

The Birth of Modern Architectural Thought: Architectural Theory From the 19th Century to the Early 20th Century

Tonkao Panin* and Tanakarn Mokkahasmita

Faculty of Architecture, Silpakorn University, Bangkok, Thailand

*Corresponding author e-mail: panin_t@silpakorn.edu

Received 19/9/2025 Revised 23/12/2025 Accepted 28/1/2026

Abstract

This paper explores the intellectual formation of modern architectural thought from the 19th to the early 20th centuries, situating it within the intertwined contexts of political upheaval, technological transformation, and theoretical debate. It begins with the Industrial Revolution and the subsequent urban transformations of Paris and Vienna, which catalyzed fundamental questions regarding architecture's social role, material logic, and representational capacity. From this context, the paper examines the 19th century debate on style through the works of Heinrich Hübsch and Karl Bötticher, focusing on their attempts to reconcile construction, material, and form in the search for architectural legitimacy in an industrial age. The study then turns to Gottfried Semper's theories—particularly the Four Elements of Architecture and the Theory of Cladding—as a decisive conceptual shift that sought to replace stylistic discourse with an understanding of architecture grounded in material practice, technique, and enclosure. Building on this foundation, the paper examines Robert Vischer's Theory of Empathy (Einfühlung), August Schmarsow's conception of architectural space (Raum), and Adolf Loos's Raumplan as critical developments that repositioned architecture around human perception, spatial experience, and the ethical act of building. Through these theories, architecture emerges not as a question of appearance, but as a synthesis of material truth, spatial order, and lived experience. By situating the notion of Building-Art (Baukunst) as a reaction against 19th century historicism and stylistic representation, the paper argues that the interrelation of empathy, space, and building constitutes a core theoretical framework that defines modern architecture. Extending this historical analysis, the paper further reflects on architectural practice and theory since 1990, demonstrating how contemporary concerns—such as phenomenology, tectonics, digital technologies, and ecological responsibility—do not represent a rupture from modern architectural thought, but rather its transformation under new historical conditions. In this expanded perspective, modern architecture is understood not as a closed stylistic period, but as an open-ended intellectual project whose foundational questions concerning material authenticity, spatial perception, and the ethics of dwelling continue to shape architectural thought and practice today.

Keywords

Modern architecture; Building-Art; Baukunst; Raumkunst; Raumplan

1. Introduction

The historiography of modern architecture has long treated the late 19th and early 20th centuries as a period of stylistic crisis resolved by the eventual emergence of a self-consciously “modern” architectural language. Yet the theoretical labor that produced this resolution—spanning debates on style, material, cladding, perception, and space—is often narrated piecemeal: Gottfried Semper’s material theories are studied within the history of ornament and the applied arts; Robert Vischer’s *Einfühlung* and August Schmarsow’s *Raum* are situated within German aesthetics and psychology; Adolf Loos’s *Raumplan* is treated as a matter of design method; and Martin Heidegger’s later philosophy of dwelling is engaged almost exclusively within architectural phenomenology, detached from its 19th-century theoretical roots. This fragmentation obscures a more fundamental continuity: that these theories are not isolated responses to discrete problems but successive, interrelated attempts to answer a single underlying question posed by the crises of industrialization and historicism—namely, on what basis architecture could claim legitimacy and meaning once the authority of historical style had collapsed.

This paper argues that a genealogical reading of 19th-century architectural theory—from Heinrich Hübsch’s and Karl Bötticher’s debates on construction and style, through Semper’s *Bekleidungstheorie*, to Vischer’s theory of empathy, Schmarsow’s theory of space, and Loos’s *Raumplan*—reveals a coherent intellectual trajectory culminating in the concept of *Baukunst*, or Building-Art, as articulated by Hermann Muthesius and Otto Wagner. Read together, these theories reposition architecture away from questions of appearance and toward a synthesis of material truth, spatial perception, and lived experience. Furthermore, this paper contends that this trajectory did not conclude with the historical avant-garde. By extending the analysis to architectural practice and theory since 1990—including the phenomenological approaches of Peter Zumthor, Tadao Ando, Juhani Pallasmaa, and Alberto Pérez-Gómez, the tectonic theory of Kenneth Frampton, and the ecological and digital turns of contemporary practice—this study demonstrates that the foundational questions of the 19th century remain operative rather than superseded. Understood in this light, modern architecture is not a closed historical style bounded by a specific period, but an open-ended intellectual project whose core concerns continue to be renegotiated under changing technological, cultural, and environmental conditions.

2. Research Objectives

This research aims to:

1. Trace and critically analyze the genealogy of 19th-century architectural theory—encompassing the style debates of Hübsch and Bötticher, Semper’s Four Elements and Theory of Cladding, Vischer’s *Einfühlung*, Schmarsow’s theory of *Raum*, and Loos’s *Raumplan*—as an interrelated sequence of responses to the crisis of historicism, culminating in the concept of *Baukunst*.
2. Examine the relationship between material authenticity, spatial perception, and the ethics of building as the core theoretical triad underlying the formation of modern architectural thought.
3. Assess the extent to which contemporary architectural practice and theory since 1990—including phenomenology, tectonic culture, digital design, and ecological responsibility—represent a continuation and transformation of these 19th-century theoretical foundations, rather than a rupture from them.
4. Advance an understanding of modern architecture as an open-ended intellectual project, rather than a fixed historical style, whose foundational questions continue to shape architectural discourse today.

3. Research Methodology

This research employs a historical-analytical methodology that combines close textual analysis of primary theoretical works with contextual study of sociopolitical, technological, and urban transformations in 19th century Europe. The primary sources examined include the writings of Heinrich Hübsch, Karl Bötticher, Gottfried Semper, Robert Vischer, August Schmarsow, Martin Heidegger, Hermann Muthesius, Otto Wagner, and Adolf Loos. These texts were analyzed not only as historical documents, but as conceptual frameworks developed in response to the crises of industrialization, urbanization, and the decline of stylistic consensus.

The methodological approach is both comparative and genealogical. Rather than reconstructing a linear historical narrative, the study traces a sequence of interrelated theoretical problems—such as material authenticity, enclosure, spatial perception, empathy, and the ethical meaning of building—that recur across different authors and historical moments. Through comparative interpretation, the research identifies continuities and tensions among these theories and examines how they were translated into architectural practice in the late 19th and early 20th centuries.

To address the relevance of these historical theories to contemporary architecture, the research extends its analytical framework beyond an historical focus. Concepts derived from 19th century theory—particularly *Baukunst*, *Raum*, *Bekleidung*, and *Einfühlung*—are treated as operative analytical tools rather than closed historical doctrines. These concepts subsequently are re-examined through selected contemporary architectural practices and post-2000 theoretical discourses, including phenomenology, tectonic theory, digital design, and ecological thinking. This extension is interpretive rather than empirical and does not aim to provide a comprehensive survey of contemporary architecture; instead, it demonstrates how foundational theoretical structures persist and are transformed under new technological, cultural, and environmental conditions.

Secondary scholarship was employed to frame both historical and contemporary debates, situating key figures within broader intellectual traditions and clarifying shifts in architectural epistemology from the 19th century to the present. By integrating historical analysis with reflective theoretical interpretation, the methodology allowed the study to link early modern architectural theory with contemporary practice without collapsing historical specificity. The research thus positions modern architecture as an open-ended intellectual project whose conceptual foundations continue to inform architectural thinking and practice today.

4. Context: Urban Transformations and the Question of Style

In the late 18th and early 19th centuries, several key events and elements led to sociopolitical and cultural changes that, in turn, affected architectural development. These included the Industrial Revolution and the widespread political revolutions across Europe in 1848 (i.e. the so-called Spring of Nations), which brought about political and governmental changes, as well as the influential rise of the middle class, or *Bourgeoisie*.

