TOWARDS AN ARCHITECTURAL *BILDUNG*: A MODEL GLOSSARY AND AN OPERATIONAL CURATION

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ABSTRACT

TOWARDS AN ARCHITECTURAL *BILDUNG*: A MODEL GLOSSARY AND AN OPERATIONAL CURATION

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This thesis is grounded in the premise that architecture is knowledge production encompassing cultural, political, and material dimensions. Yet many concepts central to this understanding have been erased or misused in modern and postmodern debates, often remaining overlooked. Addressing this requires a renewed terminology that revisits neglected strands of architectural theory to reframe diverse approaches to architectural knowledge-making. Accordingly, the framework builds on the nineteenth-century shift from "being" to "becoming", within which the German concept of *Bildung*, encompassing "formation", "culture", and "education", is claimed as both a theoretical and operative lens. Despite its foundational role in nineteenth-century art and aesthetics, *Bildung* has remained underexplored in architectural discourse. Intellectual perspectives approached it as subjective, historical, natural, and pedagogical; defined architecturally, however, it can further enable critical re-evaluations of the concept. In this regard, the research advances two arguments. First, strands of architectural theory over the past two centuries reveal recurring "reflexive doubles" that mirror the conceptual framework of *Bildung*, offering a means to define it in architectural terms. The thesis constructs a model glossary around doubles such as "artform and coreform", "scenographical and technological", and "shape and form". Second, the interplay of plural understandings of *Bildung* offers an operational framework for architecture, defining

three categories of creative processes: Imitative *Bildung*, Formative *Bildung*, and Reflexive *Bildung*. Treating earlier theories as active sites for generating new connections, this thesis contributes to the evolving theory of making by reactivating forgotten strands of architectural theory and proposing an expandable set of operations.

Keywords: *Bildung*, architectural knowledge, architectural making, imitation, formation, reflexivity

ÖZ

MİMARİ *BILDUNG* ÜZERİNE: BİR MODEL SÖZLÜK VE OPERASYONEL ÇATKI

Sarıca, Sezin
Doktora, Mimarlık
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Bu tez, mimarlığın kültürel, politik ve maddi boyutları kapsayan bir bilgi üretim biçimi olduğu öncülüne dayanmaktadır. Ancak bu anlayışa temel oluşturan birçok kavram, modern ve postmodern tartışmalarda göz ardı edilmiş ya da yanlış yorumlanmıştır. Bu durumu ele almak, ihmal edilmiş kuramsal izlekleri ve mimari bilgi üretimindeki farklı yaklaşımları çerçeveleyen bir terminoloji geliştirmeyi gerektirir. Bu bağlamda tez, on dokuzuncu yüzyılda "varlık"tan "oluş"a gerçekleşen dönüşüm içinde tanımlanmış, "oluşum", "kültür" ve "eğitim" anlamlarını içeren Alman kökenli *Bildung* kavramını hem kuramsal hem de operatif bir çerçeve olarak ele alınmaktadır. *Bildung*, on dokuzuncu yüzyıl sanat ve estetiğinde kurucu bir rol oynamasına rağmen mimarlık söyleminde büyük ölçüde göz ardı edilmiştir. Entelektüel yaklaşımlar, kavramı öznel, tarihsel, doğal ve pedagojik olarak ele almıştır; ancak mimari olarak tanımlandığında, kavramın eleştirel biçimde yeniden değerlendirilmesine olanak tanıyabilir. Bu bağlamda tez, iki temel tartışma ortaya koyar. İlk tartışma, son iki yüzyılın mimarlık kuramındaki izleklerin, tarihsel kökleri on dokuzuncu yüzyıl öncül düşüncesine dayanan 'öz-düşünümsel çift terimler' üzerinden inşa edildiği ve *Bildung*'un mimari bağlamda tanımlanmasını mümkün kılan bir kuramsal çerçeve sunduğudur. Bu tartışma, "sanat-form ve öz-form", "skenografik ve teknolojik" ve de "şekil ve form" gibi çift kavramlar etrafında bir model sözlük oluşturur. İkinci tartışma ise, *Bildung*'un çoğul yorumlarının

mimarlık için operatif bir mantık sunduğudur. Bu bağlamda üç kategori yorumlanır: taklitsel *Bildung* , oluşumsal *Bildung*, ve öz-düşünümsel *Bildung*. Sonuç olarak, tarihsel kuramsal çerçeveleri yeni ilişkiler üretmek için etkin düşünsel alanlar olarak değerlendiren bu tez, mimari yapma kuramına katkıda bulunur ve genişletilebilir bir operasyonlar dizisi önerir.

Anahtar Kelimeler: *Bildung*, mimari bilgi, mimari yapım, taklit, oluşum, öz-düşünüm

To my mother, the strongest woman in the world

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CHAPTER 1

INTRODUCTION: UNDERSTANDING *BILDUNG*

The *Mira Calligraphiae Monumenta*



Figure 1.1. Pages with *trompe-l'œil* stem of a Maltese cross, Joris Hoefnagel, *Mira Calligraphiae Monumenta* ("The Model Book of Calligraphy"), 1561–62.. Source: https://www.getty.edu/art/collection/object/103RWD

In the 1500s, with the rise of printing as the most common method of book production, intellectuals began focusing on the creativity of scribes and the visual appeal of writing.[1] This change generated interest in the diversity of calligraphy,

[1] This information was obtained from the Getty Museum Collection online inventory and the talk "Magical Vision and Occult Text in Georg Bocskay's and Joris Hoefnagel's *Mira calligraphiae monumenta*," Matthew D. Lincoln, October 24, 2013. This talk was originally presented at the 2013 Sixteenth Century Society Conference in San Juan, Puerto Rico. https://www.getty.edu/art/collection/object/103RWD

leading to the creation of model books that compiled various calligraphic styles. In 1561–62, the master calligrapher Georg Bocskay (d. 1575), who served as imperial secretary to Holy Roman Emperor Ferdinand I, created *Mira Calligraphiae Monumenta* ("The Model Book of Calligraphy") to demonstrate his exceptional calligraphy skills. The *Mira Calligraphiae Monumenta* is an impressive collection that showcases calligraphic scripts utilizing both old and new designs of letterforms from the sixteenth century. This manuscript, which highlights Bocskay's mastery, was not designed with the intent of teaching the art of calligraphy. Rather, it served as a display of extraordinary skill, presenting the aesthetic potential of calligraphy. The texts selected as examples range from Biblical excerpts and prayers to passages of courtly correspondence, reflecting the manuscript's role as a display of skill rather than an educational tool.[2] The manuscript was crafted on high-quality parchment obtained from animal skin, which was frequently used during the Renaissance for its durability and smooth texture. This medium was perfect for calligraphy and intricate illustrations, allowing artists to capture fine details and vivid colors in the manuscripts (Figures 1.1 and 1.2).[3]

[2] https://www.getty.edu/art/collection/object/103RWD
[3] https://www.getty.edu/art/collection/object/103RWD



Figure 1.2. Pages from *Mira Calligraphiae Monumenta*, with only calligraphy, edited by the author. Source: https://www.getty.edu/art/collection/object/103RWD

This manuscript was later inherited by Ferdinand's grandson, Emperor Rudolf II. Approximately 30 years after its creation, or 15 years after Bocskay's death, Rudolf II commissioned the renowned Flemish artist Joris Hoefnagel (1542–1600) to enhance the work further with intricate illustrations of flowers, fruits, and insects encompassing a variety of flora and fauna. This series not only displays Hoefnagel's artistic skill, blending scientific observation with artistic mastery, but also reflects the Renaissance approach to classifying and understanding the natural world systematically. The use of parchment served to elevate Hoefnagel's contributions. The material of the pages of the model book not only provided a durable and smooth surface but also allowed Hoefnagel to add illustrations by following the traces of his own drawings (Figure 1.3). Its slightly transparent quality allowed him to mirror original drawings on the back pages, enhancing the illusionistic effect. The result, as shown in Figure 1.3, was an extraordinary fusion of calligraphy and illustration, reflecting an artistic dialogue between text and image.



Figure 1.3. Pages from the final version of *Mira Calligraphiae Monumenta* featuring both calligraphic texts and illustrative additions. Source: https://www.getty.edu/art/collection/object/103RWD



Figure 1.4 (continued). Pages from the final version of *Mira Calligraphiae Monumenta* featuring both calligraphic texts and illustrative additions. Source: https://www.getty.edu/art/collection/object/103RWD

The formation of the model book was a layered process to be explained in three interwoven stages rather than as a strictly linear sequence. The first step was the

existing model book itself, composed of a collection of calligraphy types (Figure 1.5a).

Second, the connection between the calligraphy and the page, as the field defined by the letterforms, established a basis for his detailed additions, emphasizing the relationship between text and overall composition. Hoefnagel traced the calligraphy, he used the existing strokes to guide his illustrations (Figure 1.4). His drawings engaged directly with the written forms, seeming to grow from the script. The careful placement of flora and fauna around and within the text indicates an intentional relationship, where letters serve as visual elements that shape the composition (Figure 1.5b).



Figure 1.5. Fragments. Existing strokes guide the additions. Source: https://www.getty.edu/art/collection/object/103RWD

Third, Hoefnagel utilized the semi-transparency of the parchment, carefully tracing and enhancing his illustrations by observing their mirrored impressions on the backs of the pages. This method transformed the drawings into multilayered images, enhancing the illusionistic depth that defines his work (Figure 1.5c).

As a result, his contribution was not merely additive but also transformative, melding calligraphy and illustration into an artistic dialogue that became a creative

composition. Now housed in the Getty Museum, this remarkable manuscript remains one of history's most unique collaborations between a scribe and a painter.[4]

The *Mira Calligraphiae Monumenta* is presented here as a pre-text because it demonstrates how the two representation techniques of calligraphy and drawing were combined at an interval of 30 years, despite having no inherent contextual relationship. As a model book, the text was originally compiled to present a variety of calligraphic styles. The illustrations formed a compilation of natural elements and created a continuous still life arranged according to the spatial constraints of the calligraphic compositions. Furthermore, the illustrations employed the renowned technique of *trompe-l'œil*, reinforcing the idea that a book was a container of information with which a reader could visually engage. Although the *trompe-l'œil* technique was widely used in many works, Hoefnagel's illusions of "back pages," where illustrative elements appear to curl, peel away, or reveal layers on the back sides of pages, was unprecedented. Hoefnagel's new technique drew attention not only to the image itself but also to the temporal and visual layers of the model book, defining these layers and displaying combinations of them (Figures 1.5a-b-c).

This pre-text provides an opportunity to rethink temporal correspondences and how they can enable creative reevaluations of existing architectural theories. The temporal layers[5] between Bocskay's script and Hoefnagel's illustrations suggest an archaeology of different information. Just as Hoefnagel's intervention redefined the manuscript through both addition and transformation, the present study considers how different frameworks in architectural theory can be revisited, not as fixed references but rather as active sites for the generation of new connections and critical insights. Learning from the transformation of a model book into a natural monument through the three interwoven stages briefly described above, this thesis first compiles

[4] Information from the Getty Museum Collection online inventory. See also: https://publicdomainreview.org/collection/the-model-book-of-calligraphy-1561-1596/.
[5] See Reinhart Koselleck's "temporal layers" (2002, 23).

a glossary to reactivate the earlier terminology. Second, much like the calligraphy model book, whose lack of textuality gains specificity when it refers to the illustrations after thirty years, the curation draws from the model book as a reference. It traces these earlier terms to uncover overlooked concepts, as in Hoefnagel's contributions with his depictions of flora and fauna. Finally, it focuses on a creative rereading, inspired by Hoefnagel's multilayered illusions that curl, peel, and reveal the temporal and visual layers of the model book, and establish interpretative frameworks illustrated by examples. These layers of the visual methodology of the creation of *Mira Calligraphiae Monumenta* help to structure the overall approach of this thesis, which examines the processes of architecture.

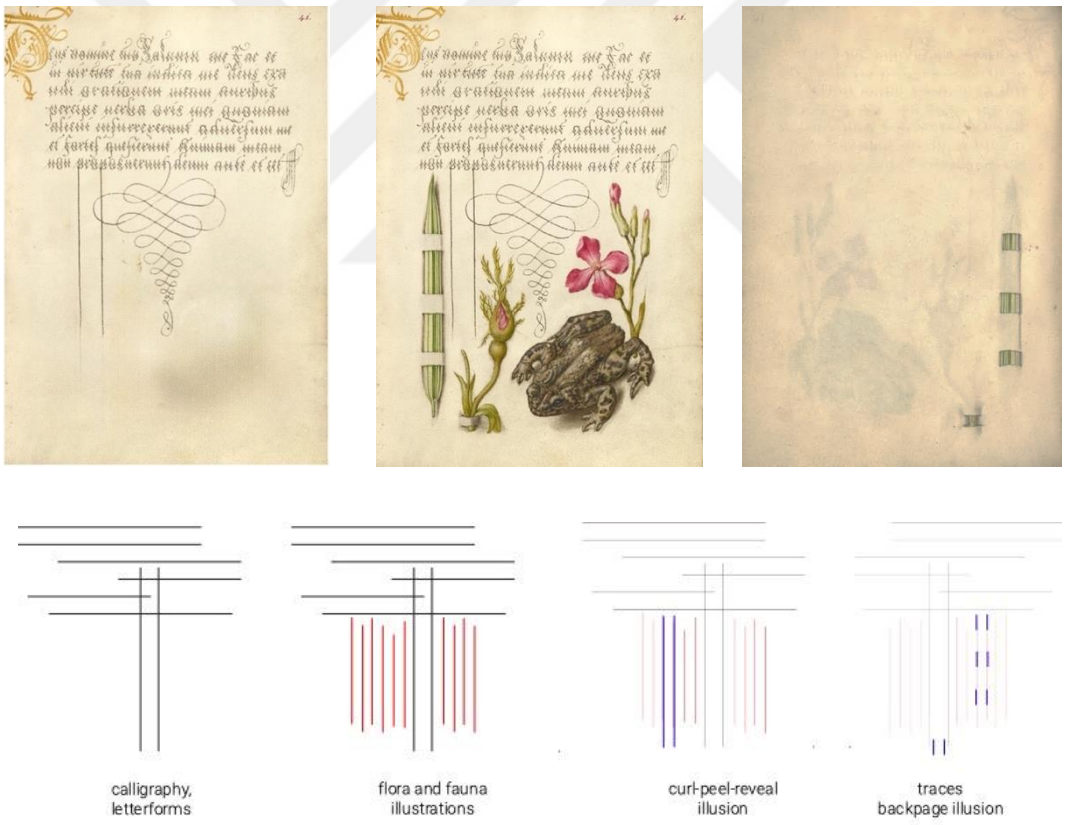


Figure 1.6. a-b-c. Layers of the formation of *Mira Calligraphiae Monumenta* (The Model Book of Calligraphy).

Underlying Presupposition and Framework of the Study

The main presupposition of this thesis is as follows: **Architecture is knowledge production that encompasses cultural, political, and material dimensions. To discuss architecture today, there is a need for new terminology that revisits and reactivates lost strands of architectural theory, allowing for a deeper understanding and reframing of the diverse approaches to architectural making.** Before addressing the reasons for developing a new terminology, it is important to emphasize that this study argues that recognizing architecture as knowledge production is more crucial than ever today, especially in a sociopolitical environment characterized by accelerated versions of totalitarianism that disregard human rights, collective living practices, and even the vulnerability of the planet. In such a context, reflecting on architectural theory might seem naive or inconsequential. However, the importance of architecture, and by extension, architectural theory, has always persisted, as it is inherently linked to knowledge production.[6] Architecture has always sought to offer solutions to the world's long-standing problems. In the postwar era, this effort was particularly evident in housing projects and the establishment of new institutions aimed at documenting, storing, and disseminating architectural knowledge.[7] Thus, architectural theory has evolving disciplinary boundaries that encompass a variety of fields. Mark Wigley, in "Prosthetic Theory: The Disciplining of Architecture," emphasizes that theory has always described itself as a kind of "building," with philosophers serving as architects who lay secure foundations and employ structural principles to create sound theses. He states that architecture remains a prosthetic intrusion within academia, forever straddling the lines between art and science or theory and

[6] See the ARCH 616 Reader (2020-24) of Prof. Dr. Ayşen Savaş, in which I participated as a research assistant and student, for a selection of texts from various anthologies of architectural theory that have contributed to the production of architectural knowledge.

