Improvising Space: Correspondences between Contemporary Architecture and Jazz

The relation between architecture and music has long inspired theoretical inquiry. Contemporary discourse reveals nuanced parallels between the compositional logic of music and the spatial poetics of architecture, where it had not been previously researched. This paper explores how the improvisational structure of jazz, a performative, temporal, and participatory art, communicates with contemporary architectural design. Drawing upon case studies of architects whose work demonstrates rhythmic modulation, spatial improvisation, and polyphonic layering, the study proposes that jazz provides an operative model for architectural thinking. Through a comparative analysis of musical and architectural processes we investigate how both disciplines ***negotiate order and freedom****. By aligning the fluid logic of jazz with architectural form-making, this research contributes to ongoing discussions in architectural theory about temporality, creativity, improvisation and freedom, and the evolving relationship between sound, structure, and space.*

Keywords: *Architecture and music, space, jazz, improvisation*

Introduction

The interrelation between music and architecture has long inspired theoretical exploration. Among musical genres, **jazz** with its fluid structures, rhythmic complexity, polyphony, and improvisational strategies resonate with contemporary architectural approaches that prioritize adaptability, spatial layering, and user interaction.

Situating architectural design within the operational logic of jazz, aims to explore if jazz paradigm, characterized by responsive adaptation and emergent coherence, illuminates new ways of understanding spatial experience of contemporary architectural design. We searched for examples of architectural designs where modularity, fluidity, and multi-sensory engagement correspond with certain musical strategies.

By analyzing the ways architects apply rhythm, repetition, variation, and in particular spatial improvisation, we analysed how architectural form-making can emulate the **responsive and emergent coherence** characteristic of jazz; furthermore, if jazz offers a critical lens for understanding **spatial temporality** in contemporary architecture; and finally, if aligning architectural processes with the improvisational and polyphonic principles of jazz, leads to environments that are dynamically experienced, participatory, and resonant with the complexities of modern life, as much as ambient created by jazz music. That being stated, the overall purpose of our research can be summarized as exploring.

Previous Research of the Topic

Since antiquity, scholars have explored analogies between spatial and musical organization, with "number" as the common ground underlying both. This analytical, number-based approach, as well as more intuitive, later Romantic perspectives, both lead to the same conclusion regarding the existing analogy between music and architecture. The famous phrase "Architecture is frozen music" has been attributed to several intellectuals, most commonly to Johann Wolfgang von Goethe, although its precise origin remains uncertain. The idea appears in Goethe's recorded conversations, where architecture is described as "frozen" or "petrified" music (*erstarrte Musik*), later popularized in simplified form (Eckermann, 1836/1901). However, similar analogies between architecture and music were articulated by other thinkers associated with German Idealism and Romanticism, including Friedrich Wilhelm Joseph Schelling, Georg Wilhelm Friedrich Hegel, and Friedrich Schlegel, which has contributed to ongoing ambiguity regarding authorship. Rather than a singular quotation, the phrase reflects a broader nineteenth-century theoretical perspective that understood architecture and music as structurally analogous arts, governed by shared principles of harmony, proportion, and composition, differing primarily in their manifestation through space and time (Picon, 2014; Scruton, 1997).

Early studies often drew analogies from structure, proportion, rhythm, and composition. In such interpretations, architecture is frequently compared to the structural clarity and formal stability of classical composition, emphasizing proportion, symmetry, and harmonic order (Summerson, 1963). These approaches tend to highlight parallels between architectural composition and the formal structures characteristic of classical music in Euro-centric cultural realm. Classical architectural theory often used musical metaphors, suggesting that spatial form could be understood through such principles as harmony and balance (Wittkower, 1971).

Dynamism of change in 20th c revealed in its depth synchronicity between in architecture and music. It received renewed attention from architects, composers, and theorists interested in the structural affinities between spatial and sonic organization. Focus shifted on the temporal, performative, and improvisational aspects shared by both disciplines.

The 20th c was marked by fast developments of both disciplines in general, and some outstanding individuals. Iannis Xenakis (1922-2001), who uniquely combined architectural and musical practice. Working in the studio of Le Corbusier while simultaneously developing an influential career as a composer, Xenakis demonstrated in its own way how mathematical models, structural logic, and generative systems could equally inspire architectural design and musical composition (Xenakis, 2008) suggesting deeper generative principles of them both.

