Risvandi and Fikri 2024] – from the outside it looks like a very masculine world and relationships, in fact it turns out that women play a large role in it. The same is true of the architecture – from the outside it is masculine, but in the interiors and details the feminine elements are evident (wall decorations, bas-reliefs).
- High Places (62) – by using this pattern together with the Limit 4 stories pattern (21), the prevailing political system of the distribution of power on the planet is emphasized (the Emperor rules the entire universe, one family is the executor of power on the planet and dominates the indigenous population). Alexander suggests that tall buildings, point-wise, should be designed as an average of 1 per 7,000 population. There are many towers (visible from above) scattered throughout the city, which can be assumed to maintain the 4-story limit. They are not very dominant, but tall enough to stand out from their surroundings and can be

observation points. The dominant building in the scale of the whole city is the governor's palace. It towers over the entire development. Also, its area and volume even overwhelm the surrounding city.

However, even the palace is not the tallest place in the area. Rocks dominate the entire man-made environment, showing the power of nature on the planet. Sending the message that humans have not tamed nature, that it is not given to them, although they extract raw materials from it.

- Ponds and streams (64) – *Dune* is a desert planet. Water is locked deep beneath the surface, and every drop of it is very precious. The Fremen have created special costumes that collect and filter sweat so that no drop of water goes to waste. The Alexander pattern shows the value of water in cities. He encourages the protection of natural bodies of water, collecting rainwater, bringing water from underground to the surface, creating fountains and places to contemplate water. The city or palace itself lacks surface water, with no ponds, streams or fountains at which to gather. However, water is one of the most important elements of the plot. The Fremen's dream is to free the water and make the planet green. In this context, it is even brutal and wasteful to build an entire city and palace out of concrete, which binds the water within itself. This can be perceived as an attempt to show the colonizers' domination of the planet and the local population.
- Sacred ground (66) – what is considered sacred should remain difficult to reach, requiring discovery, waiting and levels of access. Every community needs places where, as we pass through successive areas containing ourselves, we arrive at the sacred center, the inner sanctuary. Ch. Alexander even states that “when a community has such places, a sense of holiness will gradually awaken among the people who share this experience.” The inner sanctuary was shared between the colonizers and the Fremen. The trees in the inner sanctuary described earlier, the limited accessibility of the place and the need to go through layers of access (desert → wall → city → residence → place designated for pilgrims → inner courtyard with garden), the building inaccessibility of the place combined with the verbal prophecy builds in the Fremen a belief that one of the colonizers (Paul Atreides) is the messiah they are waiting for.

4.2. Buildings

- Connected buildings (108) – according to Alexander, isolated buildings are a sign of a broken society. Buildings connected to each other, touching each other, with no unnecessary spaces between them, force people to interact with each other and adapt to the “vast and more impenetrable” reality of the outside world. In the film world of *Dune*, we have a city that is very compact. One reason for this may be the city's limited space by the rocks that provide security. But it is also underscored by the need to unite the colonizer community with each other, to create strong bonds in opposition to threats lurking from outside.

- Tree Places (171) – Alexander points out the need to nurture trees planted by humans until they create social spaces and can survive without human care. He reveals how psychologically important a role trees play in human life (as a symbol of personality, fullness and development, drawings of trees are used during projection tests). He argues that trees planted in cities will not satisfy the longing for trees when the places they create are not respected. This pattern in the film adaptation is used to show the Fremens’ dream, to build and nurture hope (as the trees are tenderly watered). The trees are planted in rows in the square, at distances large enough that their crowns do not meet. They are arranged evenly, in straight lines and identical spacing. They don’t have a chance to create the social spaces Alexander writes about, even though they try (they are on two sides of the square, forming its walls). The emperor, with the hands of the ruling family on the planet, gives illusory hope of fulfilling the dream of a green planet, when in fact it is a place showing domination – the existence of the trees depends on the colonizer, they are inside the city, on the palace grounds, they exist by grace and can be part of the political game.
- A Gobelin of Light and Darkness (135) – this pattern tells how important the role of light and shadow is in an interior. By using lighting appropriately, we can create a striking setting for events. People instinctively turn and move toward the light. In the rooms in the governor’s palace, even though they don’t have a lot of openings, this pattern is very evident. The interiors where the movie scenes take place are even made of light and darkness. Spaces illuminated through gaps in the walls or ceiling draw the viewer’s eye and add drama to dialogues or events.
- Secret place (204) – there should be a place in the house that is hidden, whose existence no stranger will guess. This allows you to create a secret and share it in an intimate way only with insiders. We see one such place in the governor’s palace when, after a failed attempt to assassinate Paul Atreides, we discover a Harkonnen soldier walled up in the wall (6 weeks earlier). Of course, there is no sharing of intimacy between the Atreides and the Harkonnens. Rather, about hostility, hatred and the demolition of a sense of security. About marking the lack of a good relationship between the families.