In addition to the industrial revolution, Europe also faced major political revolutions aimed at overthrowing feudal regimes and establishing democracies. These began in Sicily, Italy, and spread across the continent in a wave of revolutions in many countries. This led to changes in governance in countries such as Denmark, the Netherlands, and France, as well as the unification of various states into the German and Austrian empires. Part of this revolution stemmed from the demand for political reform following the Industrial Revolution, which had empowered the middle class of business owners and industrialists. With such a major shift in the social structure, the cultural structure of Europe also changed. This impacted ideas in cultural arts and sciences, including philosophy, fine arts, literature, and architecture.

Not long after the 1848 revolutions, major European cities began to change. A massive urban reform project began in Paris, where Emperor Napoléon III commissioned Georges-Eugène Haussmann to renovate the city. This involved restructuring the road network and buildings. Numerous old neighborhoods, which had existed since the Middle Ages, were demolished. After these areas were cleared, a network of new, large avenues was built, complete with modern public utilities and numerous new buildings. In particular, new residential buildings for the middle class replaced the old, crowded areas. Haussmann's project began in 1853 and continued for several decades until around 1927, transforming the face and system of the city into the Paris we know today (Olsen, 1986).

As a result of the political, economic, and social changes of the 19th century, Paris was not the only city to be transformed. Vienna, the capital of the Austro-Hungarian Empire at the time, also underwent significant changes. This sparked new questions and a revolution in architectural thought, which became a crucial catalyst for the conceptual formation of modern architecture later on.

In the mid-19th century, while other major European cities were expanding and changing rapidly, old Vienna remained encircled by its medieval fortress and city walls. Outside the walls, numerous new neighborhoods had emerged. The persistence of the old city walls cut off old Vienna from the new surrounding areas, preventing a seamless integration as had emerged in other European capitals. In 1857, Emperor Franz Joseph I decided to develop the city by demolishing the old fortress and walls to build a large ring road. This road would be lined with numerous new buildings and projects, following the example of Paris's urban development. The road was to be called the Ringstrasse. The competition for the road's urban plan and development was won by Viennese architect Ludwig von Förster. Soon after, Vienna transformed from a Baroque city confined within a medieval structure to a modern metropolis.

The Ringstrasse was lined with many new government buildings, including the Parliament, University, Theater, Opera House, museums, churches, and City Hall. The remaining areas were developed into residential buildings or apartments for the wealthy middle class. At that time, the main question for Vienna and its architects was not about the new functionalities of the 19th century or the relationship between buildings and the city (Schorske, 1980). Instead, it was a question of style: What should these buildings look like on the outside to represent the progress of the Austro-Hungarian Empire, the economic wealth of Vienna, and the stability of the government?

Buildings were not seen in terms of their direct function but were given the important role of representing and communicating social, economic, and political ideologies. The strange and significant phenomenon of the buildings on the Ringstrasse was that the question of style was not about what a specific architectural style should be in that era, as architects of previous eras had wondered. Instead, it was about which historical style each building should adopt. As the 19th century had not yet developed its own distinct architectural style, the architects of the buildings on the Ringstrasse seemed to have a wide array of historical styles to choose from. The result on the Ringstrasse was a mashup of numerous historical styles, depending on what architects who designed different buildings deemed appropriate for the building's discursive content (Schorske, 1980). For instance, the Parliament building was designed in the Greek style, relating to the democracy of ancient Greek states. Each style became a representation of a historical social idea. This phenomenon sparked many questions and created a platform for debate about the diverse nature of architecture and its possibilities in modern industrial society (Schorske, 1980).

5. Theory and the Industrial Age

Throughout the 19th century, the relationship between architectural theory and the modern industrial world became a crucial question driving a shift in thought. The industrial society of consumption and urban growth placed heavy burdens and expectations on the architectural profession, causing the direction of architectural development to splinter into several conflicting parts. With rapidly changing construction techniques and design processes, professional practices were no longer fixed. The debates in architectural theory during this period were an attempt to find common ground within the architectural community amidst the changes and uncertainty.

5.1 Heinrich Hübsch and the Search for a New Style

In 1828, the German architect Heinrich Hübsch published a landmark book titled *In welchem Style sollen wir Bauen?* (In What Style Should We Build?). This book became the focal point of theoretical debate for the next few decades. Although only fifty pages long, Hübsch's book asked a direct question and attempted to provide an answer by analyzing the main styles of the past to find a direction for how a new style for the 19th century could emerge (Hübsch et al., 1992).

Hübsch proposed that four key factors determined architectural style: material, construction technique, climate, and specific contemporary needs. He explained that a building's essential components—walls, ceilings, roofs, structures, windows, and doors—all were elements of style. Their shapes differed based on the material and technique used. For example, ancient Greek architecture, which used strong, durable marble as its building material, developed a system where every component clearly expressed its function. Columns appeared when they bore the weight of beams, and beams appeared when they bore the weight of the roof. Every component worked together in a truly simple and direct way.

In contrast, Roman architecture used smaller, more fragile stones and invented the vaulted structure to replace the beam system. As construction techniques became more advanced, vaulted design became more complex. The invention of the pointed arch allowed buildings to become both taller and wider, leading to a vault-based construction system where everything originated from the vault. This created the medieval vaulted style we call Gothic, which was in complete opposition to the post-and-lintel system of the ancient Greek style.

Hübsch concluded that historically, there were only two main construction systems that created style: the system of horizontal beams and the system of arches, whether vaulted or pointed. At the end of his book, Hübsch compared the vaulted or rounded arch system of the Romanesque era with the pointed arch system of the Gothic era. He emphasized that the true simplicity of the round arch system was a suitable form for the development and application of a style for that era (Hübsch et al., 1992). After Hübsch's book questioned historical styles, the debate over the principles and origins of those forms continued for many years, with architects and theorists attempting to explore the possibilities of a relationship or collaboration between the simple but strict forms of Greek architecture and the sensitive and rich discourse of medieval architecture.

5.2 Karl Bötticher: Core-Form and Art-Form

A key theorist who later analyzed the difference between Greek and Gothic architecture was the German archaeologist Karl Bötticher. In his important work, *Die Tektonik der Hellenen* (The Tectonics of the Hellenes), published in 1844, Bötticher presented a theory of the ancient Greek construction system, specifically the function and importance of its forms. He began with the importance of materials, stating that a building's value

lay in the work and true expression of the material itself. In ancient Greece, material was used in large, solid masses, or monoliths. A system of relationships between components and load-bearing was developed, creating a clear structural system, while the enclosing elements were supported by structures like columns and beams (Bötticher, 1874).

Even as the construction capabilities of the ancient Greeks advanced, the Greek construction system remained based solely on the use of large monolithic materials. The manipulation of materials occurred later during the Romanesque period when construction systems turned to connecting small stones instead of using a single large stone. This was a structural system directly opposite to ancient Greek architecture. The greatest success of this new construction system was the invention of the vault.

Bötticher studied the process of technical development, from simple arches to vaulted roofs and load-bearing structures. This allowed walls to be freed from other functions besides enclosure and culminated in the invention of the pointed arch, which reduced horizontal forces with the help of buttresses and flying buttresses. This allowed buildings to have wider spans and much greater heights. In Bötticher's view, this represented the pinnacle of working with materials (Bötticher, 1874).

After analyzing the differences between the post-and-lintel and vaulted systems, Bötticher presented a crucial idea that would influence and become the foundation of architecture in the late 19th and early 20th centuries. He believed it was a criterion for developing the value of the various styles that he called Kernform (Core-form) and Kunstform (Art-form). The Core-form referred to the collaboration of material and construction techniques, as well as the efficiency of each component's function. In contrast, the Art-form focused on the visible expression of those functions. In other words, the function of various components could be expressed symbolically in relation to their true function. This meant that both the Core-form and the Art-form had to respond to the authenticity of construction, even if from different perspectives (Bötticher, 1874).