Philosophical and theoretical approaches of 20th c have further explored connections between the two disciplines. Concepts such as syncopation, fragmentation, and creative indeterminacy have been interpreted through broader discussions of deconstruction and cultural theory (Derrida, 1978). Within architectural discourse itself, jazz has occasionally been invoked explicitly as a

metaphor for design thinking. For example, Frank Gehry famously described architecture as a fluid and collaborative process comparable to jazz improvisation, in which designers respond to evolving ideas and develop projects through iterative experimentation. Studies of jazz have evidently introduced alternative perspectives on creativity, process, and interaction, while interdisciplinary research has expanded this discussion into the context of impact on architecture. Research in improvisation studies suggests that the improvisational logic of jazz may offer a productive conceptual framework for interpreting architectural design processes and spatial organization. In the book *Noise Orders: Jazz, Improvisation, and Architecture,* improvisation functions have been explored as a model for understanding architectural and urban space, themes such as creative process, urban complexity, and the dynamic interplay between order and disorder in cultural production have been addressed (Smith, 2012).

Regarding the experiential dimension of this analogy, according to Juhani Pallasmaa, architecture and music may both be understood as temporal arts in the sense that they unfold through perception and movement. Although architecture is a spatial art, it is experienced sequentially as the observer moves through space, in a manner comparable to the temporal progression of music (Pallasmaa, 2012).

Relation between jazz and architecture has been also examined in conservative way, as in recent research of *Nexus Network Journal show,* with focus on organisation principles – rhythm, proportion, formal sequence, and compositional structure (Brown & Patel, 2024). The genuine research interest of such studies has been on similarity in perceptual and psychological effects based on those principles.

Insights also emerge from research on musical improvisation and spatial perception. Studies in jazz performance consider improvisation a musical process but also a spatial experience, shaped by the relationships between performers, audiences, and the surrounding environment (Borgo, 2018). In this context, space becomes an active participant in the creative process, contributing to the atmosphere and dynamics of improvisational performance. Björk & Snøhetta collaboration has recently reached exceptional artistic hights in that sense, especially with performance Cornucopia (Luxor, 2025).

Despite these contributions, the analogy between architecture and jazz remains relatively underdeveloped within architectural theory. Relatively few studies have examined how specific musical characteristics of jazz might correspond to architectural thinking and spatial organization and vice versa.

To sum up, the academic literature used to construct the conceptual foundation of this research includes classical architectural theory addressing proportion, harmony, and alike (e.g., Wittkower, Summerson), contemporary phenomenological and experiential approaches to architecture (e.g., Pallasmaa), musicological and jazz studies literature focusing on improvisation and performance theory (e.g., Berliner, Borgo), interdisciplinary research on architecture–music relationships (e.g., Xenakis, Smith, Brown & Patel) and philosophical and cultural theory addressing structure, indeterminacy, and creative processes (e.g., Derrida) These sources provide the theoretical vocabulary for exploring the subject.

Materials and Methods

The use of analogy as a design and analytical tool has been recognized as a significant mechanism in architectural thinking, enabling the transfer of concepts across disciplines (Casakin & van Timmeren, 2014). A qualitative, interdisciplinary research situated at the intersection of architectural theory, musicology, and cultural analysis has been applied here. The intention was not to establish any kind of quantitative equivalences. Therefore, the research is structured as a comparative theoretical analysis supported by selected case studies, aiming to identify structural, procedural, and experiential analogies between jazz music and contemporary architectural practice.

The methodological approach combines **theoretical synthesis** of existing literature on architecture–music interrelation, **conceptual mapping** of musical categories onto architectural phenomena, **interpretive case study analysis** of selected architectural works and **hermeneutic analysis** of improvisation as a shared creative logic. The primary materials used in this research consist of the interrelated groups: theoretical and scholarly sources, analytical framework of Jazz and architectural case studies.

Jazz as Analytical Model refers to the key musical categories extracted from jazz practice:

- Rhythm and syncopation
- Harmonic complexity and tension
- Polyphony and interaction
- Dissonance and resolution
- Improvisational variation and spontaneity

These categories are reinterpreted as spatial and procedural analogues within architecture.