4.3. Constructions

- Space next to poles (226) – poles play an important social role. Even a single pole accentuates a certain point, divides a space and at the same time defines a new space around it – provided it is thick enough. In the film, in the Imperial Ecology Research Station, in the middle of one of the rooms is a large pole with a hole above it. There was research being done here on releasing water hidden in the planet until a valuable raw material was discovered, a spice that would disappear along with the appearance of water and plants. This pillar is definitely larger than Alexander’s good pillars describe, on a human scale it is even too large to produce social space. We see this room when the shift judge tries to help Paul

after the Harkonnen attack on the city: a scene is shown when several Fremen sit under the pillar preparing coffee for them and the Atreides (which can be seen as a symbol of friendship). Even when the Emperor's soldiers silently descend, intending to kill everyone in the station, the Fremen manage to hide under the sands and attack them by surprise. Although in the end most of the people in the station are killed (except for the 2 main characters and the shift judge), the pillar allows the viewer's attention to be focused in the right place and has built a sense of stability and safety – a rest after escaping from the attacked palace. Using contrast (safety, hiding place – attack, death), a sense of brutality on the part of the Emperor towards the Atreides family was also built in the viewer.

- Ornament (249) – Alexander states that ornaments are as important in a building as doors and windows. Ornaments are not just for decoration (although everyone tends to decorate), but make the world or space more whole. Ornaments especially work at the junction – between two elements binding them together as if seams, where there are two edges (of materials, walls, worlds, spaces, cultures...). The austere and brutalist architecture of the colonizers on *Dune* seems to have no need for ornaments. After all, it is “only” useful, it is supposed to provide shelter and continuity in the extraction of a valuable resource. However, even here ornaments appear, stitching the spaces together. One boundary that is visible and is decorated with ornament is the partition between the tree plaza (the plaza, which is a sacred place, sacred ground and tree place) and the place where the Fremen pilgrims come. The metal grating is carved, which contrasts with the simplicity and lack of ornamentation in the plaza and building walls. There is a clear boundary between two cultures and two spaces. It seems that the creators of the concept may have wanted to stitch the boundary between the square and the hope provided by the trees, and the place for pilgrims and their “unfulfilled dream.” One can also see an attempt to bring the colonizers and the local population together – for which the willingness of both sides is needed (the Harkonnen family did not show this willingness, unlike the Atreides family). The second ornament is the reliefs in the palace. They are seen in the company of Paul Atreides. So is the previously mentioned metal partition. Paul, in a way, becomes a sort of guide to the palace for the viewer. One of these bas-reliefs depicts the Shei-Hulud, the brood of the desert – a threat to the colonizers, a symbol of the planet's power, a producer of extracted raw material and a sacred creature to the Fremen. The second bas-relief is in Paul's bedroom and depicts fish. It is interesting and significant that the director cared that these ornaments were made in reality.
- Objects from your life (253) – the things that surround us play an important role in the continuous process of self-transformation, if they are personal, chosen instinctively, have meaning for us and tell our personal story. In the film, amid the non-personal architecture and interiors of the palace (after all, another family had previously run the planet), there was no room for the motif of a personal object. The ring that Paul found in the packet of life-saving

items during the escape becomes his personal only after leaving the non-personal architecture. The ring previously belonged to his father and is a symbol of the transfer of power and the duration of the dynasty.