[7] See, for example, CIAM meetings, especially after World War II. See also, for example, Ayşen Savaş, *Between Document and Monument: Architectural Artifact in an Age of Specialized Institutions* (Ph.D. diss., Massachusetts Institute of Technology, 1994), https://dspace.mit.edu/handle/1721.1/11641.

practice. Michael Hays developed a similar but more specific argument that defines "critical architecture."[8] He positions critical architecture between the representation of cultural values and the detached autonomy of abstract formal systems. These sources are significant as they both explore the role of architecture in knowledge production, which is a crucial aspect to be emphasized.[9] Accordingly, this thesis is based on the presupposition that "architecture is knowledge production" with the capability of expanding across various disciplines, and that architectural theory is necessary in exploring the limits of these disciplinary relationships. Architectural making, as a fundamental aspect of knowledge production, requires critical examination through making processes to understand the development of its methods and the connections between different disciplines.[10] Here, the use of the phrase "architectural making" is inevitably informed by the Frankfurt School's definition of praxis.[11] Without claiming the rights to neo-Marxist discourse but nevertheless acknowledging it, "architectural making" is used in this research based on Tim Ingold's definition of "making" which underlines architecture of inquiry. Ingold's definition suggests that the act of making as growth, and creates knowledge, and anthropology, archaeology, art, and architecture are all ways of making. Definitions of architecture as an act of making that creates knowledge and as knowledge production itself that feeds ways of making have existed since the nineteenth-century avant-garde theories that defined architecture as both knowledge and becoming.[12]

It is through this lens of making as knowing (or vice versa) that I understand any academic engagement with architecture. This rather personal experience has been

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[8] K. Michael Hays, "Critical Architecture: Between Culture and Form," *Perspecta*, 21 (1984): 14-29.
[9] See Mark Wigley, "Prosthetic Theory: The Disciplining of Architecture," *Assemblage*, no. 15 (August 1991): 6, https://doi.org/10.2307/3171122.
[10] See Tim Ingold, *Making: Anthropology, Archaeology, Art and Architecture* (London: Routledge, 2013).
[11] Within this academic context, credit should be given to Güven Arif Sargın for his work on the concept of praxis and for his contributions through his blog, titled "mekan_praxis", at https://gasmekan.wordpress.com.
[12] These avant-garde theories of the nineteenth century will be discussed in detail in Chapter 2.

shaped by the process of pursuing a Ph.D. as both instructor and student, teaching in architectural design studios while simultaneously engaging with architectural theory, design, and history. As an instructor in architectural design studios and as a student in courses on architectural design, theory, and history, I have actively participated in both the production and transmission of architectural knowledge. In the course of my Ph.D. program, I was both a student and a research assistant in the Arch 616 - Architectural Research course conducted by Prof. Dr. Ayşen Savaş. While taking graduate courses as a student between 2017 and 2025, I was also a teaching and research assistant for the Arch 401–402, Arch 101–102, and Arch 201–202 design studios of Middle East Technical University. The accumulation of knowledge that I gained through these years taught me the importance of creating an environment where methods for architectural making are diverse and generative.[13] These experiences allowed me to comprehend the importance of discovering new perspectives to define architecture as "inquiry" instead of relying on repetitive conventional methods.[14, 15]

With these points in mind, the first reason for the need for a new terminology that reactivates core theories, lies in the vocabulary currently used in architectural design and theory. The discourse of design studios, in particular, relies on a mix of

[13] In Arch 616, we pursued a new set of terms to trace shifts, changing understandings, and references every year. That course's methodology shaped the foundations of my own research. Particularly in the Arch 401-402 graduation studios led by Prof. Dr. Ayşen Savaş, we focused on developing that methodological environment through research and new modes of making. The studio explored two key approaches: first, working with "programs without images," which encouraged students to conceptualize architectural ideas beyond predefined visual references, and second, engaging with "context-bound" design processes, emphasizing the significance of situational and material conditions. With these methods, we sought to move beyond conventional design approaches and achieve more adaptable and research-driven architectural making.

[14] Ingold, 10.

[15] One of these conventions envisions the white male modern architect of the 1920s and 1930s, who sees a final image, sketches a brilliant perspective, and meticulously translates it into a built structure. Another convention assumes an initial stage of "mass configuration," frequently referred to as "abstract" despite its inherent limits. However, these cannot be the only approaches, as they fail to acknowledge architecture as evolving knowledge production. What is needed is not just a single vision or a predefined abstraction but a more comprehensive and refined architectural terminology and a diversity of methods that recognize the complexities of architectural thinking and making.

conventional yet essential terms such as form, image, shape, drawing, concept, technique, nature, land, and code, among others. Interestingly, these terms are employed in highly normative and static contexts that do not convey their histories or the changes accumulated within them. As a few examples out of many, the distinction between "technical" and "conceptual" can be an oxymoron since "technics," or ways of making, cannot exist without concepts.[16] In their work, historian and theorist Zeynep Çelik Alexander, who examines the intersections of architecture, science, and pedagogy, and John May, an architectural theorist exploring the relationship between technology and design, argue that no ways of thinking remain isolated from technical acts. Accordingly, no ideas, dreams, fears, or desires are insulated from the characteristics of a given technical age. The notion that ideas exist apart from their technical formation in the brain or "the mind" is "one of the most pervasive fallacies of modern life."[17]

Another example is provided by a renowned set of misused terms that John May comments on. He distinguishes between drawing, image, and photograph in his discussions of architectural media and technics, particularly in relation to contemporary digital environments. His main argument is primarily framed around the transformation of architectural representation. He explains that architectural drawing is an active process that maintains a certain ontological and epistemological connection to design thinking. This is not just a representation but rather a process of thought and projection. Images do not carry the same trace of process or time that drawings possess**.** Rather, they appear as immediate snapshots that seem disconnected from the act of making. He connects this shift with broader transformations in media, where the image is instantaneous and self-sufficient,

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[16] Zeynep Çelik Alexander, "Introduction," in *Design Technics: Archaeologies of Architectural Practice*, ed. Zeynep Çelik Alexander and John May (Minneapolis: University of Minnesota Press, 2020), ix.
[17] John May, "Foreword," in *Design Technics: Archaeologies of Architectural Practice*, ed. Zeynep Çelik Alexander and John May (Minneapolis: University of Minnesota Press, 2020), 220.

contrasting with the more process-oriented logic of drawing. Finally, May notes that photographs are often perceived as representations of reality, and he emphasizes their influence on how architecture is experienced and understood. May's theories have been significantly influential for this work, as will be discussed in subsequent sections of the text.

Another misused and loaded familiar term is "form." With its use as a near synonym of "shape," especially after the second half of the twentieth century, "form" lost its layered and process-oriented understanding. To address this narrowing of meaning, it is necessary to consider the difference between "form" and "*Form*." The translation of "*Form"* from German is significant for the modern paradigm because it transformed the meaning of "form" in the English-speaking world. Adrian Forty states that:

> The German language (which is where the modern concept of form was principally developed) has a slight advantage over English for thinking about the problem, for where English has only the single word "form", German has two, "*Gestalt* and "*Form*": *Gestalt* generally refers to objects as they are perceived by senses (their shapes), whereas *Form* usually implies some degree of abstraction from the concrete particular.[18]

These terminological nuances will be explored in more detail throughout this thesis. The misuses of and ambiguities surrounding these concepts were central in constructing the glossary of this thesis, which aims to uncover lost and forgotten strands of meanings in architectural theory. The double structure of the glossary makes the conceptual relationships that can reorganize the terminology more explicit.

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[18] Adrian Forty, *Words and Buildings: A Vocabulary of Modern Architecture*, Vol. 268 (London: Thames & Hudson, 2000), 149.

The other reason for the need for a new terminology, closely related to the first, is the necessity of reclaiming architectural ideas and terms that have been lost within technological discourse. The need for an intellectual reengagement with such ideas was recently noted in a lecture titled "Generative AI, Imitation, Style, and the Eternal Return of the Precedent," delivered by Mario Carpo at the Harvard Graduate School of Design in March 2024, confirming that these concerns remain highly relevant today. Carpo also discusses "forbidden" architectural concepts, which are now being revived with generative AI. He explains how such components are reclaiming the act of imitation to generate new images. Generative AI functions by analyzing collections of images to produce new outputs, and this mirrors historical processes whereby artists and architects studied precedents to evolve their work. Carpo highlights the importance of critically and creatively engaging with imitation, especially as generative AI reintroduces the historical role of imitation in art and architecture in contemporary practices. Additionally, Carpo remarks on the irony of contemporary digital technologies, initially viewed as tools to break from historical styles, promoting a revival of traditional imitation and precedent-based design methods. This gives rise to a renewed discourse on the role of terms that are "forbidden," as Carpo says, or lost or forgotten, as I prefer to say, and highlights complex ways of architectural making that also include inductive (with precedents) and generative (with inventions) processes, resulting in a confluent combination of precedents and inventions.[19]

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[19] This recalls the well-known discussions on the binary oppositions of modernism that define different approaches. Poststructuralist readings of modern architecture could provide particularly valuable insight in this context. See the works of Peter Eisenman, Bernard Tschumi, K. Michael Hays, Mark Wigley, and Anthony Vidler from the second half of the twentieth century, which are philosophically grounded in the writings of Jacques Derrida, Michel Foucault, Roland Barthes, and Gilles Deleuze and Félix Guattari. To expand on one of these, K. Michael Hays's notion of "0(p)positions" challenges the conventional binary oppositions of modernist architecture. Instead of viewing architectural discussions as governed by strict dichotomies like form versus function or rationality versus subjectivity, Hays suggests that modernist architecture engages in a dialectical approach where opposing ideas do not merely resolve but coexist in a state of productive tension. This perspective allows for a more nuanced understanding of architectural theory, where contradictions are not obstacles but rather essential forces that drive reflexivity in critical discourse and creative production. See K. Michael Hays, *Modernism and the Posthumanist Subject: The Architecture of Hannes Meyer and Ludwig Hilberseimer* (1995); K. Michael Hays, *Architecture's*

Picking up where Carpo leaves off, a thorough examination of overlooked strands of architectural theory may prove beneficial in understanding, advancing, and developing contemporary complexities that suggest confluent positions rather than binary choices and oppositions in architectural making.

Introducing *Bildung*

As stated, acknowledging familiar but misapplied terms, this thesis aims to address the gap related to the need for new terminology to reunderstand lost strands and reframe the confluent ways of architectural making. **This is why understanding *Bildung* is necessary.**

These confluent positions can be traced back to the origins of premodern and early-modern discourses, where lost theories and concepts evolved into various present-day forms.[20] In this regard, nineteenth-century theories are particularly intriguing due to their expanded sets of concepts and the unconventional relations between architectural theory and aesthetic philosophy.[21] This thesis proposes that the renowned German concept *Bildung*, particularly prominent in the nineteenth century, should be reconsidered to effectuate the aforementioned new terminology, as it has multiple understandings that inherently signify confluency. *Bildung*, with diverse interpretations that include "formation," "culture," and "education," is particularly relevant for enabling this discussion and is repurposed here as both a historical and an operative framework. While Heidegger's renowned term *techne*, meaning the "logos of making," can similarly ground architectural thought in processes of

Desire: Reading the Late Avant-Garde (2010). See also Mario Carpo's lecture titled "Generative AI, Imitation, Style, and the Eternal Return of the Precedent," given by Mario Carpo at Harvard Graduate School of Design, March 2024.

[20] Barry Bergdoll, "Views across the Rhine: Interchanges in French and German Architectural Thought" (Presentation), 2017.

[21] Harry F. Mallgrave and E. Ikonomou, *Empathy, Form and Space: Problems In German Aesthetics 1873-1893* (Santa Monica: Getty Center for the History of Art and the Humanities, 1994).

creation and bringing-forth, *Bildung* introduces a richer spectrum of scales ranging from personal cultivation to collective development and aesthetic formation, thus allowing for a more expansive exploration of architectural knowledge. The term *Bildung* is a derivation from *Bild,* meaning "image," "imitation," "form," or "formation."[22] Since it encompasses religious definitions, the linguistic root and derivatives of the concept inevitably extend to creation and creative processes. Sven Erik Nordenbo, who has published recent works on educational philosophy in the early twenty-first century in particular, offers four meanings of the term *Bildung* by referring to the classic *Deutsches Wörterbuch* of the Brothers Grimm "we learn that the word has four meanings, which are indicated by the Latin expressions (1) *imago*, (2) *forma*, (3) *cultus animi*, *humanitas* and (4) *formatio*, *institutio*; that is, (1) image, (2) form, (3) cultivation of the soul and (4) formation."[23] He underlines the etymology of the term to explain its plural meanings and refers to Drowdowski to reveal the relationship among *Bildung*, the verb *bilden*, and the verbal noun *Bild*, or image:

> The suffix -ung on a verbal noun in German indicates that we are dealing either with an act, a process or an occurrence (in Latin grammar denoted as nomina actionis), or with the completion or result of an occurrence (in Latin grammar denoted as *nomina acti*).[24]

Nordenbo reevaluates this etymological relationship in terms of how the concept manifests itself. In the context of *Bildung*, it refers to an act, process, or event through which someone or something transforms into an image, or the image that emerges from such an act, process, or event.[25] In today's world, the term is mostly used within

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[22] Alexandre Alves, "The German Tradition of Self-Cultivation (Bildung) and Its Historical Meaning," *Educação & Realidade* 44, no. 2 (2019): e83003, https://doi.org/10.1590/2175-623683003.
[23] Sven Erik Nordenbo, "Bildung and the Thinking of Bildung," *Journal of Philosophy of Education* 36, no. 3 (2002): 341-352, p. 341.
[24] Quoted in Sven Erik Nordenbo, "Bildung and the Thinking of Bildung." *Journal of Philosophy of Education* 36, no. 3 (2002): 341-352, p. 341.
[25] Alves.

education discourse. However, *Bildung* differs from teaching and education; it encompasses a breadth of concepts that no single term can define.[26] *Bildung* as "the most ambiguous concept of German pedagogy, providing a range of uses and interpretations,"[27] reflects many shifts and meanings:

> Formation [*Bildung*] can designate a process and a result, a purpose and a state, can be thought of as active, passive and reflexive, individual and (more rarely) collective. In terms of its meaning, the concept is impregnated by different conceptions, mystic-pietistic, philosophical, aesthetic and pedagogical.[28]

These broad uses of *Bildung* are shaped by its theological roots and biological-organic associations, resulting in a wide and varied understanding of the term. This inherent complexity makes it a perfect foundation for diverse interpretations, and, as discussions of *Bildung* in recent years show, this complexity and variability in meaning continue to persist.[29]

Thus, *Bildung* offers a unique framework allowing us to explore and restructure the discourse and operations of architectural knowledge production and making. Among many possible concepts, *Bildung* stands out due to its confluent plural interpretations, both imitative and formative, encompassing cultural development and individual formation. **This thesis addresses a critical gap in noting that the reintegration of *Bildung* into architectural theory has been limited despite its influence on nineteenth-century art and aesthetics.** The term was originally defined within the frameworks of art and aesthetic philosophy; it was then elaborated in educational philosophy and became a significant part of its discourse, "ignoring

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[26] Alves, 3.
[27] Alves, 3.
[28] Georg Bollenbeck, quoted in Alexandre Alves, "The German Tradition of Self-Cultivation (Bildung) and Its Historical Meaning," *Educação & Realidade* 44, no. 2 (2019): e83003, https://doi.org/10.1590/2175-623683003
[29] Rebecca Horlacher, "Bildung – a Construction of a History of Philosophy of Education," *Studies in Philosophy and Education* 23, no. 5-6 (September 2004): 409-26, https://doi.org/10.1007/s11217-004-4452-1.

its special roots and the unique philosophical framework behind the concept."[30] It is important to note that the phrase "plural interpretations of *Bildung*" is used here intentionally to emphasize that this study does not offer semiological analysis dealing with "meanings"; rather, it constitutes a hermeneutical exploration, one that engages with the diverse historical interpretations of *Bildung* and their potentials. The use of the word "interpretation" is also intentional. The hermeneutic circle reflects an interpretive process in which understanding emerges from the dynamic interplay between parts and the whole.[31]

It should be noted that the German term *Bildung* is a complex concept that resists direct translation, as any single equivalent diminishes its multiple layers of meaning. As a scholar, I should acknowledge that I am neither a native speaker of German nor of English. Yet, the critical distance of being an outsider has allowed me to approach the concept with a critical mind, establishing creative and sometimes unexpected connections. At the same time, I am aware that such distance may risk flattening certain nuances. Nevertheless, I believe this is an inevitable challenge for an architectural thesis, which necessarily traverses multiple disciplines.[32]

Going back to the pretext *Mira Calligraphiae Monumenta* and its interwoven stages of formation, this thesis similarly follows a threefold process, with the first two stages ultimately shaping the third, mirroring the overall structure of the research itself. First, theoretical strands are traced to create a model glossary to define an architectural *Bildung*, just as the pre-text's connection between the calligraphy and

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[30] Jesper Sjöström and Ingo Eilks, "The Bildung Theory—From von Humboldt to Klafki and Beyond," *Science Education in Theory and Practice: An Introductory Guide to Learning Theory* (2020): 55-67.