Under the criteria for evaluating the value of Core-form and Art-form that Bötticher proposed, an artist or architect could not create forms arbitrarily just to create a discourse, without considering the true functional purpose of those components. The most important point was that a style had value only when it expressed the authentic relationship between the Core-form and the Art-form and could be developed into a genuine and lasting architectural language (Bötticher, 1874). Bötticher believed that it was essential to have a thorough understanding of the true principles of both forms, to create a new system based on completely different, new materials. Ultimately, the conflict between the ancient Greek and Gothic construction systems would cease to exist, being resolved by the effort to find a style for the present and the future.

6. Gottfried Semper: From Exile to a Theory of Architecture

While the academic debate on architectural styles continued throughout the mid-19th century, producing many valuable theoretical works, another German architect and theorist worked on both design and theory. His theories became an important part of 19th century architectural thought, influencing numerous scholars, theorists, and architects in the late 19th and early 20th centuries. His work became a reference for the origin of architecture, the relationship between architectural components and the specific properties of materials, and the origin of ideas about surface and the architectural envelope, which continue to shape our understanding of space today.

Gottfried Semper was an architect, theorist, and professor who left behind designed works we can still see today, such as the Dresden Opera and the Burgtheater in Vienna. Despite being a skilled and famous

architect in Germany, Semper unfortunately became politically involved in the revolution of 1849. When the revolution failed, Semper was one of those found guilty and had to flee the country, wandering through various European cities for the rest of his life.

6.1 Comparative Building Theory and the Four Elements

However, Semper's misfortune was a stroke of luck for the world of architectural theory. As a refugee, with little opportunity for serious design work, Semper dedicated his time to a deep study of architectural history and theory. He was able to study artifacts in the Louvre Museum and various libraries, which led to the production of many important writings. While living in Paris and trying to find design work, Semper began writing a book titled *Vergleichende Baulehre* (Comparative Building Theory). Semper intended to study the history and evolution of architecture from various civilizations around the world and cover different building types to create a foundational understanding of the origins of structural forms and their relationship to the functions of those building types (Semper, 2004). This was one of the first attempts by an architectural theorist to differentiate and discuss the function that gave rise to various building types, unlike Quatremère de Quincy or Jean Nicolas Louis Durand, who spoke of typology in terms of form and component outlines.

The purpose of writing this great book was explained in the introduction: many books had discussed architecture from a historical and philosophical perspective, from aesthetics or architectural history, or they focused on a single aspect of design, or they were treatises on materials and techniques (Semper, 2004). However, there was no work that discussed the relationship between the creator's ideas and the true creative potential of materials in the art of architecture. Semper believed the purpose of his theoretical work was to explain the development and change of architecture in relation to fundamental and true principles. He also sought to uncover the rules hidden beneath the discursive expression of artistic cladding, which would lead to a foundational understanding and the simplest possible expression.

6.2 Bekleidungstheorie (Theory of Cladding)

Amidst his attempts to find design work in Paris or secure a more stable position in European institutions, which always ended in disappointment, Semper decided to send the first part of his manuscript to a publisher. A new element Semper added to this manuscript was the concept of the "four elements" present in the world's oldest traditional architecture: the roof, the earthen platform, the enclosing wall, and the hearth, which was the center of the social system and the origin of all social situations. These four elements were part of his search for the fundamental elements (*Urelemente*) of architecture, which would later become the core of Semper's ideas (Semper, 2004).

Another important aspect that Semper began to discuss in this manuscript was the Theory of Cladding (*Bekleidungstheorie*), which he would study more deeply and which would become the most important part of his theoretical ideas in his subsequent treatise, *Der Stil* (Style). It is worth noting, however, that the manuscript Semper sent out at the time was not complete; it was only one-fifth of the content Semper intended to write (Semper, 2004).

Semper's time as a refugee lasted for six years, from 1849 to 1855, before he decided to move to Zürich, Switzerland, to accept a professorship at a new architectural technical institute established by the Swiss government, now known as ETH Zürich. Before he moved to Zürich, Semper had the opportunity to travel to London, which also was part of his effort to find a more stable job. This trip became an important inspiration for the development of Semper's architectural theory.

6.3 Der Stil and Practical Aesthetics

While in London, Semper had the opportunity to participate in The Great Exhibition of 1851. This exhibition showcased art, crafts, and other inventions from countries around the world, giving Semper a chance to study creative products from different civilizations up close. He noticed a common characteristic in the creations from ancient, traditional civilizations, as well as those from countries that had not yet undergone industrial development. In these civilizations, artistic creation was guided by a natural instinct for form and color, using techniques that authentically related to the specific properties of the material. This resulted in a high quality and standard of craftsmanship (Semper, 2004).

As a result, works from traditional civilizations, such as those of the Caribbean islands, which had not been dominated by the industrial system, could express their technical properties in a clear and truly direct way, in a way that no nation in Europe at that time could. The true quality and standard of creation would only be possible if European nations turned to studying what traditional civilizations could do by instinct: respecting the properties of the material and the true function of the material and the creation itself.

In addition to materials, techniques, and function, the creations Semper studied at the London exhibition also made him ask a fundamental question about the root or origin of architecture. Semper rejected the theory that the Primitive Hut was the model for all architecture. He did not believe that architecture was the first human artistic creation. He thought that other creations, although seemingly minor compared to architecture, appeared to have emerged alongside human society and were developed before we had any buildings in the world. These included decorating the body with patterns, pottery, weaving mats or carpets, making everyday tools, and creating weapons from stone, metal, and wood. These arts had genuinely progressed for a long time before humans undertook architectural design and construction (Semper, 2004).

It was from creating these various objects that humans began to instinctively learn about order, rhythm, patterns, size, and proportion. Thus, the first aesthetic principles of humanity emerged in parallel with the creation of objects for daily use before being later developed in architecture. The creation of these functional objects therefore was a key to understanding the origin of architectural creation.

It was during his time in London that Semper had the opportunity to research and formulate the theoretical ideas that would become the work for which he is famous today: *Der Stil in den technischen und tektonischen Künsten oder praktische Ästhetik* (Style in the Technical and Tectonic Arts: or Practical Aesthetics). This was published in two volumes, 1860 and 1863. The first volume of *Der Stil* was divided into four main chapters on the art of textile, discussing the fundamental origins and nature of textile art itself and its relationship to architecture. The second volume discussed four types of art: ceramics, carpentry, stereotomy (stone construction), and metallurgy, both in terms of their own basic principles and their relationship to architecture (Semper, 2004).

The book's title, with its emphasis on "practical aesthetics," expressed Semper's core idea about architecture. Although Semper did not reject architectural ideals or discourse, he wanted to point out the difference between architecture and other pure arts: the truth in architecture does not primarily come from communication, but from function, technique, construction, and material working together to create form. This dimension of construction and material led Semper to create his theory of the Four Elements of Architecture (*Die vier Elemente der Baukunst*) (Semper, 1989).

Semper proposed that architecture was not just about the structure as a key component, but that it was composed of four elements that worked together to create architectural form: the roof, the earthen platform, the enclosing wall, and the hearth, which served as the social center. These four elements did not originate from ideals or discursive communication, but from functional needs, techniques, and materials. This allowed

Semper to connect the four elements to four types of creative techniques or arts. The roof arose from the technique of carpentry (Tectonic), while the platform was related to the art and technique of stone construction (Stereotomic). The hearth was related to the technique and material of ceramics, while the enclosing wall originated from the stretching of a mat or carpet, thus relating to the art of textiles (Semper, 1989).