A selection of **Architectural Case Studies** is used to illustrate theoretical correspondences. The case studies are chosen based on their explicit or implicit engagement with concepts of fluidity, adaptability, layering, and participatory spatial experience. The selection criteria include presence of modular or non-linear spatial organization, evidence of iterative or process-driven design methods, strong emphasis on user interaction or spatial flexibility and formal or conceptual openness resembling improvisational systems.

Analytical Method consists of three steps: decomposing musical principles of Jazz, spatial mapping and case study interpretation. Mapping is based on correlating elements of Jazz and architecture in **terms of improvisation** and **generating sense of freedom**.

Architectural case studies include works by Antonio Gaudi, Frei Otto, Bernard Tschumi, Rem Koolhaas Toyo Ito, Peter Zumthor, Lacaton & Vassal and Smiljan Radić. Selected architectural works are analyzed, in order to identify how logic of jazz manifests in spatial composition. This step is interpretive rather than empirical, focusing on meaning-making and conceptual resonance.

The study acknowledges several methodological limitations. Firstly, the

analogy between music and architecture is inherently interpretive and cannot be validated through direct empirical measurement. Secondly, the selection of jazz as a primary musical model reflects a conceptual preference for improvisational systems and may not represent other equally valid musical frameworks. Finally, the case study approach is selective rather than exhaustive and illustrative rather than comprehensive.

Results

Fundamental Musical Categories in Architecture and Jazz - Rhythm, Harmony, Polyphony, Dissonance, Sequence

It is useful to examine in more detailed manner several fundamentals used further as vocabulary: rhythm, harmony, polyphony, dissonance, and sequence (see Table 1):

- **Rhythm** is one of the most frequently invoked analogies between architecture and music. In music, rhythm refers to the organization of sound in time, involving patterns of duration, accent, and repetition. In jazz, rhythm often becomes particularly complex due to the use of syncopation, shifting accents, and the interactive interplay between instruments within the rhythm section. In architecture, rhythm can be understood as the repetition or alternation of spatial or structural elements. Columns, windows, structural bays, and facade modules often create rhythmic patterns that organize visual perception. Architectural rhythm is therefore related to repetition, spacing, and variation within spatial composition. The comparison between architectural rhythm and jazz rhythm becomes particularly interesting when considering the flexibility of jazz rhythms. Unlike the regular metric patterns commonly associated with classical music, jazz rhythm often involves syncopation and subtle shifts in timing. Similarly, contemporary architecture frequently departs from strict regularity, introducing variations and irregularities within otherwise structured systems.
- **Harmony** in music refers to the combination of different tones to create chords and harmonic progressions. In classical tonal music, harmony often follows relatively stable patterns of tension and resolution. Jazz harmony, however, is characterized by extended chords, altered tonalities, and complex harmonic substitutions. In architectural terms, harmony refers not to sound but to relationships between spatial elements, materials, proportions, and forms. Architectural harmony emerges when different components of a building interact in a coherent and balanced way. Proportional systems, material consistency, and spatial relationships contribute to the perception of architectural harmony. The comparison with jazz highlights the possibility that harmony need not imply static equilibrium. Just as jazz harmony often introduces tension through complex

chord structures, architectural harmony may also involve contrasts and dynamic relationships rather than simple formal balance.

- **Polyphony** refers to the simultaneous presence of multiple independent musical lines. In jazz ensembles, polyphony often arises through the interaction between different instruments, each contributing distinct rhythmic or melodic patterns. A similar concept can be applied to architecture. Buildings are composed of multiple interacting systems: structural frameworks, circulation paths, ambiental sequences, and material layers. These elements function together while maintaining relative autonomy.This layered condition suggests that architecture may be understood as a form of spatial polyphony, in which different spatial and functional systems coexist and interact. The analogy with jazz polyphony emphasizes the complexity of architectural organization and the simultaneous presence of multiple spatial "voices."
- **Dissonance** in music refers to combinations of tones that create tension or instability. In jazz, dissonance is often used intentionally to enrich harmonic texture and create expressive intensity. In architectural design, dissonance may appear as contrast or tension between forms, materials, or spatial relationships. Contemporary architecture frequently employs sharp contrasts or unexpected juxtapositions to generate visual and spatial interest, especially in adaptations, partial reconstructions etc. Rather than representing disorder, such tensions may contribute to the expressive qualities of architecture, much as harmonic dissonance contributes to the richness of jazz music.