[31] See Hans-Georg Gadamer, *Truth and Method*, trans. Joel Weinsheimer and Donald G. Marshall, 2nd rev. ed. (New York: Continuum, 2004).

[32] In the discussion at the EAHN Young Scholars Workshop with Kathleen James-Chakraborty, the issue of "nativeness" in studying a philosophical term was raised, to which she responded, "The world should open to the world." Similarly, during my research mobility supervised by Anna-Maria Meister, when I presented an earlier version of my thesis, the critical distance I held was discussed as a potential source of creativity in theory-making.

the page establishes a basis for detailed additions. Second, operations are proposed that allow learning from historical processes and interpreting *Bildung* as a generative method within architectural making, analogous to the tracing of calligraphy, where existing strokes guide emerging illustrations. Third, a creative intervention is introduced, offering both a model glossary and an architectural curation that engages with the productive tension between imitation and invention, much like the mirrored impressions on the back sides of the parchment that reverse, curl, peel, and reveal different layers. This approach integrates the tracing of historical developments with generative methods that broaden architectural discourse to discover its reflexivity. In doing so, it repurposes ***Bildung* in architecture** with its plural interpretations connoting imitative, generative, and reflexive processes.[33] By integrating these processes, the study reconstructs lost or forgotten strands in architectural theory while proposing new ways of understanding and making architecture a reflexive practice.

Bildung in Twentieth century

To further contextualize *Bildung*, this study takes a retroactive view from the twentieth century,[34] emphasizing the contributions of Hans-Georg Gadamer and Reinhart Koselleck. Twentieth-century hermeneutic theories are significant in this context as they both serve as a foundational theoretical framework for this research and influence its methodology. Hans-Georg Gadamer (1900–2002), a German philosopher, and Reinhart Koselleck (1923–2006), a German historian, are both significant figures for twentieth-century hermeneutic theories. Their discussions on *Bildung*, particularly in relation to hermeneutics, provide a critical foundation for understanding its proposed framing in architectural knowledge and making. Both

[33] "Reflexive" means self-referential and self-stabilizing. See Koselleck's definition of *Bildung.*
[34] The term was coined in a German-speaking context and translated into and disseminated throughout North American academia, like much of architectural theory up until the most recent few years. This thesis references the North American literature largely due to this historical trajectory.

Gadamer and Koselleck were influenced by the hermeneutic tradition, emphasizing interpretation in human understanding. Gadamer expanded on Heidegger's theories, considering hermeneutics a philosophical framework for understanding historical and textual meanings, most notably in his work titled *Truth and Method*. On the other hand, Koselleck integrated hermeneutical theories into his historical methodology, especially in the context of conceptual history (*Begriffsgeschichte*), which examines how concepts develop over time. Informed by Hegel's dialogical thinking, Gadamer's hermeneutics offers significant input for this thesis, first because it strongly corresponds to critical thinking in architecture and second because of the hermeneutic definition of *Bildung*, centering itself in art and aesthetics. Hermeneutics connotes a process of interpretation, which necessitates historical thinking. Such processes include the recognition of historical knowledge as well as interpretative insights that consolidate theory-making. In the works of both Gadamer and Koselleck, *Bildung* as both a term and a theoretical tool takes on greater significance as a converging concept.

In his renowned *Truth and Method*, Gadamer underlines the merits of *Bildung*, comprising the ambiguities and thus potentials of the terms *Bildung* and *Bild*. Although Gadamer's work is often framed within the context of art and aesthetics, his work, perhaps unconsciously, underscores the importance of *Bildung* in architectural theory, emphasizing its potential to enrich architectural knowledge production and the processes of architectural making. By examining the unaddressed implications of these terms in architectural contexts, the present study reintegrates *Bildung* as a crucial concept within the discourse of architectural theory. The following passage from Gadamer's text is particularly revealing:

> In German, too, the corresponding derivations of the idea of *forma*—e.g., "*Formierung*" and "Formation"—have long vied with the word *Bildung*. Since the Aristotelianism of the Renaissance the word forma has been completely separated from its technical meaning and interpreted in a purely dynamic and natural way. Yet the victory of the word *Bildung* over "form" does not seem to be fortuitous. For in *Bildung* there is *Bild*. The idea of "form"

> lacks the mysterious ambiguity of *Bild*, which comprehends both *Nachbild* (image, copy) and *Vorbild* (model). In accordance with the frequent transition from becoming to being, *Bildung* (like the contemporary use of the German word "Formation") describes more the result of the process of becoming than the process itself.[35]

This quotation precisely explains the etymology of the term *Bildung*, highlighting its connections to various other terms that reveal their confluency and relationships. Gadamer elaborates on these varieties with an emphasis on art and artistic becomings. In Gadamer's definition of *Bildung*, art is understood as a broad ability to form images or representations of experience. Accordingly, he elaborates on relationships of art-related terms in other languages. He underlines the interrelations of the terms *Urbild* - "origin," *Vorbild* - "model," *Abbild* - "copy," *Bild* - "picture," and *Einbildungskraft* - "imagination," which cannot be reproduced in English.[36] Gadamer also emphasized the Latin meaning of *Bildung* as *formatio*, which can be traced in other languages e.g., in English, where "form" and "formation" are primarily explored in artistic and architectural discourses.

For Gadamer, *Bildung* embodies a philosophical ideal of self-cultivation and dialogical engagement.[37] This requires fully engaging in tradition while maintaining a critical openness. His theory introduces the concept of the fusion of horizons (*Horizontverschmelzung*), where past and present perspectives intersect and enrich each other.[38] Hans Georg Gadamer's understanding of hermeneutics and *Bildung* as "culture" within the definition offered in *Truth and Method* is significant.[39] He explored aesthetic philosophy in close linkage with hermeneutics.[40] In the

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[35] Gadamer, 10.
[36] Gadamer, 12.
[37] Craig Brandist, "Bakhtinian *Bildung* and the Educational Process: Some Historical Considerations," *Educational Philosophy and Theory* 49, no. 9 (February 2016): 867–78, https://doi.org/10.1080/00131857.2015.1135411.
[38] Gadamer, xxxi.
[39] Gadamer also addresses later critiques of the concept, particularly the suspicion that "culture" and "cultivation" are simply instruments of bourgeois domination.
[40] Paul Kidder, *Gadamer for Architects* (London: Routledge, 2013): 2. "The root of the word "hermeneutics" is an ancient one referring to the activity of interpretation. Already in the philosophies

translator's preface of the book, it is noted that *Bildung* is translated as "culture" and related forms such as "cultivation" and "cultivated." The translator glosses Gadamer's definition of *Bildung* as "the properly human way of developing one's natural talents and capacities."[41] Gadamer also broadens the meaning through his questions, reflecting an association with aesthetics viewed as an ideal of life. He highlights the fact that the term *Bildung* contains the root word *Bild*, meaning "form," "image," and, more particularly, "picture." Accordingly, he refers to *Bildung* as a process of "forming the self in accordance with an ideal 'image' and he sees art as a crucial field within the conception of 'cultivation.'" In explaining the guiding concepts of humanism, he begins with *Bildung* in the sense of "culture." He points out that a key aspect of the traditional concept of *Bildung* is its earlier association with a "natural form," which refers to external appearances such as body shape or natural formations like mountains (*Gebirgsbildung*), and during the period in question, it was largely separated from later conceptions.[42] Referring to Gadamer's perception, Grondin emphasizes the meaning of *Bildung* as "natural formation":

> the term first means in German a natural formation, for example, the form of a chain of mountains. Formation is thus not opposed to nature but is its natural and organic development. In human culture, *Bildung* means the uniquely human way of developing inherent dispositions. According to Gadamer, this concept of formation, education, or culture has always been the natural element of the human sciences.[43]

Gadamer compares the plural meanings of *Bildung* and underscores the expansion of the term from "natural formation" to "the idea of culture" and its emphasis on the

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of Plato and Aristotle, and in the writings of ancient rhetoricians, there occurred the question as to how people understand and misunderstand one another, and how words that are written down can be interpreted when the author is not present to be questioned in dialogue. In the eighteenth and nineteenth centuries in Europe, "hermeneutics" became an important subfield within the disciplines of law, theology, and modern rhetoric."

[41] Gadamer, Preface.

[42] Gadamer, 9.

[43] Jean Grondin and K.Plant. *The Philosophy of Gadamer*. (Routledge, 2014): 24.

human and individual.[44] Acknowledging these pluralities, Gadamer also refers to the "current" (i.e., the mid-twentieth century's) transition from becoming to being, stating that "*Bildung* (like the contemporary use of the German word "Formation") describes more the result of the process of becoming than the process itself."[45] However, looking at *Bildung*'s intellectual history, he also underlines the processual significance of the term:

> the result of *Bildung* is not achieved in the manner of a technical construction, but grows out of an inner process of formation and cultivation and therefore constantly remains in a state of continual *Bildung*.[46]

Here, the "state of continual *Bildung*" means that *Bildung* is always *in the making*. Gadamer's hermeneutic framework provides an essential foundation for understanding this continuity as an active mode of interpretation and formation. While Gadamer's conceptions do not explicitly address architectural theory or the architectural aspects of *Bildung*, they offer valuable insight for considering the term as an architectural term. This emphasis on *Bildung* as an ongoing process resonates with the understanding of architectural knowledge production not as the mere accumulation of facts or technical expertise, but as the evolving interpretation of architectural concepts, practices, and forms. This mode of production inevitably includes architectural theory but approaches it as an integral part of interpretive processes. This interpretive approach finds a complementary framework in Reinhart Koselleck's method of conceptual history, which similarly situates *Bildung* within wider temporal frameworks.[47] Koselleck defines *Bildung* as a historical concept that captures the evolving dynamics of power, culture, and identity in modern times. His notion of "temporal layers" (*Zeitschichten*) highlights the shifting significance of

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[44] He refers to Kant, Hegel, and Herder and their definitions of *Bildung*. He observes that Kant does not actually use the term itself, while Hegel distinguishes between *Bildung* and self-cultivation.
[45] Gadamer, 10.
[46] Gadamer, 10.
[47] Reinhart Koselleck, *The Practice of Conceptual History: Timing History, Spacing Concepts*, trans. Todd Samuel Presner (Redwood City: Stanford University Press, 2002).

Bildung in various sociopolitical contexts.[48] In the eighteenth century, the focus was on personal self-development, whereas in the nineteenth century, it was increasingly linked to national identity and formal education.[49] Between these transitions, interpretations of *Bildung* within natural and aesthetic frameworks were largely set aside. However, Koselleck's understanding of the term in the twentieth century helped to broaden its inclusions and rethink new interpretations. Koselleck understood *Bildung* within his conceptual-historical approach:

> In his historical-semantic analysis, Koselleck considers *Bildung* a dynamic metaconcept that cannot be associated with any particular ideology, intellectual current or specific social stratum. As a supra-political concept, *Bildung* circulated in diverse ideologies and is socially open, compatible, in theory, with any social stratum, because it appeals to all individuals, regardless of their origin or social condition.[50]

According to Koselleck, connections to concepts like autonomy, self-determination, and reflexivity are fundamental elements of the concept of *Bildung*.[51] Koselleck's understanding of *Bildung* as such is significant in approaching the concept's ambiguity and rethinking it, especially through its reflexivity, within processes of architectural making. He considers *Bildung* to be a dynamic metaconcept circulating within diverse ideologies:[52]

> *Bildung*, a fundamental modern concept, is the result of the Enlightenment and, at the same time, an answer to it. No definitive knowledge and no single discipline, no political stance or social pregiven, no denominational affiliation and no religious tie, no ideological option or philosophical preference, not to mention any specific aesthetic inclination in art and literature, is sufficient to characterize *Bildung*.[53]

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[48] Koselleck.
[49] The eighteenth- and nineteenth-century conceptions of *Bildung* will be addressed further in the third chapter; see "Displaying Architectural Bildung: An Operational Curation."
[50] Alves, 9.
[51] Alves, 13.
[52] Alves, 9, 12.
[53] Koselleck, 179.

According to Koselleck, *Bildung* is a uniquely German term that is incredibly challenging to translate into other languages.[54] He suggests that each translation of the term loses some meaning and introduces various external interpretations. However, in most cases, an emphasis on process remains. He states that "*Bildung* is both the process of producing and the result of having been produced."[55] This duality reflects the complexity of *Bildung*, highlighting how it encompasses not only the process of becoming but also the condition of being cultivated. The relationship between process and outcome enhances the philosophical depth of *Bildung* and its relevance in architectural theory. Koselleck might give the impression that defining *Bildung* is impossible; however, it can be argued that there are several ways to elaborate on or rearticulate its theory. According to Koselleck, *Bildung* can be defined as "the reflexive and communicative force field that has attempted to integrate all the heritage of life and of the arts as well as all the specific knowledge."[56] Koselleck refers to the plastic arts (*bildende Kunst*) and offers a parallel reading of artistic thinking and making processes. Referring to the verb *bilden*, he defines *bildende Kunst* as "a term that can itself be read as a historical reflection, [where] the artist's commentary is part of productivity."[57]. Koselleck's focus on the reflexive and dual aspects of art allows for a precise projection of *Bildung* as an aesthetic-philosophical term. According to him:

> any art can be historical, innovative, or both at the same time. In particular, historicizing architecture (one need only think of Schinkel) was a highly reflected accomplishment of art that could render present the otherness of the past as such and convert it into formally harmonious new buildings.[58]

Koselleck's understanding of *Bildung* serves as one of the primary theoretical foundations for this thesis. He argues that the concept is fundamentally developed

[54] Koselleck,173.
[55] Koselleck,176.
[56] Koselleck,195.
[57] Koselleck, 198.
[58] Koselleck, 198.

by historical reflection, which encompasses genres, styles, and forms. He warns against restricting *Bildung* to its "original situation" from approximately 1800, a time associated with classical ideals and Romanticism in Germany. While these intellectual traditions significantly influenced the history of *Bildung*, he contends that they do not define its boundaries, nor should *Bildung* be constrained to the specific "knowledge contents, modes of thought, and artistic products of the 18th century. Instead, *Bildung* transcends its historical framework and remains open to reinterpretation and evolution across various disciplines. Koselleck emphasizes imitation (as the reproduction of past forms) and decadence (as the decline of those forms) as key perspectives that shift within the ongoing process of *Bildung*. However, rather than being static, these perspectives are part of a historically reflexive process. Even as certain styles or modes of thought are imitated or decline, they contribute to the creation of new forms of *Bildung*. Revisiting the term's etymology further allows us to emphasize the reflexivity of *Bildung*. Defined as both the process and the outcome, its duality highlights the complexity of *Bildung*, which encompasses not only the process of becoming but also the condition of being cultivated. This relationship enhances the philosophical depth of *Bildung* and its relevance in educational theory. This thesis claims that its relevance is further applicable in the sense of a connection between *Bildung* and architecture. This connection is evident in the direct relationships among concepts, form, and processes and their historical and philosophical ambiguity.