The important point of Semper's four elements theory was that in addition to its emphasis on technique, it contained a new and crucial idea that would become a foundation for modern architecture: the production and construction process was related to the different properties of the raw materials or materials used, from solid materials to elastic materials, and from plastic materials to flexible materials. It was this combination of technique and material properties that was the key factor in creating forms or styles in the various artifacts humans created, including architecture (Semper, 1989). Semper's intellectual influence also spread throughout Europe, affecting the architectural designs of architects in the late 19th century such as Otto Wagner and Adolf Loos, as well as clearly developing into modern architecture in the works of Walter Gropius and Mies van der Rohe.

7. Cladding, Communication, and the Wall

Gottfried Semper believed that the four key elements that work together to form architectural expression are the wall, the roof, the earthen platform, and the hearth. These four elements are related to four types of construction arts: textile, tectonic (carpentry), stereotomic (masonry), and ceramics. Of these four, Semper believed that textile was likely the first construction art to emerge. It originated from the simple act of tying knots, which later developed into the complex weaving of cloth, garments, mats, and carpets used to enclose and shelter humans from their environment. For Semper, covering the human body and enclosing space had the same root need (Semper, 1989). As human civilization and architecture developed, this act of enclosure took on more complex forms to serve changing and increasing sociopolitical and cultural purposes in each location.

However, beneath the increasingly complex function of architectural cladding lies a crucial element of Semper's *Bekleidungstheorie* (Theory of Cladding): the human need to communicate. Based on the social need for communication, various forms of language developed, from the instinctive language of the body to the learned languages of speech and writing. Similarly, the language of architectural cladding and enclosure also stems from a communicative purpose that works in tandem with functional purposes to create expression, whether or not the creator and user intend it (Semper, 1989).

The German-British psychologist John Carl Flügel explained this concept in his famous 1930 book, *The Psychology of Clothes*, as he described the diverse purposes of clothing the human body, noting that it was not solely for protection against heat or cold (Flügel, 1950). Weather and environment were only part of the reason for ancient human clothing. Another important function of covering the body was expression and communication—whether expressing social status, role, or personal identity. Therefore, covering the body is difficult to separate from body ornamentation, and sometimes the two merge into one.

Gottfried Semper's Theory of Cladding reflects a similar idea. He connected the patterned mat or carpet, created through textile art with the development of permanent building walls. These walls still needed a symbolic expression related to the colorful, original mat. Therefore, creating patterns on a building's wall was not just aimless decoration; it came from the ancient function of enclosing with a mat. A wall that is "clad" with patterns or colors makes us clearly aware of its nature as a flat surface assembled to enclose a specific space.

The nature of color and pattern to express or communicate, whether intended by the creator or not, produces an inseparable relationship between the function of enclosure and the communicative function of the architectural element we call a “wall.”

Semper’s Theory of Cladding, which presented the dimension of expression and communication through surface, pattern, and wall ornamentation, was partly linked to the late 19th century field of human perception psychology and the emotional relationship between an object and its viewer or user. This was part of the study of aesthetics in Germany, which developed from questions posed by German philosophers such as Immanuel Kant. This led to a theory known as Empathy Theory (Einfühlung), developed by the German scholar and theorist Robert Vischer in his 1873 book, *Über das optische Formgefühl* (On the Optical Sense of Form). This became one of the most influential theories for the development of art and architecture in the late 19th and early 20th centuries, as it attempted to find a new way of looking at and understanding art based on a foundation no one had previously studied (Vischer, 1873).

8. Perception and Feeling: Robert Vischer’s Einfühlung

Vischer’s Theory of Expression or Empathy, which he named *Einfühlung*, is based on the relationship between physical sensory perception and human emotions. It suggests that human emotions cannot arise without the physical sensory perception of the world. At the same time, once emotions are born, they also influence our physical perception. Therefore, emotions are always determined by the capabilities and limitations of our physical sensory tools (Vischer, 1873).

Within this relationship, Vischer distinguished between human perception and emotion. Perception is the body’s response to external stimuli, while emotion is the mind’s response. A fundamental part of aesthetics is the relationship between physical perception and emotional response. All art objects are created with the purpose of reflecting emotion or creating an emotional connection between the physical characteristics of those objects and human perception. Vischer divided visual perception into three main levels: “seeing,” which is natural, unintentional perception; “looking,” which is an intentional consideration that leads to awareness; and the highest level of visual perception, which for Vischer is the relationship between seeing and the creation of imagination in our minds. Thinking (*Denken* in German) therefore is a primary component of the highest level of visual perception, which is a crucial part of the aesthetics of perceiving and appreciating art (Vischer, 1873).

At the turn of the century, two important art and architectural theories from the previous century, Gottfried Semper’s Theory of Cladding and Robert Vischer’s Empathy Theory were linked together. This, combined with a desire to find a new architectural language free from the historicism of the 19th century, led to the formation of art and architecture we know as Art Nouveau. (Vischer et al., 1994) Art Nouveau sought to create forms, surfaces, and ornamentation to stimulate and reflect emotions between the art object and the viewer, using forms derived from surrounding nature. This was based on the belief that all things in nature were the first to offer emotions to humans, so art based on natural forms would be the best at communicating with human emotions.

We can see that the core of Semper’s theory discusses the “function” of architectural elements, which reflects the true reason for their existence. Even when Semper developed his Theory of Cladding, which is directly related to the building’s skin, he focused on questioning the function and reason for creating the skin, as well as the relationship between the skin and other elements, rather than viewing the skin as merely

a decorative part or a surface that could be anything. Therefore, while the communicative function of the architectural skin or enclosing elements that Semper discussed could be linked to Empathy Theory, it was not the only important function of the building's enclosing elements. Empathy did not arise and exist independently from the other purposes or functions of architecture. Thus, in addition to Empathy Theory, two other important theories in the late 19th century paved the way for modern architecture: the theory of "space" and the theory of "building," both of which were debated in several important articles and books at the time.

9. The Emergence of Space: From Alberti to Schmarsow

In architectural history before the 19th century, when architects and theorists discussed architecture, the topics analyzed and debated often were about orders, proportions, symmetry, balance, components, materials, structure, construction techniques, function, and decorative beauty. It was not until the 19th century that style became an important topic of critical discussion. And it was in the late 19th century that the concept of "space" became a key architectural idea that would influence the way architects worked around the world.

Of course, architectural space has existed and developed alongside human civilization since ancient times. However, throughout history, architects did not call these units of area "space," or perhaps they did not give any name at all to what we call "space" today. This is because space was never a topic or architectural concept for architects. It was simply the result of the enclosure of other architectural "elements" that all had names, such as columns, beams, walls, floors, and roofs. In the past, the shape and form of what we now call space were not the result of intentionally molding or forming them for their own sake, but rather the result of forming architectural elements based on the principles and rules of order, size, proportion, form, and construction methods. This is why no theoretical treatise in history explicitly discussed space. The closest thing was the concept that Leon Battista Alberti, written between 1443-1452, called *area* in Latin, which did not mean the size of an area as we understand it in English. Alberti's *area* meant the space covered by a building, its location, and the organization of the plan. Therefore, the word *area* that Alberti used was sometimes translated into English as "plan" or "ground plan" (Alberti, 1994).

Besides *area*, Alberti also discussed two other topics related to the creation of architectural space. The first he named in Latin *os et complementum*, which can be simply translated as "skeleton and enclosing surface." The *os* could be the main or secondary structure, while the *complementum* referred to the part that was stretched, built, or constructed to fill the space between the structures. The second topic Alberti named *partitio*, which referred to the process of dividing a site or building area into smaller parts that, when put together, were like the various components of a complete body. This word is the root of the English word *partition*, which implies dividing units of space (Alberti, 1994).