Table 1. *Comparative Analysis of constituting Elements of Jazz and Architecture*

Element	Jazz	Architecture
Rhythm	beat, tempo, swing	rhythmic façades, spatial modulation
Harmony	consonance, combination of tones	visual coherence, relationships between volumes
Dissonance	tension, contrast	contrasting forms, unexpected spatial elements
Sequence	sequences of phrases and sections	*promenade architecturale, marche*

- **Sequence.** Music unfolds through time, forming sequences of phrases and sections. Architectural experience, although spatial in nature, also unfolds sequentially as one moves through a building. The concept of spatial sequence is closely related to the idea of the *promenade architecturale*, introduced by Le Corbusier, or much older term *marche* (École des Beaux-Arts) where architectural space unfolds progressively through movement and perception. Spatial sequences guide perception and movement, creating a progression of spatial experiences. In this sense, architectural space can be understood as a temporal experience analogous to musical phrasing. The

sequential organization of spaces allows architecture to be experienced as a dynamic composition rather than a static object. The temporal unfolding of architectural space has also been interpreted through the role of light as an experiential medium, where spatial perception evolves through movement and atmosphere (Mako, 2013).

Decomposing Musical Principles of Jazz

Beyond specific musical categories, broader principles of composition organize individual elements into coherent structures. Concepts such as: the organization of parts into a whole, theme and variation, tension and resolution, and composition as a process can be applied to both disciplines.

Organization of Parts into a Whole - In both music and architecture, composition involves organizing individual elements into a coherent whole. Musical compositions integrate melody, harmony, rhythm, and form into structured works. Similarly, architectural design integrates spatial volumes, structural systems, materials, and circulation patterns.

The success of a composition often depends on the balance between unity and diversity. Too much uniformity may produce monotony, while excessive variation may lead to fragmentation. Both architecture and music therefore rely on compositional strategies that maintain coherence while allowing variation.

Theme and Variation - One of the most fundamental compositional strategies in music is the relationship between theme and variation. A musical theme provides an identifiable motif that can be transformed, developed, and reinterpreted throughout a composition.

Jazz frequently employs this principle. A standard jazz performance typically begins with the presentation of a theme, followed by improvised variations developed by individual musicians.

In architecture, similar processes can occur through the repetition and transformation of spatial motifs. Architectural elements such as structural modules, geometric forms, or facade patterns may appear in multiple variations throughout a building.

Tension and Resolution - Musical compositions often create emotional and structural interest through cycles of tension and resolution. Harmonic progressions introduce instability that is later resolved through tonal closure.

In architecture, similar dynamics may occur through spatial contrasts or transitions. Changes in scale, light, enclosure, or spatial direction can produce moments of tension that are later resolved in more open or stable spaces.

These spatial dynamics contribute to the experiential narrative of architecture, much like harmonic progression shapes the narrative of a musical composition.

Composition as Process - Finally, both music and architecture can be understood not only as finished products but also as processes. Musical composition may involve experimentation, improvisation, and iterative development. Jazz, in particular, foregrounds the role of improvisation as a central creative method. Architectural design likewise evolves through iterative processes involving sketches, models, revisions, and conceptual transformations. Design rarely emerges

fully formed; rather, it develops gradually through exploration and reinterpretation.

Understanding composition as a process rather than a fixed structure opens the possibility of interpreting architecture through the lens of improvisational creativity. This perspective leads directly to the central theme of this paper: the relationship between architectural creativity and the improvisational freedom characteristic of jazz performance.

Mapping Improvisation and the Sense of Freedom in Architecture and Jazz

Among the numerous correspondences that can be drawn between architecture and jazz, improvisation stands out as one of the defining characteristics of jazz aesthetics and an especially productive conceptual bridge between the two disciplines. Earlier sections of this paper have addressed structural analogies such as rhythm, harmony, polyphony, dissonance, and sequence. Improvisation, however, introduces a different dimension, foregrounding the dynamic interplay between structure and freedom.

Within jazz practice, improvisation is generally understood as spontaneous musical invention unfolding within a pre-existing harmonic and rhythmic framework. Instead of executing a fully predetermined score, musicians engage in real-time interaction, developing variations on a shared theme while responding to the evolving musical environment. The performance thus emerges from a continuous dialogue between individual expression and collective coordination, allowing musical ideas to develop in ways that remain only partially predictable.