Highlighting Koselleck and Gadamer's interpretations of *Bildung* in this study inherently gives rise to a broader intellectual network, as these thinkers themselves reference and engage with a wider discourse that reveals plural interpretations of *Bildung*. The different interpretations of *Bildung* have been the subject of philosophical inquiries, and this thesis addresses these many-layered interpretations. In this research, defining an architectural *Bildung* is not possible without considering pre-twentieth-century interpretations of the concept. Johann Wolfgang von Goethe's (1749–1832) generative *Bildung* that learns from natural formations, Wilhelm von

Humboldt's (1767–1835) *Bildung* as an ideal of education, and Georg Wilhelm Friedrich Hegel's (1770–1831) dialectical understanding of *Bildung* will be addressed in detail. Similarly, much earlier definitions based on religious "creation" were expanded with the first interpretations of *Bildung*. According to Susan Cocalis, a historian of German literature, it is necessary to credit Johann Joachim Winckelmann (1717–1768), an art historian and archaeologist, and Christoph Martin Wieland (1733–1813), a philosopher, with introducing the term *Bildung* in a broader context.[59] Both referred to *Bildung* as an "ideal" state or condition. Winckelmann conceived of *Bildung* as an ideal state of being and Wieland interpreted it as a formative process.[60] Winckelmann and Wieland's understandings emphasize that the concept can be outlined by art and aesthetics, even though a majority of theory on *Bildung* is embedded within pedagogical philosophy. Rebecca Horlacher, an educational scholar, emphasizes that an appreciation of antiquity is fundamental to the theory of *Bildung*, particularly drawing from the work of Winckelmann.[61] These aesthetic contexts are important for understanding *Bildung*, which encompasses more than just educational frameworks and includes aesthetic thinking. In the same time period, Moses Mendelssohn (1729–1786), a significant philosopher of the Enlightenment from Dessau, defined *Bildung* within a broader setting in terms of epistemology. In his work from the late eighteenth century, he emphasizes the terms "culture" (*Kultur*), "enlightenment" (*Aufklärung*), and "formation" (*Bildung*). Horlacher references the first sentence of Mendelssohn's essay: "The words Enlightenment, culture, and *Bildung* are still new arrivals in our language."[62] With his introductory remarks, Mendelssohn outlines the historical context of the term *Bildung* in Germany towards the end of the eighteenth century,[63] According to

[59] Susan L. Cocalis, "The Transformation of "Bildung" from an Image to an Ideal," *Monatshefte* (1978): 399-414, p. 402.
[60] Cocalis, 402.
[61] Horlacher, 418.
[62] Moses Mendelssohn. "Über die Frage: was heißt aufklären." *Berlinische Monatsschrift* 4, (1784): 193-200. Horlacher, 418.
[63] Horlacher, 418.

Mendelssohn, *Bildung* breaks down into culture and enlightenment.[64] It can be defined within and in between two concepts: one relating to the past and existing culture, and the other relating to the change and formative processes.

As seen here, while it was initially tied to theological and philosophical concerns, the concept of *Bildung* was gradually expanded to address both individual and communal development, encompassing processes of inner and outer self-formation. It was originally understood within the frameworks of art and aesthetic philosophy, and subsequently elaborated in the context of educational philosophy to become a significant part of its discourses. Jesper Sjöström and Ingo Eilks state that "[t]he often-used translation of *Bildung* as only 'education' ignores its special roots and the unique philosophical framework behind the concept."[65] The term encompasses not only teaching but also learning, which is closely linked to the act of "knowing." Reintegrating *Bildung* within architectural theory and the process of architectural making is not far-fetched; on the contrary, it is inevitable. In the context of architecture, knowing inherently involves making. These perspectives accordingly provide for a nuanced understanding of *Bildung* as both self-formation and a societal process influenced by historical forces, especially enriched by twentieth-century elaborations including Gadamer's philosophical depth and Koselleck's historical insight. This understanding helps to define architectural *Bildung* while recalling the pre-text of this thesis and how seemingly disparate elements, formed across different temporal layers, can engage in dialogue. Just as the model book's text and illustrations, created decades apart, were recontextualized through their juxtaposition, architectural *Bildung* can be understood through evolving historical forces and intellectual networks, enabling "reflexive" ways of making.

[64] This reference to the twofold distinction was provided by Assist. Prof. Dr. Erdem Ceylan during a meeting of the qualification jury for this thesis.
[65] Sjöström and Eilks, 56.

Towards an Architectural *Bildung*: Outline of the Chapters

This thesis presents two interconnected arguments that constructs a new terminology: "Defining Architectural *Bildung*: A Model Glossary of Reflexive Doubles" and "Displaying Architectural *Bildung*: An Operational Curation." These arguments reflect the layered processes observed in the *Mira Calligraphiae Monumenta*. First, a terminology is compiled to trace the relevant theoretical strands and construct a model glossary for reinterpreting *Bildung* in architecture, similar to the way in which the connection between the script of *Mira Calligraphiae Monumenta* and the pages themselves laid the groundwork for Hoefnagel's later additions. Second, following Hoefnagel's approach of allowing existing calligraphic strokes to inform his illustrations, this thesis proposes operations of architectural making and introduces a creative intervention, much like Hoefnagel's method of layering and transforming drawings into multidimensional forms. With this structuring, the study positions *Bildung* not as a static concept but as an evolving process. Rather than constituting separate definitions, the **model glossary** and the **curation of operations** reveal how *Bildung* in architectural discourse and in formation are deeply intertwined yet offer distinct frameworks. "Defining Architectural *Bildung*: A Model Glossary of Reflexive Doubles" provides a theoretical lens for exploring the existing discourse of making, while "Displaying Architectural *Bildung*: An Operational Curation" engages with strategies that unfold in the processes of architectural making. The significance of this research lies in its contribution to the ever-relevant and continually evolving theory of making as an enduring concern in architectural knowledge.

"Defining Architectural *Bildung*: A Model Glossary of Reflexive Doubles" revisits architectural theory to compile a model glossary that traces a possible *Bildung* through recurring terms. Drawing inspiration from Bocskay's *Mira Calligraphiae Monumenta*, this glossary functions not to define terms in isolation but rather to map the reflexive relationships between imitation and formation, referring to different understandings of *Bildung*. The terminology for defining architectural *Bildung*

includes the introduction and revisiting of *Tektonik* theories, with lateral/diachronic samples, from their nineteenth-century articulations to later philosophical and aesthetic expansions (Figure 1.5). The term "defining" as used in the title of this chapter suggests understanding architectural *Bildung* in relation to existing architectural culture. This chronological glossary not only reconstructs overlooked terms from the past two centuries but also offers a methodological lens for understanding architectural *Bildung* as a cultural and theoretical process in flux.

"Displaying Architectural *Bildung*: An Operational Curation" builds upon the glossary of the previous chapter to illustrate how *Bildung* can be enacted through architectural operations. It achieves this by proposing three interpretive categories: imitative *Bildung*, grounded in collecting and referencing; formative *Bildung*, which emphasizes generative rules and iterative transformation; and reflexive *Bildung*, which combines the previous two through recursive acts of making. Returning to the *Mira Calligraphiae Monumenta*, this chapter parallels Hoefnagel's interpretive illustrations to propose an operational curation that reactivates historical material within contemporary architectural makings. By presenting examples of architectural making that unfold temporal and visual layers, or vertical/synchronic samples, this chapter frames *Bildung* as an operative logic for design (Figure 1.5). Here, "displaying" is conceived of as a method of making visible that situates architectural works within discursive environments.

While the glossary and the curation are presented as distinct parts, their relation is intrinsic. The glossary establishes the conceptual vocabulary by reactivating well-known terms, whereas the curation demonstrates overlooked concepts underpinned by the glossary structure, which can operate through examples of architectural making. In this sense, selected entries from the glossary reappear in the description of examples, bridging conceptual reflection with creative production. The glossary and the curation also differ in their interpretative level, and this distinction is intentional. The glossary aims to compile sources and concepts as clearly as possible,

providing a precise vocabulary. By contrast, the curation is more interpretative and visually illustrative, as it proposes a new categorization and demonstrates how concepts can operate through examples.

Overall, this thesis reclaims the nineteenth-century shift from being to becoming as a conceptual trajectory that resurfaces in late twentieth-century and contemporary architectural thought. I argue that this flux is not linear but recurring, positioning *Bildung* as both a historical and an operative framework in architectural knowledge. The central problematic of this study lies in the concepts that were erased or misused amid modern and postmodern debates, and that continue either to be misappropriated or to disappear, particularly as they have been absorbed into technological discourse.[66] Yet, this problematic coincides with the recurrence of the forementioned conceptual trajectory -the shift from being to becoming- which opens a parallel through which lost meanings may be revealed. In this regard, *Bildung* serves as a knowledge filter, enabling the reactivation of these lost strands. Existing intellectual perspectives reveal *Bildung* as at once subjective, historical, natural, and pedagogical. In addition to these, when defined architecturally, it can also support a pedagogical, cultural, and critical re-evaluation of the concept.

As a final note, this thesis is conceived as an architectural project, and it both theorizes and illustrates ideas as a mode of architectural knowledge production. It is significant to point out that, as a research project developed within an architectural theory and design program, this work is grounded in the principle that each

[66] Rosemary Bletter, introduction to *Adolf Behne: The Modern Functional Building*, by Adolf Behne, trans. Michael Robinson (Santa Monica: Getty Center for the History of Art and the Humanities, 1996), 12. Bletter writes: "The postmodern reaction against Modernism—as well as the consequent tendency to present Modernism in an overly simplistic form—has been most apparent in the Anglo-American sphere, whereas elsewhere attitudes have reflected a calmer evolutionary approach. In this context it is significant that Klotz's book, when it was first published in Germany in 1984, was called *Moderne und Postmoderne: Architektur der Gegenwart*. The German title suggests that Modernism and postmodernism are simultaneously present in contemporary architecture; in the title of the American version Modernism has been banished."

architectural theory thesis should embody a uniqueness comparable to that of an architectural design project. In this sense, design and research should operate as complementary and intertwined processes, particularly when architectural theory is the primary focus. Within this framework, the study approaches theory as invention through the logic of the CATTp model: it **contrasts** the predominantly instrumental and non-operational theoretical language of architectural theory, which has often developed through historical disconnections, draws **analogies** from nineteenth-century German debates on *Bildung* and *Tektonik*, sets targets for reconstructing architectural knowledge as a processual framework, grounds these aims in a **theory** of architectural *Bildung*, and materializes them through **prototypes** in the form of curated projects and operational strategies.[67] To achieve this, the research employs archival research, textual and conceptual analysis, comparative interpretive study, and curatorial synthesis as methodological tools, while following a broader and more original framework as an architectural project. [68]

Having explored the intellectual genealogy and potential of *Bildung*, the next chapter offers a model glossary that introduces a conceptual structure through key terms in architectural theory—one capable of defining *Bildung* within the discourse of architecture.

[67] The CATTp model is referenced through the *SMArch Colloquium* course at MIT, accessed via İlkyaz Sarımehmetoğlu (course slides, 2025).
[68] The topic of research methodology in architectural theory deserves a separate study. It could be further discussed and criticized with the sources: Nigel Cross, Designerly Ways of Knowing (London: Springer, 2006) and Linda Groat and David Wang, *Architectural Research Methods*, 2nd ed. (Hoboken: Wiley, 2013).

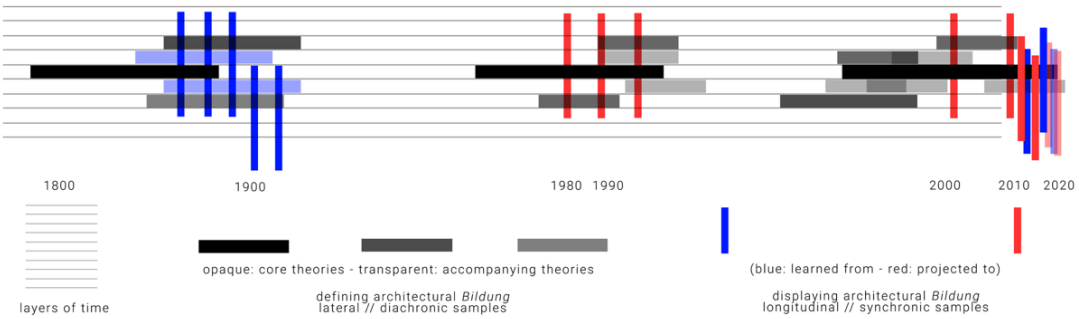


Figure 1.7. The author's interpretation of defining and displaying *Bildung*, projected to the relevant timeline.

CHAPTER 2

DEFINING ARCHITECTURAL *BILDUNG*: A MODEL GLOSSARY OF REFLEXIVE DOUBLES

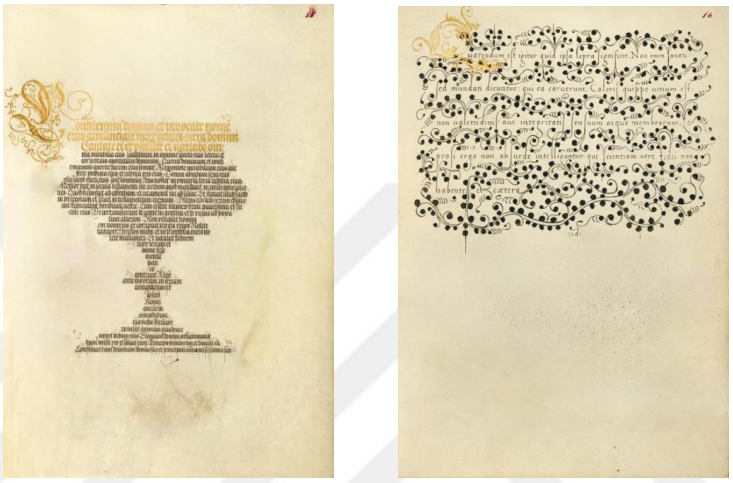


Figure 2.1. Pages from *Mira Calligraphiae Monumenta*, with only calligraphies, edited by the author.

In line with the previous chapter's framing of *Bildung* as a layered, interpretive process, this chapter introduces the first phase of the thesis: the compiling of a model glossary to trace how *Bildung* in architecture can be articulated by revisiting key architectural terms. Returning to the *Mira Calligraphiae Monumenta*, just as Bocskay's calligraphic model book assembled a range of scripts, this glossary brings together terms that reflect shifting interpretations (Figure 2.1). By mapping these terms across various frameworks, overlooked or forgotten connections are reconstructed while foregrounding the reflexive character of a yet-to-be-defined architectural *Bildung*. In doing so, this thesis lays the foundation for rethinking architectural knowledge through *Bildung*, uncovering its imitative and formative dimensions.