But after Alberti presented his ideas about these units of area, the direction of architectural theory remained focused on orders and forms for several hundred years. It was not until Gottfried Semper introduced his theory of architectural elements in the 19th century, combined with the Industrial Revolution, which led to the emergence of many new building types and changes in production and construction systems, that the direction of architectural theory was ready to shift to other topics related to philosophy and the sociopolitical and cultural issues of the time. The topic of architectural space was clearly explained for the first time in an inaugural chair's address at University of Leipzig titled *Das Wesen der architektonischen Schöpfung* (The Essence of Architectural Creation), delivered in 1893 by the German historian and theorist August Schmarsow (Schmarsow, 1894).

Schmarsow's main ideas discussed human understanding of space and the main function of architecture in creating that space. Although Schmarsow's theory of space was directly influenced by Gottfried Semper's ideas, he began his writing by criticizing Semper's famous Theory of Cladding. He believed that *Bekleidung* (cladding) in German, being related to the word for clothing, when translated into English as "dressing," was a superficial way of looking at architecture from the outside, as merely an art of dressing or arranging elements. But while Schmarsow spoke negatively of Semper's theory of cladding, one of the most important points in Semper's theory, that of enclosing space, became the catalyst for Schmarsow to clearly develop his idea of architectural space (Schmarsow, 1894). Semper had talked about creating units of space by enclosing with a wall to accommodate various functions. Semper saw this as an idea that would replace the past view of architecture through form or appearance. Therefore, under the seemingly superficial name of the "Theory of Cladding," a significant implication about the creation of space from the enclosure of elements was hidden, which Schmarsow used as a starting point to develop his ideas about architectural space.

However, the clear development of the concept of architectural space by August Schmarsow was tied to the meaning of the German word for space, *Raum*, which has a completely different root and original meaning from the English word "space." In addition, the word "space" comes from the Latin *Spatium* (Greek *Stadion* and the ancient Indo-European root *Spei*), which means continuous and endless expansion and growth, making the word "space" also used for what we call "outer space" in English, signifying emptiness and infinite continuity. However, the German word *Raum* comes from the ancient German (Teutonic) word *Ruun*, which means a unit, piece, or part, implying limitation, making something into a piece or unit, defining a boundary, and having a definite location. The word *Ruun* also is the root of the English word *room*. From this meaning, we can see that architectural space, in August Schmarsow's sense, is not emptiness but a unit of area with a defined boundary (Schmarsow, 1894).

10. Raumwissenschaft, Raumkunst and Raumplan

In addition to the crucial idea of architecture as something that creates space, Schmarsow also discussed space in two different but related aspects: the Science of Space (*Raumwissenschaft*) and the Art of Space (*Raumkunst*). The science of space is the mathematical reality of the elements that create space, while the art of space refers to the human ability to transform their internal instinct about space into a tangible form that can be perceived by the senses. When these two things work together, they create the system or order that humans use to perceive the world. Architecture therefore is a product of both the science and art of space, creating units of space that we can perceive, which originate from our own instinct about space.

Another important point in August Schmarsow's theory of space that influenced the concepts of 20th century modern architecture is its focus on humans, whom Schmarsow saw as the center of architectural space. Therefore, humans and their movement through space, as well as their occupation of space for various activities, whether functional or perceptual, are the core and primary purpose of the creation and existence of all architectural space. Humans are the first and most important element that allows architectural space to be created. Space can arise from different levels of relationships between humans and elements, from the dilute unit of space created by a mere demarcation to the clearer unit of space created by a boundary, and finally to the clearest unit of space, the enclosure (Van de Ven, 1977).

In the early 20th century, August Schmarsow's theory on the perception of space units and the view of architecture as a creator of spatial units, which was closely related to Gottfried Semper's Theory of Cladding

and enclosure, was developed and applied in the most concrete way in the architectural designs of the Austrian architect Adolf Loos, under the theory we know today as the Theory of Spatial Structure (Raumplan in German, or “Space-plan” in English). Loos did not view the design of space as two-dimensional planning or the division of a plan into parts. Instead, Loos’s architectural works, such as the Villa Müller, were conceived from three-dimensional units of space with different mass and volume, which were connected in an assembly of volumes rather than a division of void space, as in the past. To understand Loos’s system, we must always consider the floor plan in conjunction with the cross-section to see the three-dimensional relationship of those volumes of space. The Raumplan concept is in extreme opposition to the Divided plan of the previous era or the Open plan of the later era (Risselada, 1988) (Figure 1, 2).

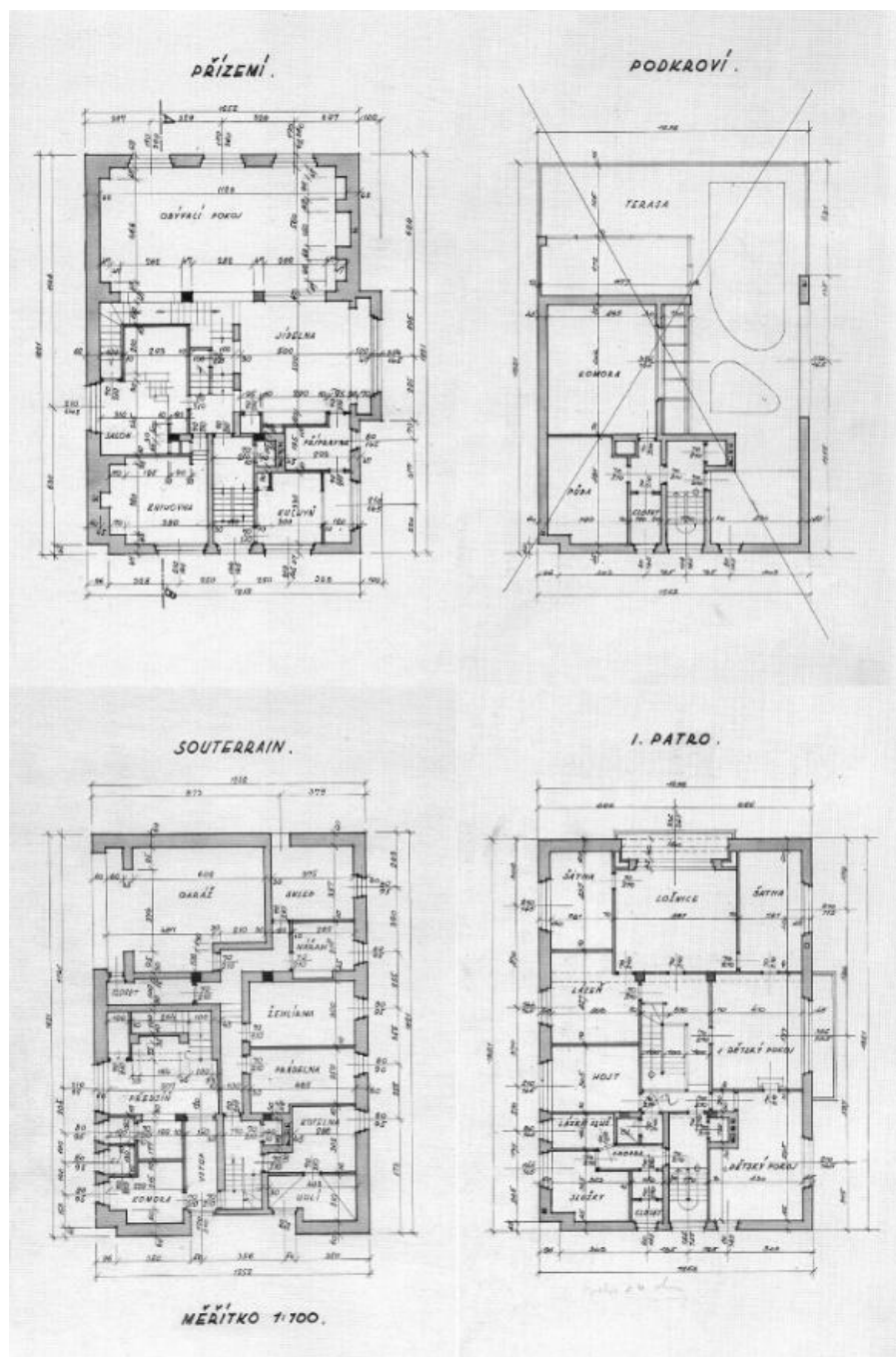


Figure 1. Adolf Loos, Villa Müller, Plans (van Duzer & Kleinman, 1997).