Scholars of jazz have repeatedly emphasized that improvisation does not imply the absence of structure. On the contrary, it normally unfolds within clearly defined harmonic progressions, rhythmic patterns, and formal conventions (Berliner, 1994). What listeners perceive as freedom arises precisely from the productive tension between constraint and creative exploration.

A comparable dynamic can be observed in architectural practice. Although the final architectural artifact ultimately assumes a stable physical form, the design process itself often unfolds through exploratory and iterative procedures. Architects typically move through sequences of sketches, models, and conceptual alternatives, gradually refining spatial ideas through cycles of experimentation and reinterpretation. From this perspective, architectural design may be understood as a form of "slow improvisation," in which spatial concepts evolve through successive transformations rather than being fully determined from the outset.

The analogy with jazz becomes particularly meaningful in the context of contemporary architectural practice. Many architects today prioritize openness, fluidity, and spatial variability over rigid compositional hierarchies. Architectural form frequently arises from the interaction of multiple parameters—structure, circulation, program, and environmental conditions—so that the final configuration reflects the negotiation of several forces rather than the imposition of a single predetermined geometry.

Improvisation can also be approached from the standpoint of spatial experience. While the building itself remains materially fixed once constructed, its use and interpretation remain inherently open. Different users engage with

architectural spaces in diverse ways, adapting them to evolving patterns of activity and changing functional requirements. Architectural environments retain a degree of indeterminacy, allowing multiple interpretations and modes of occupation to emerge over time.

Such openness is comparable to the role that jazz compositions play within performance. A jazz standard functions less as a fixed musical object than as a framework that supports reinterpretation. Depending on the musicians involved and the circumstances of the performance, the same composition may produce markedly different musical outcomes. Architectural spaces operate in a similar manner, accommodating a wide range of activities and interpretations throughout their lifespan.

The relationship between structure and freedom therefore becomes central to both architecture and jazz. Jazz musicians perform within harmonic and rhythmic frameworks while simultaneously exploring new melodic possibilities. Architects, in an analogous way, establish spatial systems that allow variation, reinterpretation, and creative development to unfold within defined structural limits.

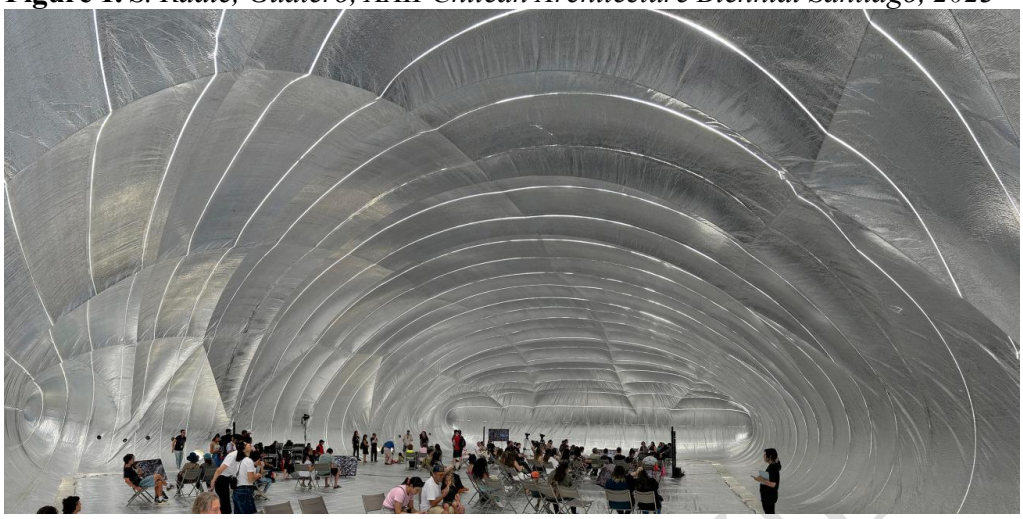
From this perspective, improvisation should not be reduced to mere spontaneity. Rather, it may be understood as a mode of creative responsiveness. Jazz musicians respond continuously—to one another, to the underlying musical structure, and to the atmosphere of the performance. Architects operate in a comparable manner, reacting to contextual conditions, functional demands, material constraints, and evolving design ideas. Architectural experience often remains open and variable, shaped by perception, atmosphere, and movement, where elements such as light actively participate in the formation of spatial meaning (Mako, 2013).