The argument here is that the strands of architectural theories of the last two hundred years are composed of repeating reflexive double terms that have their historical basis in the nineteenth-century avant-garde inquiries. These doubles mirror the conceptual structure of *Bildung* and thus offer a lens through which to define it in architectural discourse. Therefore, we need a model glossary to understand these recurring terms together.[69] This model glossary introduces a series of reflexive doubles that are not necessarily contrasting but are interconnected. The term *reflexive doubles*, introduced here, draws from Koselleck's three core dimensions of *Bildung*: autonomy, self-determination, and particularly reflexivity. In this context, reflexive means self-referential and self-stabilizing. The doubles are not opposites but interdependent, shaping one another as well as themselves. By framing architectural *Bildung* through a model glossary, this chapter underlines the continuous negotiation between imitation and formation, between inherited knowledge and generative design strategies. The title is "Model Glossary", not to say selected terms, because it emphasizes the expandable nature of the glossary and draws inspiration from the *Mira Calligraphiae Monumenta*, which similarly compiles different models of calligraphy into an evolving structure. The use of "defining" in the title signals a revisitation of historical strands and terminologies—not to fix meanings, but to explore how a glossary is structured, underlining a reflexive format. This chronological glossary is necessary not only to historicize architectural terms but also to propose a methodological lens for understanding architectural *Bildung* as an evolving cultural and theoretical process, drawing analogies from the continuing strands of nineteenth-century architectural debates.

This first argument that shapes this chapter is grounded in two theoretical foundations, drawing from the related theories and citing the relevant literature. The first of these foundations is Reinhart Koselleck's conceptual history, or

[69] A preliminary and summarized version of this glossary was published in Studiolog ARCH 401–402: Architectural Design Studios [2022–2023] Öykü Madeni [2023–2024] Urla Quarantine Island Post-Trauma Center, edited by Ayşen Savaş, Selahattin Önür, Bengisu Derebaşı, and Serda Buket Erol.

Begriffsgeschichte.[70] The second foundation is Michael Hays's influential essay titled "Critical Architecture Between Culture and Form" and the discussions surrounding it.

Before delving into Reinhart Koselleck's conceptual history, however, it is important to acknowledge the works of D'Amico (1989), Tafuri (1980), Frampton (1980, 1995), and others, who have emphasized the inseparability of architectural theory and history.[71] This view, central to discussions of modernism and postmodernism, reflects the wider intellectual movement of the 1970s and 1980s, a period marked by engagement with both historical and theoretical questions in architecture. Notably, Koselleck's work on conceptual history, which emerged during the same period, parallels this shift. His emphasis on the temporal evolution of concepts offers a theoretical lens that resonates with architectural theorists working at the intersection of history and theory. This convergence is not coincidental. Both architectural theory and conceptual history responded to wider cultural transformations that demanded a rethinking of theory and history as deeply intertwined.

Here, Koselleck's conceptual history (*Begriffsgeschichte*), defining the methodological approach of the study in examining the historical evolution of key concepts, significantly contributes to the development of the model glossary. Koselleck's *Begriffsgeschichte* emphasizes how the meanings of key terms evolve over time, shaped by changing historical conditions. Words that appear constant often undergo significant conceptual shifts when transferred across different periods. Moreover, different terms may articulate overlapping ideas, especially when viewed across distinct intellectual frameworks. This chapter applies Koselleck's insights to

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[70] Koselleck.

[71] See Robert D'Amico, *Historicism and Knowledge* (New York: Routledge, 1989); Manfredo Tafuri, *Theories and History of Architecture* (New York: Harper & Row, 1980); Kenneth Frampton, *Modern Architecture: A Critical History* (London: Thames and Hudson, 1980); Kenneth Frampton, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, edited by John Cava (Cambridge, MA: MIT Press, 1995).

architectural discourse by focusing on groups of recurring terms and their substitutions that resurface across various historical moments. In doing so, it explores how architectural concepts not only reflect but also shape historical consciousness.

Conceptual history emphasizes how the understanding of key terms evolves over time, reflecting changes in historical experience.[72] This transformation is particularly evident in the years of approximately 1750–1850, when the premodern use of language transitioned to modern understandings, accompanied by a "denaturalization of the old experience of time."[73] The same words used across different periods can undergo significant changes in meaning. Furthermore, different terms may define similar or overlapping concepts, particularly throughout historical periods. This dynamic interplay of semantic change and the convergence of various terms highlights the central role of language in shaping and understanding historical processes, a key focus of conceptual history.[74]

Drawing on Koselleck's idea that concepts are not static but evolve in response to historical conditions, this chapter applies his perspective to architectural theory by analyzing how terms related to architectural making have evolved over time, reflecting shifting paradigms. It highlights sets of terms that reappear throughout various historical periods, revealing both shifts and continuities in architectural culture.

While Koselleck offers a historical methodology for tracking conceptual change, Michael Hays's approach to architectural discourse, as the second foundation of this chapter's first argument, provides a parallel lens for understanding how these shifting concepts are articulated in architectural theory and practice. Hays's influential essay titled "Critical Architecture Between Culture and Form" presents his understanding

[72] Koselleck.
[73] Koselleck, 5-6.
[74] Koselleck, 6.

of architecture as an evolving discourse shaped by both cultural and formal dimensions. Nearly thirty years ago, Hays described two positions of architecture as being "symptomatic of a pervasive dichotomy in architectural theory and criticism: architecture as an instrument of culture and architecture as autonomous form."[75] He writes:

> An alternative interpretive position which cuts across this dichotomy would bear not only a more robust description of the artifacts, but also the more intricate analysis demanded by artifacts situated explicitly and critically *in the world* - in culture, in theories of culture, in theories of interpretation itself.[76]

Referring to Stanford Anderson and Diana Agrest, Hays's interest in the well-known discussion of "quasi-autonomy" is no coincidence. This is where Agrest's definition of culture becomes particularly relevant. She defines culture as a system of social codes governing how information enters the public domain. In this framework, design, and by extension, architectural culture, is seen as a closed system that selectively recodes general cultural notions within the framework of its own distinct parameters. This perspective suggests that architectural culture operates through internal codes which, while intertwined with broader social and historical contexts, also establish a degree of separation from them.[77]

In relation to this, Hays defines architecture "not as a passive agent of culture in its dominant ideological, institutional, and historical forms, nor as a detached, disinfected object."[78] Hays highlights architecture's capacity to critically engage with culture, neither fully complying with the ideological demands of its time nor functioning entirely autonomously. This in-between position, which he and his

[75] Hays, 1984, 15.
[76] Hays, 17.
[77] Agrest.
[78] Hays, 27.

teacher Stanford Anderson refer to as "quasi-autonomy," emphasizes that architecture can engage with wider cultural codes while retaining its own agency.

The dichotomy and this in-between condition that Hays proposes, using Anderson's phrase, provides a productive framework for initiating a dialogue between nineteenth-century avant-garde theories and contemporary architectural conditions.[79] Agrest's formulation of "codes," together with Hays' notion of in-betweenness, strengthens the argument for the interconnectedness among the terms in the glossary. This framework of architectural culture not only supports the task of defining an architectural *Bildung* but also makes apparent the otherwise overlooked relationships between *Bildung*'s layered understandings and the discourses of architectural culture.

Building on these theoretical frameworks, the glossary takes shape as a collection of architectural terms that parallels the conceptual structure established by the multiple understandings of *Bildung*. As previously mentioned, the terms in the glossary are proposed as "reflexive doubles." Although they may appear distinct in wording or phrasing, these terms share underlying ideas that have been recontextualized. While covering a wide theoretical terrain, the glossary ultimately narrows down to six terms, organized into three reflexive doubles: "Artform and Workform/Coreform (*Kunstform* and *Werkform/Kernform*)," "Scenographical and Technological," and "Shape and Form." These are presented chronologically, beginning with the foundational double of Artform and Workform/Coreform.

Karl Bötticher (1806–1889), a German architect and theorist, plays a central role in the first double. His theory of *Kunstform* (artform) and *Werkform* (workform) provides a basis for understanding architectural form through its reflexive structure.

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[79] In the presentation "Views across the Rhine: Interchanges in French and German Architectural Thought" in 2017, Barry Bergdoll stated that the concept of "avant-garde," which is mostly associated with the twentieth century, first emerged in the early nineteenth century. The nineteenth-century invention of the avant-garde invites us to rethink forgotten relationships. In this regard, Bergdoll defines contemporary approaches in architecture as "neo-nineteenth-century" ideas.

According to Bötticher, architecture cannot be grasped solely through its visual attributes; its underlying cultural and functional logic must also be accounted for. His distinction between doubles marks the starting point of the proposed glossary. Artform and Workform/Coreform are inherently reflexive; they cannot be fully understood in isolation. Rather, their meanings emerge through their interrelation, a principle that also applies to the other two doubles.

Based on these nineteenth-century foundations, the glossary includes both reinterpretations and possible extensions of these concepts. This first reflexive double has continued to influence architectural thought through reinterpretations by Kenneth Frampton, Mitchell Schwarzer, and others in the 1990s.

It is important to note that the glossary is built on specific theories rooted in the nineteenth-century *Tektonik* debate. While other scholars have noted the connections between the multiple meanings of *Bildung* and architectonics, their focus has often remained on *Bildung* as an educational concept that shapes architects and architectural processes.[80] In contrast, this thesis takes that parallel further by using it as a theoretical framework for rethinking architectural making itself. For instance, Daniel Purdy, referencing Susan Bernstein's *On the Ruins of Babel*, notes: "she observes that architectonics marks a fold between the technical or rhapsodic gathering of the historical and its recasting as a necessary system of relations."[81] Bernstein's analysis goes further, examining the aesthetic ideologies embedded in both architectonics and *Bildung*. [82] In this study, that parallel is instrumentalized to construct a glossary that redefines the plural conditions of architectural making.

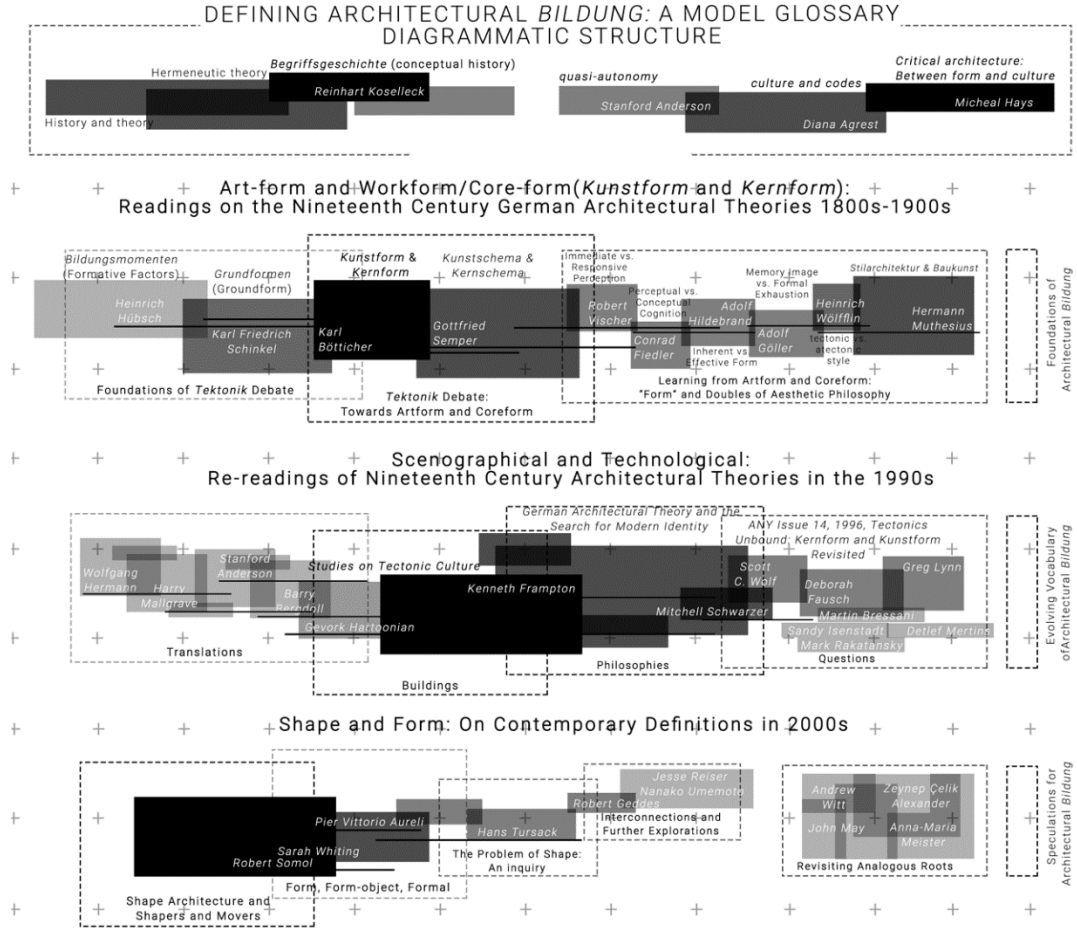
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[80] See Daniel Leonhard Purdy, *On the Ruins of Babel: Architectural Metaphor in German Thought* (Ithaca, NY: Cornell University Press, 2011). See also Susan Bernstein, "Goethe's Architectonic Bildung and Buildings in Classical Weimar," *MLN* 114, no. 5 (December 1999): 1014–36, https://doi.org/10.1353/mln.1999.0061.

[81] Bernstein.

[82] Here, Bernstein's architectonic obviously references Kant's understanding of architectonics. "The architectonic entails the arrangement of sensory data according to a method. The "architectural" quality of system building consists in shaping and designing knowledge according to an idea that was not generated by any individual science but instead is derived from an examination of human

Diagrammatical Introduction



existence in its entirety. Architecture provides a technology and a metaphor for the always expanding problem of how to process the vast information generated by the sciences."

Art-form and Workform/Core-form(*Kunstform* and *Kernform*): Readings on the Nineteenth Century German Architectural Theories 1800s-1900s

This section begins with the nineteenth-century debates on *Tektonik*, illustrating how architectural theory embodies the dualities of *Bildung*. The first glossary entry, "Artform and Workform/Coreform (*Kunstform* and *Werkform*/*Kernform*)," serves as the title for this section, but its contents offer an expanded interpretation of the terms. This section primarily emphasizes the idea of becoming and, in this context, revisits the foundational debates on *Tektonik* (tectonics) of the nineteenth century and their influence on subsequent theoretical developments. These terms are not only distinct but also defined in relation to one another. Although conceptually different, they gain meaning through their interrelationship.