Because the spaces in Loos's buildings are units connected in multiple three-dimensional directions (Figure 3), Loos integrated the idea of space units with Semper's Theory of Cladding by using every surface of the space as a symbol of its function. Each space unit therefore had a visibly different surface or cladding. Thus, when traveling through the space, we are aware that we have crossed a boundary from one area to another through the perception of the different surfaces around us. Many of Loos's architectural works therefore can be used as a clear test of the practical application of the two main architectural theories of the 19th century.

11. The Outcome: Baukunst or Building Art

The topics of architectural theory debate in the 19th century, especially in German-speaking countries, whether on perception, empathy, human instinct, and psychology regarding form and space, all paved the way for the field of philosophy known as Phenomenology, particularly in its early stages in the works of the German philosophers Edmund Husserl and Martin Heidegger. While August Schmarsow was familiar with the ideas of his contemporary philosopher Carl Stumpf, who presented ideas about psychology and sensory perception and included the topic of human perception of space in general and human movement in space as a topic of study, Stumpf's ideas clearly influenced Husserl during his study of philosophy with Stumpf at the University of Halle in 1886. This helped motivate Husserl to formulate his ideas about the structure of consciousness, which is based on the key principle of distinguishing between consciousness and the phenomena that are the source of that consciousness, whether natural or man-made (Vischer et al., 1994).

The topic of perception, awareness, and the relationship between phenomena and man-made objects we call art, especially the origin of art, was later explained in *Der Ursprung des Kunstwerkes* (The Origin of the Work of Art), written between 1935 and 1936 by Martin Heidegger. He explained art not as an expression of truth or a specific cultural characteristic, but as a tool for creating a certain type of truth. Therefore, art is not merely a representation of truth or a real situation, but it also creates a shared understanding for a society or group of people. New art that emerges in any culture always changes the meaning and understanding of phenomena in that culture. The relationship between a real-world object and the meaning we understand from its representation is not a linear relationship but a network of symbolic systems that link people, objects, and other events connected to it. Heidegger did not extensively discuss architecture in *Der Ursprung des Kunstwerkes*, but one example he used was the Greek temple, in terms of its purpose, its relationship to its construction method, and the meaning humans later perceived. This brought Heidegger's ideas closer to architectural theory (Heidegger, 1971).

It was not until the publication of the article *Bauen Wohnen Denken* (Building Dwelling Thinking) in 1952 that Heidegger's philosophy influenced the development of architectural theory and the study of architecture. The main content of "Building Dwelling Thinking" clearly reflects August Schmarsow's ideas about the nature of space and the perception of that space in relation to everything else in the world. Heidegger began the article by questioning how the meaning of dwelling and building are related (Heidegger, 1971).

The word "building" (Bauen) comes from the old German and English root *buan*, which means "to dwell," in the sense of existing or remaining in one place. Therefore, building and dwelling are ideas that are tied together, and "dwelling" in this sense does not have a meaning in itself but links to the various human activities performed in that place, whether working, resting, or other activities. The word "dwelling" or *Wohnen*, which comes from the Old Saxon root *wuon* and the Gothic root *wunian*, also originally meant to exist or remain in a place. The word *wunian* implies remaining in peace or making something remain in peace and freedom (the word for "peace" in German, *Friede*, means to be free) (Heidegger, 1971).

Heidegger explained the ancient meaning of the word “space” (Raum) as a “place” that has been made empty and free and is prepared for dwelling. This space exists within a boundary that we can perceive. Furthermore, with the word “boundary,” Heidegger referred to the ancient Greek root *peras*, which is not a boundary of stopping, but a boundary for the beginning of something. This content clearly shows the relationship between Heidegger’s ideas about space and the concepts developed decades earlier in the work of August Schmarsow, who believed that we could only perceive architectural space once a boundary was created. These boundaries could be in the porous level of the solid, stable boundaries of enclosing architectural elements. But these boundaries did not have a meaning in themselves. They have meaning only through their connection to the human “awareness of location” in those spaces. In other words, the meaning of space lies in the awareness of location, not in its emptiness.

Heidegger’s idea of building reflects the theory that the German architect and theorist Hermann Muthesius explored earlier in his 1902 book, *Stilarchitektur und Baukunst* (Style-architecture and Building-art). Muthesius discussed the difference between two contrasting ideas. The first was architecture driven by the pursuit of style or the creation of an external appearance, which is architecture that emphasizes a discursive content of communication more than anything else. The opposite extreme is the Art of Building or *Baukunst* in German, which comes from the words *Bau* (building) plus *Kunst* (art). The Art of Building is an idea based on reason and reality, as well as methods, techniques, and functional needs that change in each era. *Baukunst* or the Art of Building is architecture that represents truth, while *Stilarchitektur* or Style-architecture represents a discursive expression (Muthesius, 1994). Muthesius believed that when historicist architecture, which emphasized the discourse of external appearance, had reached its saturation point, the next era of architecture should question the true reasons for building, whether for functional needs or materials and construction methods, which could truly reflect the specific sociopolitical and cultural characteristics of that time.

The idea of the authenticity of building that is embedded in the word *Baukunst* also appeared in the writings of other architects, including Otto Wagner, who wrote the important theoretical book *Moderne Architektur* (Modern Architecture) in 1896. When Wagner revised and published the book for the fourth time in 1914, he changed the title to *Die Baukunst unserer Zeit* (The Art of Building of Our Time), in recognition of the meaning that signified the genuine truth in the reason for building that was inherent in the word *Baukunst* (Wagner, 1988). It was under this same idea that we know the school that represents the teaching and creation of modern architecture under the name Bauhaus.

12. Discussions:

Discussion I: Toward Modern Architecture: Materials, Programs, and Practice

Looking back at the 19th century, we see that the discourse of historicism created a reaction, leading to questions in many areas that resulted in three main architectural theories: Empathy-Einfühlung, Space-Raum, and Building-Bauen. Although all three are related, they each stimulated different applications.

Empathy Theory led to the creation of another form of discourse to communicate and express emotions by reinterpreting nature. It is the theory of space that eventually replaced the old discourse of Empathy. This new theory of space, which led to an understanding of at least three levels of boundaries—demarcation, boundary, and enclosure—opened the door to new ways of creating space and area. This included the assembly of three-dimensional volumes of space in the architecture of Adolf Loos, the connection of fluid spaces in the work of Mies van der Rohe, and the continuous movement of humans through space in the buildings of Le Corbusier.

And as the theory of space was developed and applied in a concrete way, the theory of building also was brought to the forefront, giving rise to questions and interpretations about how materials, production systems, and construction methods influence the formation of space and the appearance of buildings. Architects therefore had to learn and understand all related processes until design and building truly merged into one. This principle became a key philosophy of modern architectural schools in Europe in the early 20th century and later spread to England and the United States.