The concept of improvisation therefore draws attention to the processual dimension of architectural creativity. Instead of conceiving architecture solely as a static object, it becomes possible to interpret it as the outcome of an evolving design process in which structure, variation, and interpretative freedom interact. In this sense, the analogy with jazz functions not merely as a metaphor but as a conceptual framework for understanding the interplay between order and freedom in architectural thinking. Jazz demonstrates how highly structured systems may nevertheless generate expressive openness and spontaneity—an insight that sheds light on contemporary approaches to architectural composition and spatial experience.

Case study

Architecture itself may contain a latent dimension of improvisational logic: a form of freedom that is not always visible in the finished object but becomes evident through process, structure, and spatial potential. Antoni Gaudí may be regarded as an early precursor of this sensibility. The organic spatial language of his architecture suggests a mode of design in which structural logic and imaginative exploration develop simultaneously.

Figure 1. *S. Radić, Guatero, XXII Chilean Architecture Biennial Santiago, 2023*



Frei Otto's experimental approach to tensile structures, documented in *Tensile Structures: Design and Construction* (Otto, 1972), illustrates how architectural form can emerge from material and structural experimentation. In the Munich Olympic Stadium, tensile membranes were developed through experimental form-finding processes rather than through predetermined geometric schemes. Physical models and the behaviour of materials guided the emergence of the structural configuration. The resulting roofscape appears both controlled and spontaneous, recalling the dynamics of a jazz performance in which a stable framework enables evolving musical expression.

Additional examples reveal further dimensions of architectural improvisation. In the Sendai Mediatheque, designed by Toyo Ito, a network of vertical structural tubes combined with open floor plates allows spatial organization to remain flexible and adaptable. The building accommodates changing programs and interactions, much like musicians navigating a harmonic structure while shaping their own melodic lines.

A different manifestation of improvisational freedom appears in the work of Anne Lacaton and Jean-Philippe Vassal. Their transformation of the Grand Parc Bordeaux demonstrates how adaptive interventions can expand existing structures and enable users to reinterpret and transform their living environments over time. Such strategies resemble the musical principle of theme and variation, where a stable framework invites continuous reinterpretation.

Peter Zumthor's Therme Vals exemplifies experiential improvisation, where space unfolds through carefully orchestrated sequences of movement, light, and materiality. This progression can be understood as analogous to sequential phrasing in jazz, in which spatial experience develops gradually through perception and bodily engagement, allowing users to actively participate in the unfolding narrative of the space.

Bernard Tschumi's Parc de la Villette demonstrates polyphonic spatial layering through the interaction of multiple independent systems—points, lines, and surfaces. These elements operate simultaneously while maintaining relative

autonomy, reflecting the logic of musical counterpoint and ensemble interaction, where distinct voices coexist within a structured yet dynamic composition.

Rem Koolhaas's Seattle Central Library illustrates layered spatial programming, in which diverse functional zones are interwoven into a complex and adaptive whole. This organization produces emergent spatial rhythms comparable to jazz polyphony, where interacting layers generate coherence through dynamic relationships rather than fixed hierarchy.

Improvisational qualities can also be observed in the fragile, imperfect and poetic architecture of Smiljan Radić (see Figure 1). His Guatero 2023 conveys temporality and openness to different purpose. Guatero is a temporal spatial event that invites exploration and reinterpretation, resonating with the performative character of jazz improvisation.