4. SUMMARY, CONCLUSIONS AND DIRECTIONS FOR FURTHER RESEARCH

The diagram in Fig.1 maps the frequency and distribution of architectural patterns, as defined by Christopher Alexander, onto the relational structures depicted in *Dune* (Villeneuve, 2021). These relationships – visualised as connections between key narrative agents (the Fremen, the colonisers, and the planet) – reveal a dense presence of patterns across Alexander's three main scales: town, building, and construction. Furthermore, these patterns are evident across all relational levels in the film's diegesis: macro (intergroup), mezzo (intragroup), and micro (intrafamilial). The application of Alexander's system in this analysis allows for a new interpretive frame through which to consider the architectural dimension of cinematic world-building and its role in visual storytelling.

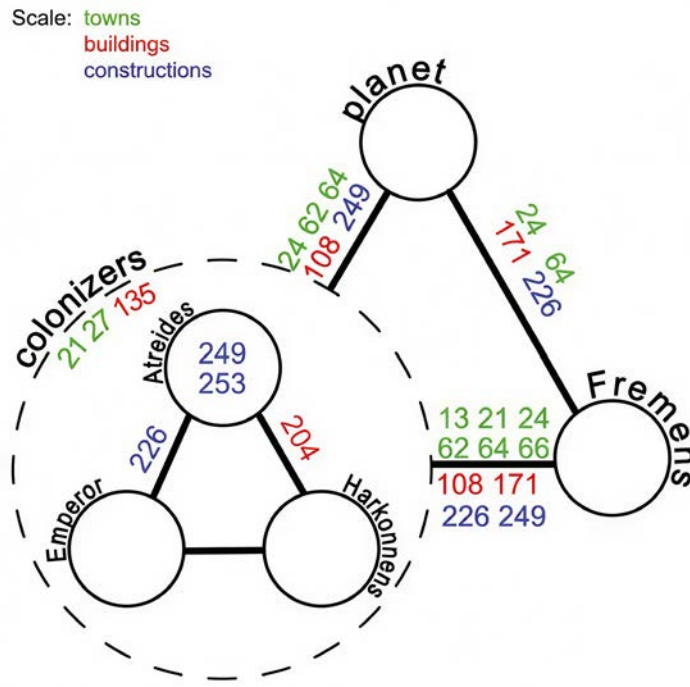


Fig. 1. Summary of characteristic features describing the architecture on Arrakeen

[own study]

On the macro level – representing the relationships between the major group entities – the architecture reflects and reinforces the dynamics between the Fremen, the colonisers, and the planet Arrakis itself. The highest concentration of patterns (10) is found in the relationship between the Fremen and the colonisers, followed by five in the coloniser–planet relationship, and four in the Fremen–planet connection. These figures correspond to the narrative focus of *Dune*, which explores the consequences of imperial power shifts, resource extraction, and the formation of new alliances. Notably, the visual language of architecture often anticipates or echoes the tensions between these groups: expansive monumental forms signal dominance, while subterranean, concealed structures suggest resistance and autonomy. This suggests that architectural space in *Dune* is not merely decorative but ideologically charged. This use of architectural *mise-en-scène* aligns with theoretical perspectives that treat space as an expressive element of narrative cinema [Bordwell and Thompson 2009]; [Branigan 2013].

At the mezzo level, architectural patterns illuminate the internal organization of the colonizing forces themselves. Here, patterns signal enduring power structures that transcend individual characters or families. For instance, pattern 21—“four-storey limit”—is visible in the consistent height of administrative buildings, which symbolically concentrate power and facilitate surveillance, regardless of whether the Harkonnens or Atrides occupy the city. Pattern 204 – “degrees of publicness”—captures the spatial separation between noble factions and the general populace, also serving to externalize political hostilities between Atrides and Harkonnens. These internal architectural codes stabilize the image of colonial governance, even as the governing family changes, suggesting that architectural form outlasts and regulates political transition.

On the micro level, the patterns function primarily at the scale of construction, encoding family histories and inherited identities. One example is pattern 253—“things from your life”—represented by Paul Atrides’s signet ring, which symbolizes dynastic continuity and political legitimacy. Although such patterns are relatively fewer, their presence suggests that even small-scale architectural or artefactual details may participate in the narrative economy, especially when used to signal themes such as inheritance, legacy, and destiny.

Taken together, these findings support the argument that the architectural patterns employed in *Dune* are not incidental but narratively functional. The deliberate deployment of Alexander’s spatial principles allows the architecture to act as a mediating agent between viewer and narrative, encoding symbolic relationships that may not be explicitly stated in dialogue or plot. The built environment thereby emerges as a semiotic system—what might be termed a cinematic pattern language—through which relational, political, and emotional tensions are visually structured and communicated. In this sense, *Dune* supports the hypothesis that

architecture, when designed and framed with narrative intentionality, can function as a storytelling agent.