Based on the philosophy that was developed in the 19th century and architectural theories that reflected similar ideas, a stimulus arose to question and debate the true purpose of architecture and the relationship between creating architecture and the new situations that were emerging at the time. These discussions explored new functional needs that arose after the Industrial Revolution, new materials and construction systems like steel and larger glass, changes in industrial production and construction methods, the advancement of public utilities and transportation systems, as well as changes in the economy, society, and politics of Europe, all of which led to new lifestyles, values, and worldviews.

All these reasons combined to push architects in the late 19th century to re-evaluate their own way of thinking and designing. Even an architect who was educated in the historicist mindset and had worked in an environment of historical reference for a long time, such as Otto Wagner, when commissioned to design buildings for new functions that had never existed before—like buildings for Vienna’s tram and subway systems— was inspired to question the nature of architecture and its true purpose at the time. This led to an architectural design that was not merely a creation of a discursive building skin, but a work that began with the authentic, specific function of each building, which resulted in spatial organization, floor plan, circulation system, size of the area, and volume of space in each building being conceived to solve different problems. In addition, Wagner attempted to understand new materials and construction, such as using steel structures, cladding panels, and various cladding systems. He created a symbolic system from new construction methods instead of from traditional historical discourse, making Wagner’s work a clear step forward, a breakthrough from the old forms of communication to a representation of modern architecture (Figure 4). The example of the possibilities in Wagner’s architecture contributed greatly to the transfer of ideas to the next generation of architects, whether it was Adolf Loos or Peter Behrens.



Figure 4. Otto Wagner's Österreichische Postsparkasse, Wien (Wagner, 1888).

The work of these architects, who are considered foundational theorists of modern architecture—Loos and Behrens—was based on the relationship between spatial systems and the formation of architectural works that were related to changing needs and purposes. Loos used residential building design as an exercise to find an answer to the relationship between interior space and the external appearance of the building, on the assumption that modern life requires complexity and richness inside, while the external appearance should be as smooth and minimal as possible. This was an idea that was further developed by many modern architects, especially Le Corbusier.

In contrast, Peter Behrens used the task of large public buildings with new functions, such as factories, as an exercise to study the relationship between function and the form of space within the framework of new materials, structural systems, construction, and production systems for maximum efficiency. This was a question that was asked again and answered more deeply in the works of German architects like Walter Gropius and Mies van der Rohe under the name of modern architecture. Architects in every era, from ancient classicism to the modern era, had struggled to integrate the knowledge of construction facts with an ever-changing ideal worldview, for the reason that architecture is not merely a shelter to protect humans, but a tool that also gives meaning to humanity's dwelling in the world.

Discussion II: Contemporary Practice and Theory Since 1990: From Baukunst to Critical Material, Spatial, and Ethical Thought

Since approximately 1990, architectural practice and theory have been shaped by forces that differ markedly from those that formed early modern architecture—globalization, digital design technologies, environmental crisis, and new modes of production and labor. Yet despite these transformations, contemporary architecture has not abandoned the conceptual foundations established in the 19th century. Rather, both practice and theory since 1990 can be understood as renewed engagements with the enduring problems of Baukunst, spatial perception (Raum), material authenticity, and the relationship between building and dwelling, now reframed under radically altered historical conditions.

Following the exhaustion of postmodern historicism in the late 20th century, architecture gradually shifted away from symbolic quotation and stylistic representation toward questions of material performance, construction logic, and embodied spatial experience. This shift echoes Hermann Muthesius's critique of *Stilarchitektur* and his advocacy of *Baukunst* as an architecture grounded in the realities of building rather than in discursive appearance alone (Muthesius, 1994). Contemporary architecture, in this sense, does not reject modern architectural thought but reactivates its ethical and epistemological core: architecture as a truthful response to material, technique, program, and human occupation.

One of the most significant continuities between 19th century theory and contemporary practice lies in the renewed emphasis on sensory perception and lived experience. The work of Peter Zumthor exemplifies this orientation. Zumthor's architecture foregrounds atmosphere, tactility, sound, and material presence as fundamental architectural values, situating perception at the center of architectural meaning. This approach resonates strongly with the lineage from Robert Vischer's *Einfühlung* to August Schmarsow's theory of space, in which architectural form acquires meaning through bodily and emotional engagement rather than through abstract visual composition alone (Vischer et al., 1994). Space in Zumthor's work emerges through the articulation of boundaries, materials, and sensory sequences, reinforcing the idea of architecture as a phenomenological construct rather than a formal object.

A similar continuity can be observed in the work of Tadao Ando, whose architecture demonstrates how modern spatial theory persists in contemporary practice. Ando's manipulation of light, concrete, and movement produces spatial experiences that are simultaneously rigorous and contemplative. His work reinforces Schmarsow's conception of space as a human-centered construct defined by enclosure and movement, rather than as an abstract void. The careful orchestration of approach, threshold, and interior progression aligns with the concept of *Raumkunst*, in which architecture becomes the art of shaping spatial experience grounded in human perception and bodily presence (Van de Ven, 1977).

At the level of architectural elements, contemporary practice also has re-engaged Gottfried Semper's *Bekleidungstheorie* in increasingly complex ways. Advances in façade engineering, material science, and digital fabrication have transformed the building envelope into a critical site of architectural inquiry. Practices such as Herzog & de Meuron explore the building skin not merely as surface or ornament, but as an interface between structure, material behavior, environmental performance, and cultural meaning. Despite the use of experimental materials and advanced technologies, this work remains conceptually aligned with Semper's understanding of cladding as both a functional enclosure and communicative medium. The façade continues to mediate between interior space and exterior context, reaffirming the inseparability of construction, material, and expression (Semper, 1989; Herrmann, 1989).

While architectural practice since the 1990s reflects these theoretical continuities, architectural theory after 2000 has further expanded and consolidated them. Since the turn of the 21st century, architectural theory has increasingly distanced itself from stylistic categorization and returned—often implicitly—to foundational questions concerning building, material, space, and human experience. Theoretical discourse has shifted toward phenomenology, tectonics, embodiment, ecology, and critical engagements with digital epistemologies. Rather than replacing earlier modern frameworks, these developments can be understood as reinterpretations of 19th century debates on *Baukunst*, *Raum*, and material truth.

One of the most influential trajectories after 2000 has been the consolidation of phenomenology as a central framework for architectural thinking. Building upon the lineage from Vischer through Schmarsow to Heidegger, theorists such as Juhani Pallasmaa and Alberto Pérez-Gómez have emphasized architecture as an

embodied, experiential, and ethical practice. Pallasmaa's critique of ocularcentrism and his advocacy for multisensory perception reaffirm that architectural meaning arises through bodily engagement with space, material, and atmosphere rather than through visual form alone (Pallasmaa, 2005). This position directly echoes Schmarsow's human-centered conception of space and reinforces perception as a foundational condition of architectural creation.

In parallel, Pérez-Gómez has argued that architecture must be understood as a culturally situated and ethically grounded practice, resisting the reduction of design to technical optimization or abstract formalism. His work reframes architecture as a meaningful act of dwelling that mediates between human existence and the world, aligning closely with Heidegger's conception of *Bauen* as inseparable from *Wohnen* (Pérez-Gómez, 2016). In this sense, post-2000 phenomenological theory does not merely revive Heideggerian thought but extends it into contemporary debates on globalization, technology, and cultural pluralism.

Another significant theoretical development after 2000 is the renewed emphasis on tectonics and material logic, often framed as a critical response to digital formalism. Kenneth Frampton's concept of tectonic culture gained renewed relevance in the context of increasingly dematerialized design processes. His insistence on the poetic and cultural significance of construction situates architecture firmly within the tradition of *Baukunst*, where meaning emerges from the articulation of structure, material, and technique rather than from representational imagery (Frampton, 1995). This position can be traced directly back to Karl Bötticher's distinction between *Kernform* and *Kunstform*, reaffirming the necessity of grounding architectural expression in constructive reality.