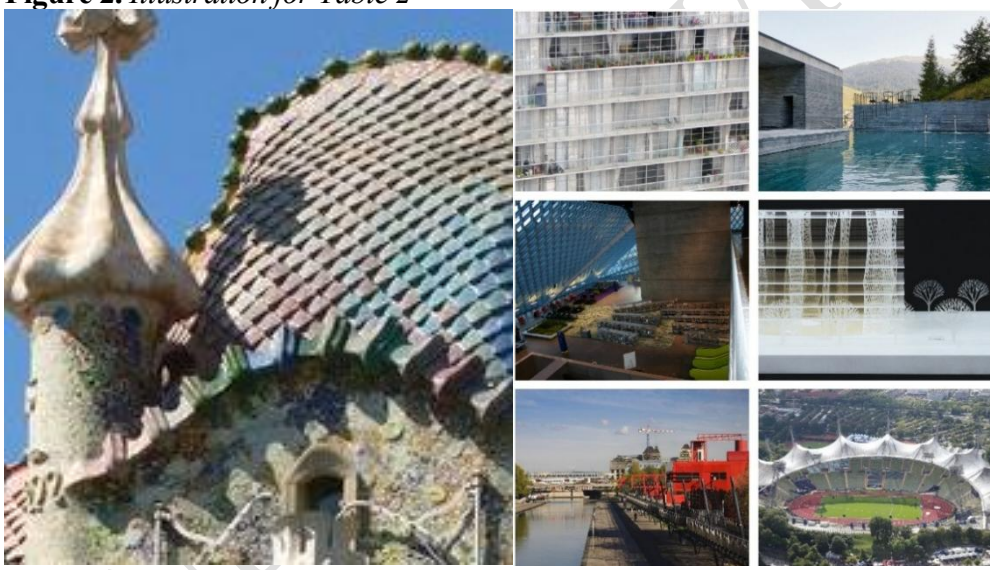
Taken together (see Table 2, Figure 2), these examples suggest that improvisation in architecture manifests through design processes, structural openness, and user participation rather than through overt formal expression. Creative freedom may therefore reside within the system itself, just as jazz performance achieves spontaneity within harmonic and rhythmic frameworks. These case studies ultimately provide a basis for understanding how contemporary architecture negotiates the balance between order and freedom, reflecting the temporal, participatory, and emergent qualities characteristic of jazz.

Table 2. *Case study Overview*

Architect	Project / Work	Type of Architectural Improvisation	Parallel to Jazz Concept	Notes
Antoni Gaudí	Entire opus	Organic formal improvisation	Precedent for melodic freedom	Early example of emergent form within structural logic
Frei Otto	Munich Olympic Stadium	Process-based form-finding	Real-time improvisation	Structural membranes evolve dynamically; emergence from constraints
Toyo Ito	Sendai Mediatheque	Structural openness; flexible spatial systems	Improvisation within harmonic framework	Open floor plates and vertical tubes allow adaptive interactions
Peter Zumthor	Therme Vals	Experiential improvisation	Sequential phrasing in jazz	Space unfolds through perception and movement; user participation
Bernard Tschumi	Parc de la Villette	Polyphonic spatial layering	Counterpoint / ensemble interaction	Multiple independent systems coexisting and interacting

Architect	Project / Work	Type of Architectural Improvisation	Parallel to Jazz Concept	Notes
Rem Koolhaas	Seattle Central Library	Layered spatial programs	Jazz polyphony	Interacting functional layers; emergent spatial rhythms
Anne Lacaton & Jean-Philippe Vassal	Grand Parc Bordeaux	Adaptive transformation	Theme and variation	Preserves and expands existing structures; user-driven variation
Smiljan Radić	Guatero 2023	Temporal & participatory improvisation	Jazz session; ephemeral performance	Fragile and poetic; open to user interpretation

Figure 2. *Illustration for Table 2*



Discussion

Previous examples can be compared along three axes:

1. **Process-based improvisation** – Otto's form-finding and Radić's experimental structures show that architectural form can emerge dynamically, reflecting jazz's real-time musical creation.
2. **Structural openness** – Ito and Lacaton & Vassal illustrate how spatial frameworks provide a consistent system while allowing flexibility in use and interpretation, analogous to improvisation within a harmonic structure.

3. **Experiential improvisation** – Gaudí, Zumthor, and Radić highlight how human perception and interaction transform architecture into a temporal and participatory event, akin to the performative dimension of a jazz ensemble.

Examining the different modalities of improvisation that architects employ we come to the following. While early experiments by Antoni Gaudí demonstrate organic formal improvisation, contemporary practitioners often embed freedom **within structural, spatial, and experiential systems** rather than relying solely on expressive form.

Such shift mirrors developments in jazz: improvisation is not only an ornament – it is an essential principle emerging from the interaction of musical rules, performers, and temporal flow (Berliner, 1994).