This interpretation extends beyond the descriptive into the theoretical. When architecture assumes this semiotic role, it challenges the conventional status of setting as inert backdrop. Instead, it becomes a kind of “spatial actor” within the narrative, endowed with agency insofar as it can influence behaviour, reflect psychological states, and reinforce ideological orders. This agentic function aligns with emerging theoretical perspectives in film studies, which explore the intersection of spatial aesthetics, cinematic narrative, and material culture. If Alexander’s patterns serve as archetypal spatial forms—recognisable even when not consciously perceived—they may constitute a universal visual lexicon through which viewers intuitively decode meaning.

However, this case study remains limited in scope. It focuses on a single film, albeit one of unusual architectural density, and does not yet establish whether such use of pattern language is systematic across science fiction cinema. Future research could address this limitation by examining other architectural environments within *Dune*, such as the Fremen sieges, the water-centric architecture of Caladan, or the oppressive structures of Giedi Prime. Each of these spatial settings is governed by different design logics, potentially grounded in their respective cultures’ ideologies, values, and survival strategies. Comparative analysis of these sites may yield further insight into how spatial form reflects social structure in speculative worlds.

A second avenue of inquiry lies in auteurist comparison. Denis Villeneuve’s *Blade Runner 2049* (2017), for instance, similarly engages with architecture as a carrier of memory, control, and ecological anxiety. Identifying recurrent spatial motifs in Villeneuve’s work may help determine whether his use of Alexander’s principles constitutes a directorial signature or a thematic concern particular to *Dune*. Alternatively, analysis could be extended across science fiction or fantasy genres more broadly to test whether architectural patterning constitutes a genre-specific visual grammar. This would involve examining whether Alexander’s language of patterns is adaptable to varied world-building traditions and visual conventions.

In conclusion, this study suggests that Christopher Alexander’s pattern language, when applied to the analysis of speculative cinema, offers a productive framework for understanding how architecture operates narratively. Far from being decorative or backgrounded, built environments in *Dune* act as dynamic narrative components that spatialise the film’s core themes of power, identity, and transformation. Whether such patterns represent a universal grammar of cinematic space or a distinctive feature of Villeneuve’s style remains an open question—but one with promising implications for future interdisciplinary research.

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„JĘZYK WZORCÓW” W KINIE: SEMIOTYKA PRZESTRZENI W FILMIE „DIUNA” VILLENEUVE’A

Streszczenie

Artykuł bada możliwość zastosowania języka wzorów Christophera Alexandra do analizy architektury filmowej, wykorzystując jako studium przypadku film „Diuna” (2021) w reżyserii Denisa Villeneuve’a. Badanie analizuje, czy wzory architektoniczne mogą funkcjonować jako język wizualny, który przekazuje relacje, hierarchie i dynamikę władzy w ramach filmowej narracji. Poprzez diagramatyczne odwzorowanie wzorów Alexandra w trzech skalach – miasta, budynku i konstrukcji – badanie identyfikuje ich powtarzalność w strukturze narracyjnej filmu „Diuna”. Wyniki sugerują, że architektura w filmie pełni nie tylko funkcję dekoracyjną, ale także semiotyczną i narracyjną, kształtując postrzeganie przestrzeni, emocji i ideologii przez widza. Łącząc projektowanie przestrzenne z relacjami międzyludzkimi i politycznymi, środowisko „zbudowane” filmu staje się systemem ekspresyjnym, który wspiera narrację. Badanie stwierdza, że ramy teoretyczne Aleksandra stanowią cenne narzędzie analityczne do interpretacji budowania świata filmowego i sugeruje kierunki dalszych badań nad innymi filmami science fiction w celu oceny uniwersalności tego podejścia. Dalsze badania w tym zakresie mogą obejmować kolejne przestrzenie architektoniczne ukazane w tym filmie, pozostałe filmy tych twórców i inne filmy, by potwierdzić nieprzypadkowość.

Słowa kluczowe: kinematografia, architektura filmowa, Język wzorców, psychologia architektury