To situate the thinkers within the debates of their time in the broader intellectual tradition, it is essential to briefly recognize the influence of nineteenth-century German philosophy on both architectural and aesthetic discourse. In *Introduction to German Philosophy*, Andrew Bowie claims that:

> most of the theoretical approaches that have changed the humanities in controversial ways, such as structuralism, post-structuralism, gender theory, critical theory, hermeneutics, and psychoanalysis, are often associated with French theorists like Jacques Derrida, Michel Foucault, and others. However, these theories mostly depend upon the key figures in German philosophy like Hegel, Nietzsche, and Heidegger. It is now precisely the ideas of these latter figures that are also being used to challenge some of the assumptions of Anglo–American analytical philosophy. Attention to German philosophy, therefore, offers opportunities for new interactions between previously opposed approaches.[83]

Bowie's emphasis is especially relevant to this study. Nineteenth-century German thought is highlighted as a key influence in the transition from classical to modern

[83]Andrew Bowie, *Introduction to German Philosophy: From Kant to Habermas* (Princeton, N.J: Recording for the Blind & Dyslexic, 2004): 4.

paradigms. The philosophical heterogeneity emphasized by Bowie is echoed in architectural theory, where thinkers like William Curtis have drawn attention to overlapping "formative strands" within nineteenth-century German debates. Curtis states that they often overlap within nineteenth-century theories, especially in German debates on architecture and philosophy. This research primarily focuses on these debates due to the productive intellectual diversity that still resonates with contemporary theory. This architectural knowledge does not rely solely on nature or normative rules. Rather, it is generated from within architecture itself, forming the foundation of aesthetic philosophy. Therefore, the heterogeneous and transitional nature of nineteenth-century architectural theory is significant as a critique of the uniformity in twentieth-century ideas. This overlapping of theoretical currents within architectural discourse led to diverse knowledge formations, which Mitchell Schwarzer describes as "open-ended." In *German Architectural Theory and the Search for Modern Identity*, Schwarzer reflects on modern knowledge of the nineteenth century by characterizing it as "open-ended and heterogeneous," though neglected:[84]

> The nineteenth-century discourses also represented architecture through multiple cultural identities. That is, unlike the unity attributed to the modern movement, nineteenth-century writers differed greatly in their prognoses for modernity. Their theories are indicative of the historical, sociological, economic, and philosophical debates of the time.[85]

Twentieth-century scholars like Mitchell Schwarzer have revisited these nineteenth-century theories to reassess their enduring relevance in architectural discourse. Schwarzer highlights a significant epistemological shift in architectural thinking during this time, shifting the focus from ontology rooted in static, classical forms to a perspective that considered architecture through historical forces and human

[84] Mitchell Schwarzer, *German Architectural Theory and the Search for Modern Identity* (Cambridge: Cambridge University Press, 1995): 12.
[85] Schwarzer, 11.

influence. This shift marked a break from classical stability. Theorists of the nineteenth century began to understand architecture as more than just built form.

Similarly, Harry Francis Mallgrave highlights the intellectual complexity of the nineteenth century. He argues that this era was characterized by an interplay of varied and even contradictory tendencies, which were nevertheless perceived as contributing to a shared goal:

> a transition from idealism to (a suspect) realism, or from metaphysical speculation to (an even more suspect) scientific positivism, is to demean the complexity of the situation, which will in no way enhance our understanding of it. We lose sight too easily of the fact that these diverse, even contrary tendencies were generally perceived as working together toward the same goal, and that the newly splintered disciplines of psychology, sociology, anthropology, linguistics, and aesthetics, for instance, were presumed to share a common methodological footing…[86]

Together, Schwarzer and Mallgrave highlight how nineteenth-century architectural theory was not a unified discourse but rather a multifaceted intellectual landscape, where diverse methodologies coexisted in shaping architectural thought. Expanding on this perspective, art and architectural historian Barry Bergdoll posits that nineteenth-century thought is foundational to contemporary architectural ideas. He argues that these theories, once acknowledged outside the concept of the nation-state, can become intriguing heterogeneities that provide fertile ground for architectural theory.[87] According to Bergdoll, numerous efforts have been made to reshape nineteenth-century discourse around the concept of conservatism. However, he notes that the term "avant-garde," which is primarily associated with the twentieth century, originated in the early nineteenth century. The invention of the avant-garde in the

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[86] Harry Francis Mallgrave, and Eleftherios Ikonomou. "Empathy, Form and Space. Problems in German Aesthetics." (*Santa Monica, CA: Getty Center*, 1994): 4.
[87] Barry Bergdoll, "Views across the Rhine: Interchanges in French and German Architectural Thought" (Presentation), 2017.

nineteenth century encourages us to reconsider overlooked relationships. In this context, Bergdoll characterizes contemporary architectural approaches as "neo-nineteenth-century" ideas. Nineteenth-century avant-garde thought encompasses the transition of architecture from archaeological to historical objects, as well as the distinctions and correspondences of the era's crises.[88]

Building on the contradictory and complementary ideas of nineteenth-century discourse, this section revisits the *Tektonik* (tectonics) debate and its historical development. Over time, the key concepts in this debate have evolved and the original contexts are often forgotten. Among the most significant contributions are the concepts of *Kernform* and *Kunstform*, which are revisited here through their foundational sources. Although these terms became distinct in later discourse, particularly after the early twentieth century, they remain closely interrelated and are best understood as complementary. Tracing these terms through nineteenth-century knowledge production in architecture guided the selection of glossary entries. Recurrent engagement with nineteenth-century theory often returns to, and reproduces, the distinction between *Kernform* and *Kunstform*.

To contextualize these terms within their intellectual genealogy, the formative contributions to tectonic theory of some key scholars should be recognized. Referencing early nineteenth-century discourse, this section first engages with the contributions of Heinrich Hübsch (1795–1863), a German architect and theorist known for his influential work on architectural style and his advocacy of a rational approach to design. It then turns to Karl Friedrich Schinkel (1781–1841), a Prussian architect recognized for his synthesis of classical and Gothic elements in an approach shaped by philosophical and theoretical inquiry. Karl Bötticher (1806–1889), an architectural historian and theorist rather than a practicing architect, played a pivotal role in articulating the theoretical foundations of Artform and Workform/Coreform

[88] Mari Hvattum, "Crisis and Correspondence: Style in the Nineteenth Century," *Architectural Histories* 1 (2013), Art. 21.

(*Kunstform* and *Werkform/Kernform*). Finally, Gottfried Semper (1803–1879), both a theorist and architect, explored the dynamic relationship between craft and form. Expanding on Karl Bötticher's distinction between *Kernform* (coreform) and *Kunstform* (artform), Semper emphasized the role of material technique. In referencing Bötticher's *Tektonik*, Semper's "*Der Stil*" refers back to these definitions and the concept of *Tektonik*. This connection is significant, as the introduction of *Kernform* and *Kunstform* is closely tied to the origins of *Tektonik.* The theoretical expansion of these terms has also influenced aesthetic philosophy, contributing to a plural understanding of form definitions and thereby enriching the discourse on *Kernform* and *Kunstform*. In this context, research on *Tektonik* (tectonics) and its reflections highlights *Bildung* as a relevant epistemological reading filter for architectural knowledge.

These ideas developed within a network of thinkers who were connected through mentorship, shared institutions, and overlapping interests in architectural theory. Karl Bötticher was a student of Schinkel, and although Semper did not attend Bauakademie, he links with Bötticher's academic work on tectonic theory and correlates his own work with Bötticher's. As other students of Schinkel, Friedrich Heinzerling and Rudolf Redtenbacher are also particularly important figures due to their theoretical work as well as their architectural representations of these theories. Their contributions, which have been somewhat overlooked, will be presented in this and the following chapter.

To trace how these conceptual debates shaped architectural discourse, the following section presents the evolution of tectonic theory in chronological sequence. This framework also clarifies why multiple theoretical terms, particularly those rooted in German discourse, are necessary to articulate the glossary's structure. This chapter has two primary reasons for its inclusion of various terms: first, the scholars of interest often introduce numerous terms and definitions, an essential mark of

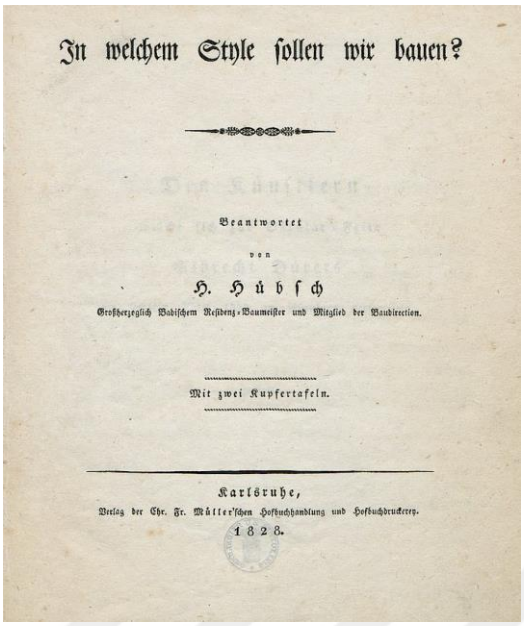
thorough scholarship, and second, these terms are necessary to articulate the interconnected theoretical framework presented in German.

Foundations of the *Tektonik* Debate

This section examines Heinrich Hübsch and Karl Friedrich Schinkel as two pivotal figures whose contributions significantly shaped nineteenth-century architectural theory, particularly regarding the tectonic debate. Hübsch highlighted *Bildungsmomenten* (formative factors) and technostatic experience, proposing a process-based, material understanding of architectural form, while Schinkel's articulation of *Grundformen* (ground forms) merged structural principles with philosophical reflections of history and innovation. Although many thinkers helped to shape the complex discourse of this era, Hübsch and Schinkel are prioritized here as key references for establishing the conceptual foundations that later evolved into the critical distinction between *Kernform* and *Kunstform,* preparing the field for broader developments in architectural tectonics.

Heinrich Hübsch and "*Bildungsmomenten* (formative factors)"

Heinrich Hübsch was a nineteenth-century German architect and one of the most distinguished students at Friedrich Weinbrenner's School of Architecture in Karlsruhe. Weinbrenner had developed a curriculum that combined classical architectural principles with practical construction techniques, establishing one of the earliest institutionalized architectural programs in Germany. Most of Hübsch's student work was preserved in Weinbrenner's archives as exemplary designs. Although the school's pedagogy emphasized redrawing and copying existing buildings, Hübsch quickly developed his own architectural stance. His independent thinking became evident after graduation, when he began challenging prevailing conventions and contributing to the evolving discourse of his time.


In welchem Style ſollen wir bauen?

Beantwortet

von

H. Hübſch

Großherzoglich Badiſchem Reſidenz-Baumeiſter und Mitglied der Baudirection.

Mit zwei Kupfertafeln.

Karlsruhe,

Verlag der Chr. Fr. Müller'ſchen Hofbuchhandlung und Hofbuchdruckerey.

1828.

Figure 2.2 Title page of Heinrich Hübsch's pamphlet *In welchem Style sollen wir bauen?* (Karlsruhe: C.F. Müller'sche Hofbuchhandlung, 1828).

In his influential pamphlet titled *In welchem Style sollen wir bauen?* (In which style should we build?) (Figure 2.2), he starts by referring to "painting and sculpture" and their long-standing "imitation of antiquity."[89] His critique underlines "the inadequacy of that style in meeting today's needs although almost all architects still adhere to it."[90] For Hübsch, style is "an organically-developed and complete structural system."[91] Bergdoll, referring to Hübsch's understanding of style, states that:

> Hübsch's pamphlet was anything but an expression of uncertainty. He insisted that only one style could express the needs and aspirations of any society. In defining that style he established an analytical approach to history

[89] Wolfgang Herrmann, ed., *In What Style Should We Build?: The German Debate on Architectural Style ; Heinrich Hübsch, 1828, Rudolf Wiegmann, 1829, Carl Albert Rosenthal, 1844, Johann Heinrich Wolff, 1845, Carl Gottlieb Wilhelm Bötticher, 1846, Heinrich Hübsch, 1847* (Chicago/Ill: University of Chicago Press, 1992): 63

[90] Hermann, 63.

[91] Barry Bergdoll, "Archaeology vs. History: Heinrich Hübsch's Critique of Neoclassicism and the Beginnings of Historicism in German Architectural Theory," *Oxford Art Journal* 6, no. 1 (1983): 9.

> and a belief that a new style could evolve from the past, which were to be fundamental to later nineteenth-century architectural theories.[92]

Moving beyond stylistic critique, Hübsch proposed a formal system rooted in material logic and purpose, articulated through the terms *Grundgestalt* (the basic form) and *Bildungsmomenten* (formative factors). Hübsch states that the existence of a building results from a twofold relationship between "the physical properties of the material and the resulting arrangement and formation of the individual parts." [93] He calls these "formative factors", which are derived from fitness for purpose (commodity) and lasting existence (solidity), determining the size and basic form of the essential parts of every building.[94] According to him, style is not a fixed term related to periods and a priori ideals, but rather a system that can be varied and reinterpreted, defined by changing "formative factors".[95] Notably, he uses both *Bildungsmomenten* and *Gestaltungsmomente* (Figure 2.3) interchangeably, reflecting his claim that shaping and forming are not conceptually distinct. This terminological fluidity resonates with his broader stance: architectural form is an ongoing, materially grounded process rather than a stylistic template. Hübsch's definition of formative factors highlights the changing conditions that result from shifting external and internal inputs, affecting both *Gestaltung* (*Gestalt* means shape; *Gestaltung* refers to the process of shaping, design) and *Bildung* (various meanings are discussed, although the term is highly relevant for understanding both conceptual and formal processes of architectural development). The interchangeable use of these two terms could be emphasized, as Hübsch's stance does not distinguish between shaping and forming.

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[92] Bergdoll, 13.
[93] Hübsch, Hermann (trans.), 64.
[94] Hübsch, Hermann (trans.), 64.
[95] Heinrich Hübsch. In welchem Style Sollen wir Bauen?, 1828.

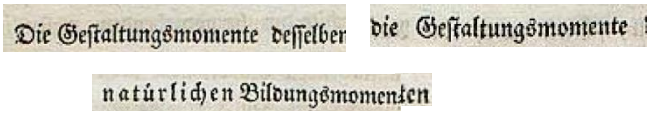


Figure 2.3 Use of both *Bildungsmomenten* and *Gestaltungsmomenten* in the pages of Hübsch's *In welchem Style sollen wir bauen?* (Karlsruhe: C.F. Müllerische Hofbuchhandlung, 1828).

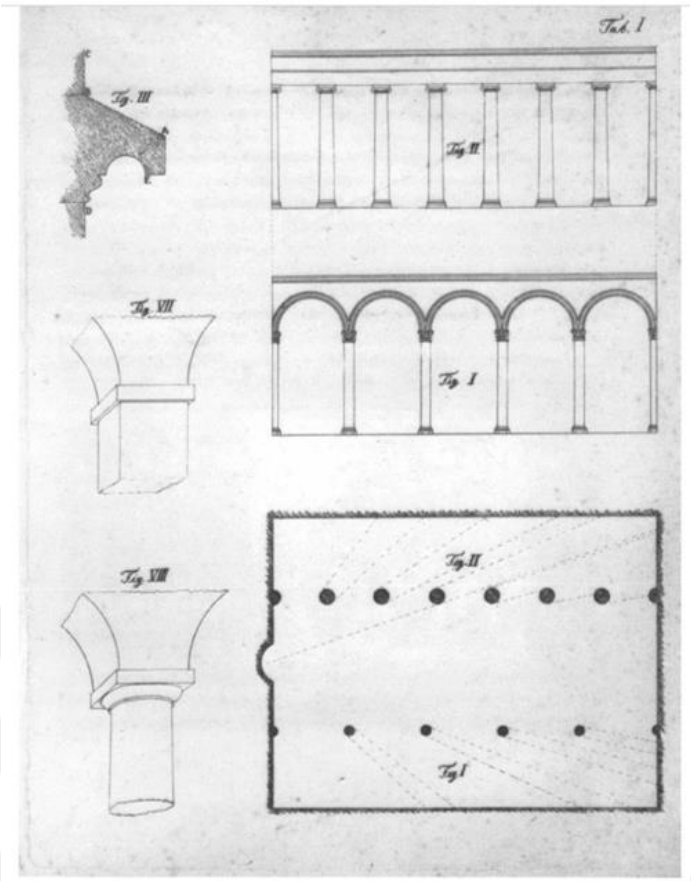
Similar to the multiple possibilities he highlights in his definition of "formative factors," Hübsch defines the beauty of a building as "composed of many elements."[96] He defines *Grundgestalt* (principle form) as the most important aspect to emphasize, as it determines the fundamental form and influences the components and evolution of the building, such as the distance between columns or decorative elements on the capitals. [97] Hübsch discusses the relationship between these architectural elements and the concept of style. He argues that the differences among monuments from different nations and periods lie in the distinct variations and combinations of walls, ceilings, piers or columns, doors, windows, roofs, and cornices, each shaped by their specific functions. Although these elements vary in size and ornamentation, often reflecting the significance of their purpose, the same fundamental types repeatedly emerge, even in their decorative aspects.[98] Thus, he defines style as a concept that manifests itself as various original forms of architecture.