One form of improvisation in architecture is **process-based experimentation**, exemplified by Frei Otto. In projects like the Munich Olympic Stadium, structural membranes were shaped through physical simulations rather than pre-defined geometries, allowing the architecture to emerge organically. Here, the architect acts as a facilitator rather than a dictator of form, similar to how a jazz musician responds to harmonic and rhythmic cues during performance. The resulting structures are inherently dynamic, retaining the potential for variation and adaptation, which parallels the spontaneity inherent in jazz improvisation.

A second aspect of architectural improvisation is **structural openness**, where frameworks are intentionally flexible to accommodate multiple uses or interpretations. Toyo Ito's Sendai Mediatheque demonstrates this principle through vertical "tubes" and open floor plates, which allow spatial relationships to evolve based on programmatic needs. Similarly, Lacaton & Vassal's renovation of Grand Parc Bordeaux preserves existing structures while adding adaptable layers. These interventions function as a **framework for user-driven improvisation**, analogous to jazz musicians navigating pre-established chord progressions while introducing spontaneous melodic variations.

A third important aspect is **experiential improvisation**, where the perception and movement of users generate a sense of emergent form. Smiljan Radić's fragile and poetic installations, rely on ephemeral structures that respond to light, gravity, and human interaction. The Guatero functions less as a fixed composition and more as an **event in space**, echoing the performative, temporal, and participatory qualities of a jazz session. Similarly, Peter Zumthor's Therme Vals shapes perception through sequential experiences of light, texture, and enclosure, offering spatial improvisation through the body and mind of the observer. The phenomenological approach to spatial atmosphere described by Zumthor (2006) reinforces the experiential dimension of architectural improvisation. This experiential dimension of jazz aligns with interpretations of architecture as an atmospheric and perceptual phenomenon, where light and spatial sequencing contribute to a temporally unfolding experience (Mako, 2013).

Comparative analysis of these examples reveals several patterns:

1. **Emergence from constraints** – In both jazz and architecture, freedom arises not from the absence of rules but from the **creative negotiation of constraints**. Frei Otto's membranes, Radić's ephemeral pavilions, and

Lacaton & Vassal's adaptable housing show that structural or programmatic limitations provide the very conditions that make improvisation possible.

2. **Layered interaction** – Polyphonic principles in jazz, where multiple instrumental lines interact, are mirrored in architecture through layered spatial systems. Tschumi's Parc de la Villette or Koolhaas' Seattle Central Library integrate independent functional layers that coexist and interact, producing emergent spatial rhythms akin to musical counterpoint.
3. **Temporal and participatory dimensions** – Just as jazz unfolds over time, architectural improvisation is often realized through sequential experiences or user interaction. Visitors' movement through Zumthor's or Radić's projects activates the space, much as a jazz ensemble reacts to the unfolding performance.
4. **Adaptive authorship** – In both disciplines, the notion of authorship becomes fluid. The architect provides a **framework for action**, akin to a bandleader setting up harmonic and rhythmic boundaries, but the final realization is co-created by materials, space, and user engagement.

Ultimately, these parallels are embedded within structural strategies, spatial organization, and experiential design, revealing a deeper kinship with the logic of jazz. By focusing on **hidden or procedural freedom**, rather than overt formal expressiveness, architects create conditions for emergent, adaptive, and performative experiences, showing that architecture, like jazz, thrives at the intersection of order and spontaneity.

Conclusions

Architecture as structured improvisation - Contemporary architecture may be understood as a form of structured improvisation, where spatial systems establish a framework within which variation, interpretation, and transformation become possible. In this sense, the relationship between architecture and jazz reveals how creative freedom can emerge not despite structural constraints but precisely through them

Architecture as an open performative system - Rather than functioning solely as a fixed physical artifact, architecture increasingly operates as an open and performative system. Much like a jazz composition that invites reinterpretation through performance, architectural space becomes a framework that supports evolving patterns of occupation, perception, and interaction.

Improvisation as a design methodology - Improvisation in architecture should not be understood merely as spontaneity or formal experimentation. Instead, it can be interpreted as a methodological principle that acknowledges uncertainty, adaptation, and responsiveness as integral components of the design process.

Jazz as a conceptual lens for architecture - The analogy with jazz therefore provides more than a poetic metaphor. It offers a conceptual lens through which architectural creativity can be understood as a dynamic negotiation between order and freedom, structure and variation, stability and transformation.

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