At the same time, digital technologies have fundamentally altered architectural epistemology. Parametric design, computational simulation, and data-driven processes have introduced new modes of form generation that challenge traditional notions of authorship and composition. Yet theoretical responses after 2000 increasingly have sought to reconcile digital processes with material and spatial realities. Rather than celebrating digital form as an autonomous aesthetic, contemporary theory emphasizes performance, material behavior, and environmental responsiveness as criteria for architectural value. In this context, digital architecture can be understood as a contemporary extension of Semper's material determinism, where form arises from the interaction between technique, material properties, and functional requirements—now mediated through computation.

Ecological theory has further transformed architectural discourse since 2000, reinforcing architecture's engagement with the ethics of building. Sustainability, climate responsiveness, and resource consciousness have shifted both theory and practice away from abstraction and toward long-term material and environmental accountability. This ecological turn resonates strongly with 19th century debates on authenticity and necessity, reframing *Baukunst* as an ethical obligation rather than merely a formal or technical pursuit. Architecture increasingly is evaluated not only by spatial or aesthetic criteria but by its capacity to sustain meaningful human dwelling within fragile ecological systems.

13. Conclusion:

The intellectual formation of modern architectural thought emerges from this analysis not as a series of disconnected theoretical episodes, but as a coherent genealogy. Beginning with Heinrich Hübsch's and Karl Bötticher's attempts to ground style in material and construction, this inquiry can be traced through Gottfried Semper's *Bekleidungstheorie* and *Four Elements*, which relocated architectural meaning in technique, material, and enclosure rather than historical quotation. From this material foundation, Robert Vischer's *Einfühlung* and

August Schmarsow's theory of Raum redirected architectural thought toward the perceiving, embodied subject, while Adolf Loos's Raumplan translated these ideas into a concrete spatial practice. Taken together, these theories converge in the concept of Baukunst—articulated by Hermann Muthesius and Otto Wagner—which reframed architecture as an art grounded in authentic building rather than discursive style. What emerges from this trajectory is not a linear succession of isolated ideas but an interrelated theoretical structure organized around three enduring concerns: material authenticity, spatial perception, and the ethical act of building.

This structure did not close with the historical avant-garde. Extending the analysis to architectural practice and theory since 1990 reveals how Peter Zumthor's and Tadao Ando's sensory and spatial concerns, the phenomenological writing of Juhani Pallasmaa and Alberto Pérez-Gómez, Kenneth Frampton's tectonic theory, and the material and ecological reconsiderations prompted by digital design all continue to engage the same foundational questions first posed in the 19th century, now reframed under different technological, cultural, and environmental conditions. Rather than representing a rupture, contemporary architecture's return to material performance, embodied experience, and ecological accountability confirms the continued relevance of Baukunst, Raum, and Bekleidung as operative—not merely historical—categories of architectural thought.

In fulfilling its stated objectives, the discussion has shown that modern architecture cannot be adequately understood as a closed stylistic period bounded by the early 20th century. It is, rather, an open-ended intellectual project whose foundational questions concerning material truth, spatial order, and the meaning of dwelling remain unresolved and continually renegotiated. This framing carries implications beyond historiography: it suggests that contemporary architects and theorists, when confronting new technological and ecological conditions, are not departing from the modern project but continuing its unfinished inquiry. Future research might extend this genealogical approach to non-Western contexts, examining how these theoretical categories—material authenticity, spatial perception, and the ethics of building—are transformed, resisted, or reinterpreted within architectural traditions outside the German-speaking and Euro-American sphere from which this theoretical lineage originated.

Taken together, contemporary architectural practice and theory since 1990 do not signal a rupture from modern architectural thought, but its transformation under new historical conditions. The foundational questions posed in the 19th century—concerning material truth, spatial perception, and the ethical act of building—remain operative, even as they are reframed through digital technology, ecological responsibility, and global cultural exchange. Modern architecture, understood through this continuity, persists not as a closed historical style but as an open-ended intellectual project that continues to shape architectural thinking and practice today.

Acknowledgement

Access to original manuscripts and unpublished materials was made possible by TU Wien, Otto Wagner Archive and Albertina in Vienna. Visits to Gottfried Semper's Burgtheater, Adolf Loos's Villa Müller, Otto Wagner's Majolika Haus and Postsparkasse were made possible by study trips organized by Community Architects for Shelter and Environment.

Funding

The National Research Council of Thailand and Silpakorn University, contract number N42A661022.

Data Availability Statement

Data may be obtained from the corresponding author upon reasonable written request.

Use of Generative Artificial Intelligence (AI) and AI-Assisted Technologies

During the preparation of this manuscript, Grammarly writing app was used for spelling and grammar check. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Author Contributions

Tonkao Panin: Conceptualization, Methodology, Supervision, Writing – Original Draft, Review, Editing.

Tanakarn Mokkahasmita: Conceptualization, Methodology, Writing – Original Draft, Visualization.

References

- Alberti, L. B. (1994). *On the art of building in ten books*. MIT Press.
- Bötticher, C. (1874). *Die Tektonik der Hellenen: Die Lehre der tektonischen Kunstformen: dorische, ionische und korinthische Bauweise* (Vol. 1). Ernst & Korm.
- Flügel, J. C. (1950). *The psychology of clothes*. The Hogarth Press.
- Frampton, K. (1995). *Studies in tectonic culture: The poetics of construction in nineteenth and twentieth century architecture*. MIT Press.
- Heidegger, M. (1971). *Building, dwelling, thinking*. In *Poetry, language, thought* (pp.141-159). Harper & Row.
- Herrmann, W. (1989). *Gottfried Semper: In search of architecture*. MIT Press.
- Hübsch, H., & Wiegmann, R., Rosenthal, C. A., Wolff, J. H., & Bötticher, C. G. W. (1992). *In what style should we build?: The German debate on architectural style*. The Getty Center for the History of Art and the Humanities.
- Muthesius, H. (1994). *Style-architecture and building-art: Transformations of architecture in the nineteenth century and its present condition*. The Getty Center for the History of Art and the Humanities.
- Olsen, D. J. (1986). *The city as a work of art: London, Paris, and Vienna*. Yale University Press.
- Pallasmaa, J. (2005). *The eyes of the skin: Architecture and the senses*. Academy Press.
- Pérez-Gómez, A. (2016). *Attunement: Architecture meaning after the crisis of modern science*. MIT Press.
- Risselada, M. (Ed.). (1988). *Raumplan versus plan libre: Adolf Loos and Le Corbusier, 1919–1930*. Rizzoli.
- Schmarsow, A. (1894). *Das Wesen der architektonischen schöpfung*. Karl W. Hiersemann.
- Schorske, C. E. (1980). *Fin-de-siècle Vienna: Politics and culture*. Vintage.
- Semper, G. (1989). *The four elements of architecture and other writings*. Cambridge University Press.
- Semper, G. (2004). *Style in the technical and tectonic arts: Or practical aesthetics*. The Getty Research Institute.
- Van de Ven, C. (1977). *Space in architecture: The evolution of a new idea in the theory and history of the modern movements*. Van Gorcum.
- Vischer, R. (1873). *Über das optische Formgefühl: Ein Beitrag zur Aesthetik*. Hermann Credner.
- van Duzer, L., & Kleinman, K. (1997). *Villa Müller: A work of Adolf Loos*. Princeton Architectural Press.

- Vischer, R., Fiedler, C., Wölfflin, H., Goller, A., Hildebrand, A., & Schmarsow, A. (1994). *Empathy, form, and space: Problems in German aesthetics, 1873–1893*. The Getty Center for the History of Art and the Humanities.
- Wagner, O. (1988). *Modern architecture: A guidebook for his students to this field of art*. The Getty Center for the History of Art and the Humanities.