He recognizes four factors as the basic determinants of these forms: material, technostatic experience, climate, and present needs.[99] The technostatic experience, as he describes it, necessitates "technostatic proportions, as distinct from the main proportions that derive from the purpose of the building."[100] He indicates that these proportions could be applied both to the building as a whole and to its individual rooms and sections. While he focuses on the technostatic proportions arising from material and climate, he also acknowledges that "they constantly evolve with

[96] Hübsch, 65.
[97] Hübsch, 65.
[98] Hübsch, 65.
[99] Hübsch, 4.
[100] Hübsch, 43.

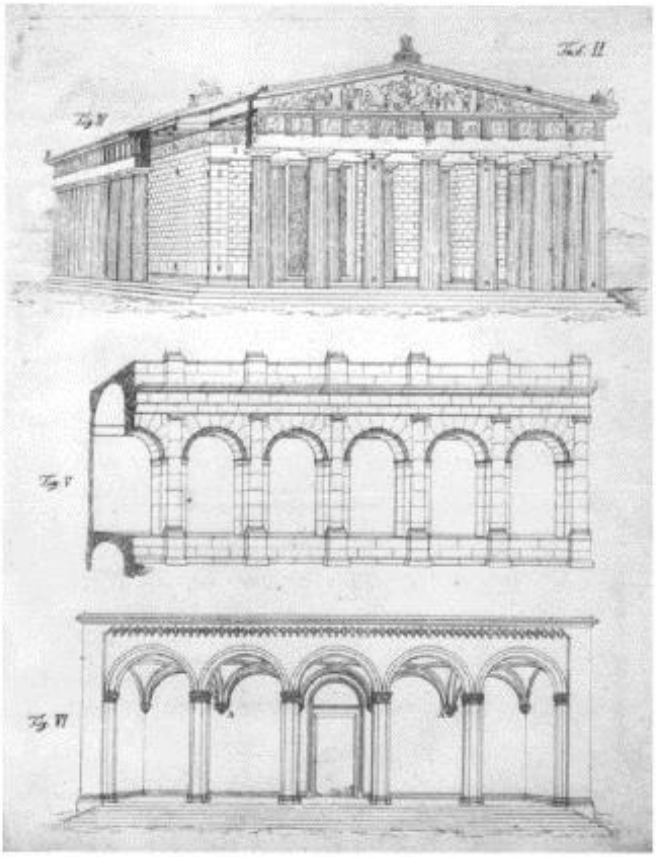
advancing architectural experience and, in fact, are subject to permanent change and the effect of progress in architecture as a fine art on the specific shape of these elements."[101] In his renowned pamphlet, he illustrates these permanent and continuous changes through sketches (Figure 2.4). These three drawings presented a transformation in architectural form, encompassing both permanence and uneasy relations, which cannot be categorized within the cyclical nature of style. The drawings present various structures: colonnades with and without arches. With his Figures I and II (Figure 2.4), he discusses the consistency of technostatic experience in using arches instead of Greek beams, significantly reducing the amount of material needed and minimizing the risk of collapse. Vaults can be built with small, manageable blocks, making them more economical and practical than the large single blocks required for architraves. As a result, he notes, a colonnade typically costs much more than an arcade, especially at larger scales.[102]

[101] Hübsch, 69.
[102] Hübsch, 72.



Heinrich Hübsch. Engraving from Heinrich Hübsch, *In welchem Style sollen wir bauen?* (Karlsruhe: Chr. Fr. Müller Hofbuchhandlung und Hofbuchdruckeren, 1828), table 1. London, Victoria and Albert Museum.

Figure 2.4 Hübsch's drawings (elevation and oblique sections) illustrating the idea of "permanent change." Source: *In What Style Should We Build?* The German Debate on Architectural Style, trans. Wolfgang Herrmann (Los Angeles: Getty Center for the History of Art and the Humanities, 1992).



Heinrich Hübsch. Engraving from Heinrich Hübsch, *In welchem Style sollen wir bauen?* (Karlsruhe: Chr. Fr. Müller Hofbuchhandlung und Hofbuchdruckerei, 1828), table 2. London, Victoria and Albert Museum.

Figure 2.5 Hübsch's drawings (elevation and oblique sections) illustrating the idea of "permanent change." Source: *In What Style Should We Build?* The German Debate on Architectural Style, trans. Wolfgang Herrmann (Los Angeles: Getty Center for the History of Art and the Humanities, 1992).

Hübsch's argument is further visualized in a second set of drawings that contrast rational material use with the dangers of imitative form-making. Hübsch highlights an interesting example, using it to critique the lack of clarity regarding the "technostatic" properties and how "imitation" can lead to a completely non-technostatic condition (Figure 2.5). He explains that the process of understanding the Greek model has changed from a technostatic form-making methodology to an imitative image-copying without reasoning:

> At the beginning, when Greek models were still fresh in people's memories, the colonnade appeared on the outside of the temple still in its pure form, untouched by vaulting. The vault was allowed in the interior, where it was indispensable if a continuous stone cover was wanted. Yet soon, the vault also intruded on the exterior, directly between the columns, thereby taking over their essential structural function. This caused the colonnade to degenerate into a mere sham and show architecture, as for instance on the Theater of Marcellus and the Colosseum in Rome (fig. V). Here the entablature is carried only by the arches, not by the engaged columns. Those engaged columns are so shallow that they hardly differ from painted ones and cannot pass for real architectural elements. Looked upon as decoration, they in no way represent wealth but only the utmost poverty of imagination.[103]

Hübsch's reading with these drawings is significant, as he explicitly states that they demonstrate that "the Greek colonnade and the arcade serve the same purpose and that their use in the same context (as in fig. V) must therefore be regarded as the most unfortunate pleonasm possible."[104] He states that when imitation becomes a means of form-making, rows of columns and pilasters are viewed as patterns that are superficially linked to the "principal forms" of the buildings.[105] Since Hübsch's definition of style is based on an active process, it has no static categories, as opposed to the latter misdefinition of style as a period and category. Hübsch's critical stance is significant and is also underlined by Barry Bergdoll in his research on "Archaeology vs. History: Heinrich Hübsch's Critique of Neoclassicism and the Beginnings of Historicism in German Architectural Theory". Bergdoll explains Hübsch's emphasis on "process":

> Hübsch, … understood history as a paradigmatic process, not as a formal model. He thus set out to attack all theories of a priori ideals as the generators of architectural form, be it the neo-Platonic aesthetics of German neoclassicism, the myth of the primitive hut promulgated in the mid-eighteenth century by the Abbe Laugier, or the traditional canons of the classical orders.[106]

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[103] Hübsch, 72.
[104] Hübsch, 72.
[105] Hübsch, 81.
[106] Bergdoll, 1983, 7.

Building upon this position, Hübsch's disagreed with Alois Hirt's Vitruvian notion that "the principal decorative forms of Greek stone architecture were translations of wooden buildings,"[107], and the debate on material translation gained prominence. This idea, defined as "a translation from a structural system derived from one kind of material to another system based on a different material — in other words, a process of imitation"[108] became a central point of disagreement. Material translation, defined as the transfer of a structural logic from one material system to another, became a key point of contention, particularly as it exposed a growing divide between rational form-making and stylistic imitation. Over the course of the century, these opposing theoretical positions were further elaborated, forming the backbone of tectonic discourse. Within this framework, Hübsch's emphasis on *Bildungsmomente* and technostatic experience, as he calls them, ultimately underscores these contrasting structures in the tectonic debate.

Within this framework, Hübsch's emphasis on *Bildungsmomente* and technostatic experience reflects his resistance to imitation. He argues that when technostatic reasoning is not prioritized, historical architectural forms are misused as if they were mere pattern cards, and he warns that the "mechanical copying of their forms led the style into a great muddle." [109] The essential distinction, for Hübsch, lies between architectural forms derived from technostatic properties and those produced through superficial imitation. This distinction would become central to the tectonic debate and would later crystallize into the theoretical concepts of *Kernform* and *Kunstform*—terms that articulate the intricate relationships among structure, material, and representation. Their emergence reflects a broader

[107] Schwarzer. "The issue of constructive rationality so important to Botticher was punctuated by the earlier exchange between Hirt and the Karlsruhe architect, Heinrich Hübsch, in the 1820s. In his book, *Ubergriechische Baukunst* (On Greek architecture), (1822), Hübsch had attacked the earlier findings of Hirt. Whereas Hirt was moved by his historical and archaeological investigations to uncover architectural truth in classical Greek sources, Hübsch proposed basing architectural knowledge on the particular and practical building realities of contemporary Germany.
[108] Hübsch, trans. Hermann, 72.
[109] Hübsch.

nineteenth-century shift toward process-based thinking, which contributed to this period being referred to as the "century of understanding," and significantly shaped the trajectory of architectural theory.

Karl Friedrich Schinkel and "Ground forms (*Grundformen*)"

Building upon the earlier debates, Karl Friedrich Schinkel's tectonic thinking introduced a foundational theoretical framework that not only influenced his student Karl Bötticher but also shaped the broader discourse on architectural knowledge in the nineteenth century. Schinkel -renowned as both an architect and artist- continues to be a pivotal figure in architectural theory. As with Hübsch, Schinkel's work, like that of Hübsch, embodies a productive tension between structure and representation, which underpins his tectonic approach. This dual logic is highlighted by Mitchell Schwarzer, who writes:

> It is perhaps to Schinkel that we owe the conceptual division between forms of construction and forms of art: forms derived from need and construction and those derived from a historical language. What Schinkel called *Grundformen* meant essentially that a system of ornament drawn from history was to represent the constructional realities of another age – the present. By embodying those new static forces, the *Grundformen* create a new objective and representational order for architecture.[110]

While Schinkel's work has been the subject of extensive scholarship, this section focuses specifically on his interpretation of historical models and their relevance to the tectonic discourse. The analysis draws on three key sources with three distinct scholarly lenses to explore how his philosophy, pedagogy, and tectonic drawings shaped nineteenth-century architectural knowledge: Goerd Peschken's study of *Das architektonische Lehrbuch*, Barry Bergdoll's *Karl Friedrich Schinkel: An*

[110] Mitchell Schwarzer, "German Tectonics," in *The Companion to the History of Architecture*, Vol. III, ed. Martin Bressani and Christina Contandriopoulos (Hoboken: Wiley, 2017), 192.

Architecture of Prussia, and Scott Wolf's dissertation *Karl Friedrich Schinkel: The Tectonic Unconscious and New Science of Subjectivity*. These works are selected for their distinct contributions: Peschken's research provides one of the first comprehensive English-language studies of Schinkel's architectural output; Bergdoll offers a widely recognized rereading of Schinkel's career and intellectual context; and Wolf focuses on Schinkel's philosophical influences, particularly his engagement with German idealism and subjectivity.

Under the mentorship of Alois Hirt and Friedrich Gilly, classical architecture and its study provided the foundation for Schinkel's early intellectual formation. A significant turning point was his *Bildungsreise*[111] through Greece and Italy, which deeply shaped his approach to learning, drawing, and architectural pedagogy. This educational journey, combined with his engagement with philosophical texts, laid the groundwork for the development of *Das architektonische Lehrbuch*. Scott Wolf's research highlights this intersection, emphasizing how Schinkel reinterpreted the writings of Johann Gottlieb Fichte and embedded idealist philosophy into architectural discourse. According to Wolf, Schinkel recontextualized the principles of German idealism and romantic psychology within a tectonic framework, redefining the relationship between thought and making. These philosophical "transpositions," as Wolf calls them, infused Schinkel's work with a speculative rigor that influenced not only his own design practice but also nineteenth-century architectural theory more broadly. [112] As Wolf writes:

> His readings and transpositions metaphorically united intertextuality - the act of writing - and the tectonic unconscious - the automatic act of making.

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[111] *Bildungsreise*: the Grand Tour was an extended journey through continental Europe, particularly Italy, undertaken by young aristocrats and artists from the 17th to 19th centuries as a form of cultural education.

[112] Scott C. Wolf, "The Metaphysical Foundations of Schinkel's Tectonics: Eine Spinne im eigenen Netz," *ANY: Architecture New York* 14 (Special Issue: *Tectonics Unbound: Kernform and Kunstform Revisited*) (1996): 17. His work will be referenced further in this chapter, under "Scenographical and Technological".

> Schinkel's transpositions did not conceal social praxis or ideology but instituted tectonics through a dialogue with emerging human sciences and technologies."[113]

According to Scott Wolf, Schinkel's tectonics can be understood in four phases.[114] The first phase entails the ways in which historical perceptions manifest themselves in tectonic forms as "primal forces" in man and nature.[115] The second phase is based on the identification of "*Grundformen*" (ground forms). As a part of his practice, he studied the renowned construction methods and forms in history and abstracted them into basic structural forms. His third phase includes the recognition of technological innovation Accordingly, he started to work on forms without historical referent. This approach is fully completed in the fourth phase, wherein he "distinguishes invention as a sign of freedom and artistic imagination."[116] He underlines the necessity of a new element for each new design to sustain a productive tension. Wolf's framework helps to highlight the concept of "*Grundformen*", which could be regarded as an early process of interpreting of existing architectural models.

Wolf suggests that as German romanticism declined, Schinkel's followers redefined tectonics with a positivist narrative that emphasized a cohesive relationship between the subject and pure technostatic expression. He calls attention to the unexploited aspects of Schinkel's tectonic theory:

> UItimately, what makes Schinkel's theory of tectonics so compelling are its totally contradictory tenets, its attempt to resolve real social dilemmas through absolute subjective representations, and its effort to unify critical philosophy with architectural praxis.[117]

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[113] Wolf, 18.
[114] Wolf, 20.
[115] Wolf, 20.
[116] Wolf, 21.
[117] Wolf, 21.

These phases materialize in Schinkel's iterative drawing practice, particularly in his *Lehrbuch*, where his exploration of *Grundformen* resulted from his in-depth study of classical architectural fragments. His tectonic rereadings of ancient forms were aimed at uncovering the core structural principles behind these formations.[118]

To fully understand *Grundformen* and Schinkel's contribution to the dual logic of structural and scenographical thinking in architectural processes, his *Das architektonische Lehrbuch* (Architectural Textbook) remains an essential source. Goerd Peschken, a leading Schinkel scholar, reconstructed the *Lehrbuch* in collaboration with Margarete Kühn, making the text available for contemporary study.[119] Peschken organizes the content into five main sections, tracing how Schinkel's ideas evolved in response to changing intellectual and political contexts.[120] Among these, the third chapter offers particularly valuable insights into Schinkel's conception of classical architecture and the methods he used to abstract its core principles.

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[118] At the same time, his work in set design combined scenographical approaches with structural thinking, highlighting textiles as an essential element. This dual approach to design, combining structural analysis with scenographical experimentation, laid the groundwork for later tectonic theory.
[119] Margarete Kühn's contributions to architectural preservation and historiography are noteworthy, especially for understanding German architectural theory, although they were often overshadowed by those of her male contemporaries. However, they fall outside the scope of this research.
[120] The book is composed of fragments within five main sections, including "1-*Lehrbuchplan für Italienreise 1804*" ("Teaching Plan for an Italian Journey 1804"), "2- *Lehrbuchstudien und Architekturtheoretische Skripten der Hochromantischenzeit 1810-1815*" ("Teaching Studies and Architectural Theoretical Writings of the High Romantic Period 1810-1815"), "3-*Die Klassizistische Fassung des Architektonischen Lehrbuchs gegen 1825*" ("The Classicist Version of the Architectural Textbook 1825), "4- *Die Technizistische Konzeption Des Architektonischen Lehrbuchs 1830*" ("The Technicist Conception of the Architectural Textbook 1830"), and "5-*Legimistische Fassung des Architektonischen Lehrbuchs: Residens eines Fürsten*" ("Legitimist Version of the Architectural Textbook: Residence of a Prince"). For more, see: Karl Friedrich Schinkel, *Das Architektonische Lehrbuch: Karl Friedrich Schinkel Lebenswerk*, ed. Goerd Peschken (Berlin, 1979).

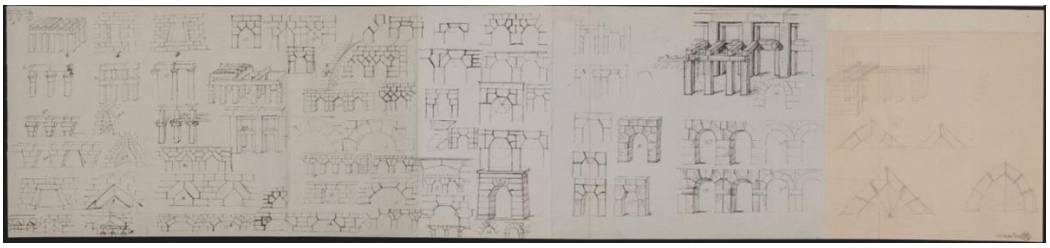


Figure 2.6 Iterative studies of architectural elements by Karl Friedrich Schinkel, illustrating variations in arches, vaults, and façade compositions. These sketches reflect Schinkel's concept of *Grundformen* (ground forms) as foundational to architectural education and design thinking. Source: Karl Friedrich Schinkel, *Das Architektonische Lehrbuch*, ed. Goerd Peschken and Margarete Kühn (Berlin: Deutscher Verlag für Kunstwissenschaft, 1982) https://schinkel.smb.museum/

In what Peschken refers to as *Vorstudien* (preliminary studies), Schinkel's drawings reflect a method of re-drawing that engages both architectural fragments and the structural whole. These sketches are not simple copies; rather, they abstract existing forms to reveal underlying spatial and tectonic principles (Figure 2.6).

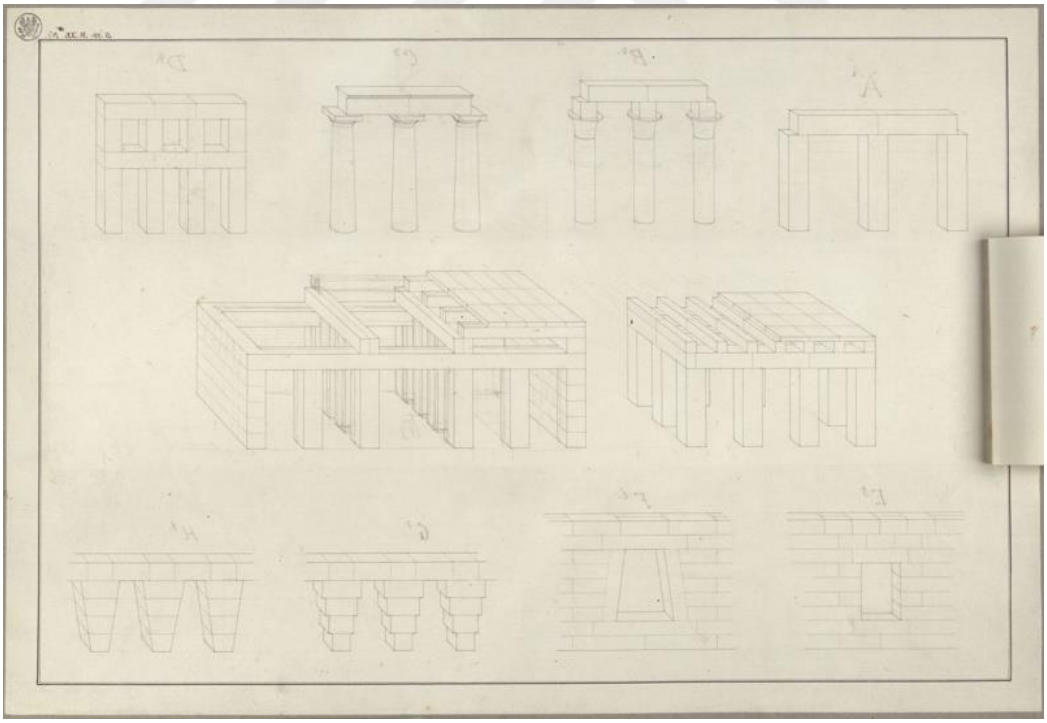


Figure 2.7 Page from Karl Friedrich Schinkel's *Architektonisches Lehrbuch*, depicting analytical studies of structural systems and wall openings. Source: Karl Friedrich Schinkel, *Das Architektonische Lehrbuch*, ed. Goerd Peschken and Margarete Kühn (Berlin: Deutscher Verlag für Kunstwissenschaft, 1982) https://schinkel.smb.museum/

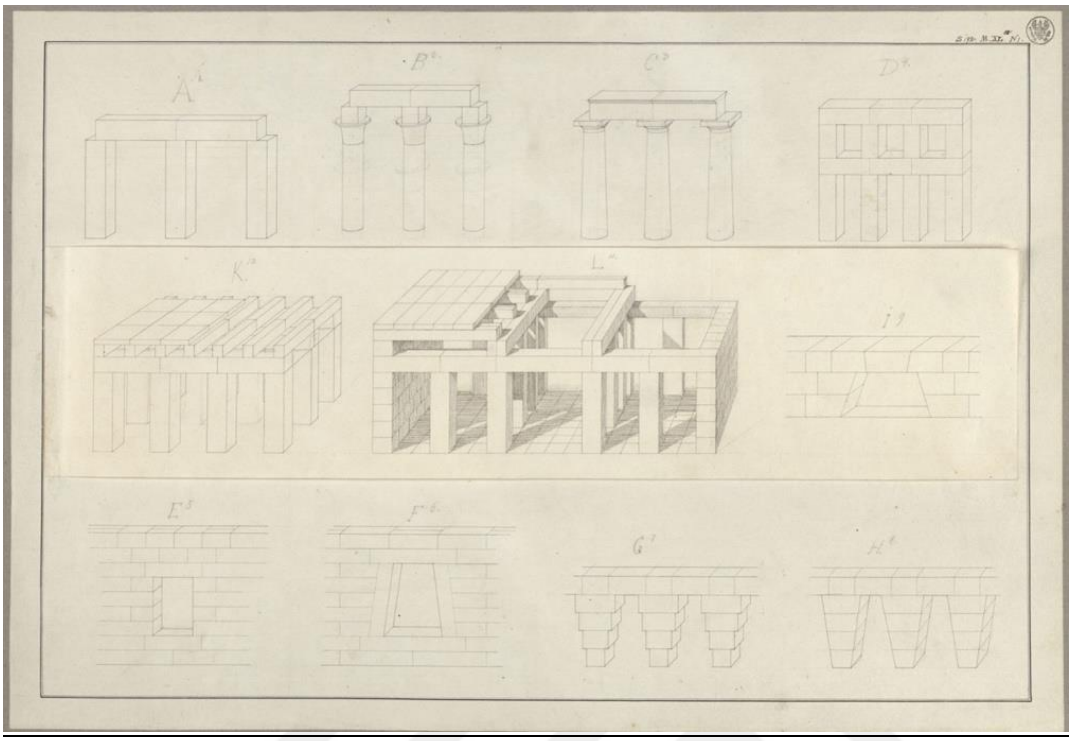


Figure 2.8 (continued) Page from Karl Friedrich Schinkel's *Architektonisches Lehrbuch*, depicting analytical studies of structural systems and wall openings. Source: Karl Friedrich Schinkel, *Das Architektonische Lehrbuch*, ed. Goerd Peschken and Margarete Kühn (Berlin: Deutscher Verlag für Kunstwissenschaft, 1982) https://schinkel.smb.museum/

His drawing research reveals the *Grundformen* of architectural relationships. Iterating the existing models of classical architecture, he creates abstract formations of elements that present the basic principles of structure (Figure 2.7). We observe that the classical orders are iterated to become simple geometries representing the vertical and horizontal elements that compose a whole system.

Schinkel's research on drawing, as presented in *Lehrbuch* to "teach architecture" consists of two sequential parts titled *Muster der Architektur* (Models of Architecture) and *Fehler der Architektur* (Mistakes/Failures of Architecture) (Figure

2.8).[121] He provides inventories of various elements from different architectural relationships.

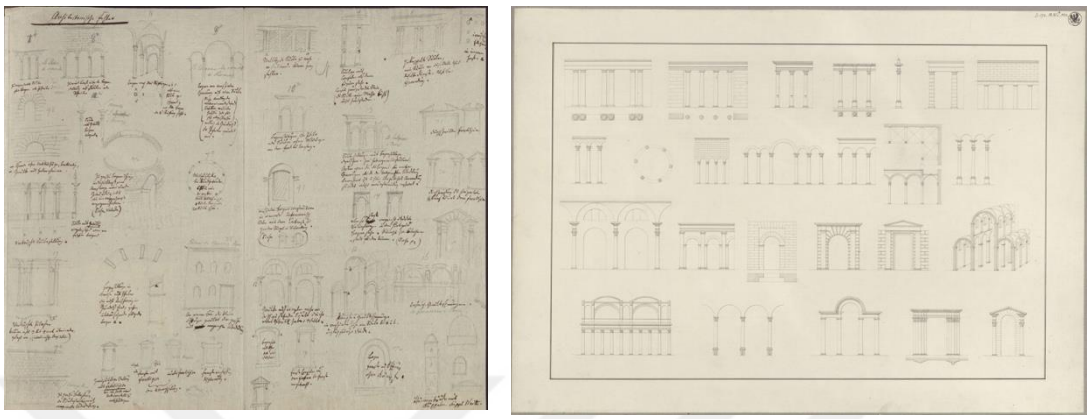


Figure 2.9 Sketches and inventory for *Fehler der Architektur* (Mistakes/Failures of Architecture).

Schinkel's *Lehrbuch* offers a structured yet open approach to architectural education, balancing historical analysis with abstraction. Through iterative drawings and theoretical reflections, he explores the relationships between classical forms in architecture.

Beginning with the works on classical forms as *Grundformen*, Schinkel's *Lehrbuch* reflected numerous aspects that established the foundation for his student Bötticher's distinction between *Kernform* and *Kunstform*. According to Schinkel, "ornamentation" should not be understood as the imitation of something that exists outside the object and its essence or essential idea."[122] He projected the idea of ornament being integral to the structure "derived from the essential nature of the building, as were the tectonic forms and the rich color harmonies of its brick patterns."[123]

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[121] Please see a recent thesis on errors in architecture: Bengisu Derebaşı, "Order and Error in Architectural Production", (PhD diss., METU, 2025).
[122] Barry Bergdoll, *Karl Friedrich Schinkel: An Architecture for Prussia* (New York: Rizzoli, 1994): 203.
[123] Bergdoll, 203.

Schinkel's engagement with both classical and medieval forms unfolded as parallel investigations within his broader commitment to what he called "progressive historicism."[124] Barry Bergdoll emphasizes this approach as a proposal for "stylistic synthesis", a model that replaces fixed stylistic categories with what he describes as "codes of architecture's fundamental genetic order."[125] This synthetic thinking is clearly reflected in Schinkel's designs, notably the *Bauakademie*, which merges tectonic clarity with aesthetic expression, and the *Friedrichwerdersche Kirche*, which exhibits "Schinkel's growing eclecticism" and visually anticipates the distinction between *Kernform* and *Kunstform* (Figure 2.9).[126]

[124] Bergdoll, 213.
[125] Bergdoll, 213.
[126] Barry Bergdoll discusses Schinkel's architectural synthesis and its historical significance in *Karl Friedrich Schinkel: An Architecture for Prussia* (New York: Rizzoli, 1994). As also noted at the beginning of his study, Mitchell Schwarzer states that "we owe the conceptual division between forms of construction and forms of art" to Schinkel. See Mitchell Schwarzer, *German Architectural Theory and the Search for Modern Identity* (Cambridge: Cambridge University Press, 1995), 103.

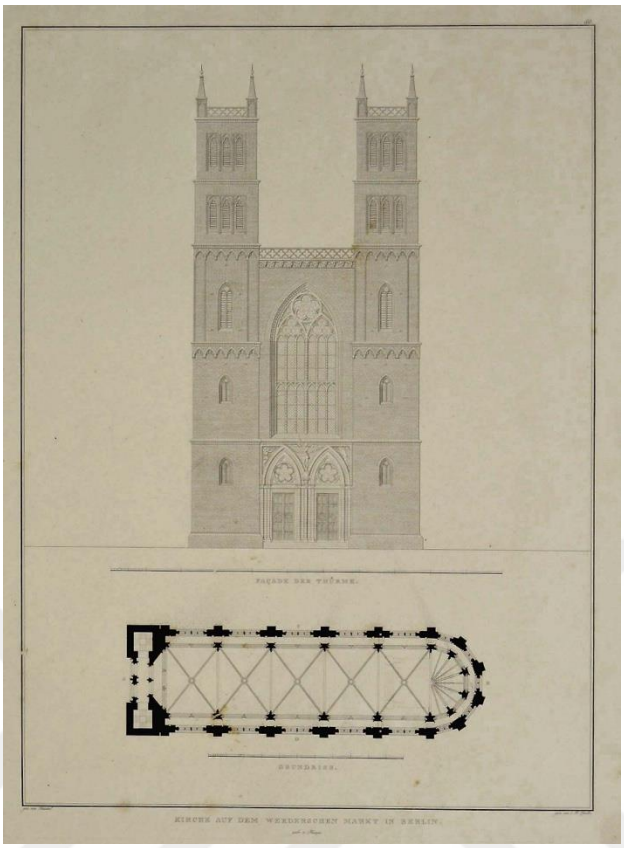


Figure 2.10 Elevation and floor plan of the Friedrichswerdersche Kirche in Berlin. Designed by Karl Friedrich Schinkel. Source: https://smb.museum-digital.de/object/86717

The *Friedrichwerder Kirche* provides a tangible illustration of Schinkel's not-yet-titled conceptual dualism between *Kernform* and *Kunstform*, terms that he used to distinguish between the essential structural form (the *Kernform*) and the decorative or aesthetic expression (the *Kunstform*).

This intellectual depth is further explored in Bergdoll's book "Karl Friedrich Schinkel: An Architecture of Prussia". Barry Bergdoll also delves into Schinkel's relationship with thinking and philosophy and his *Lehrbuch* as a product of his philosophical inquiry, describing Schinkel's approach as "abstracted classicism," which serves as a precise definition in the context of his research on Grundformen. Bergdoll states that:

> Schinkel's abstracted classicism is no exercise in archaeology, but rather, a search for a fundamental, visible ordering system. The system exquisitely interweaves the two scales of the building, the colossal scale of its larger masses and the smaller scale of the individual stories set as though within a frame.[127]

In addition to Schinkel's foundational theories, which laid the groundwork for the later articulation of *Kernform* and *Kunstform*, a compelling visual counterpart appears in a painting discussed by Barry Bergdoll in a chapter titled "Building and Ethos of Bildung: Schinkel's Public Architecture and Humboldt's Ideal." Here, Schinkel's design philosophy, drawing practices, and pedagogical values intersect with Wilhelm von Humboldt's theory of *Bildung*. [128] The chapter begins with a painting by Schinkel himself, *A View of Greece in Its Flowering* (Figure 2.10), also analyzed by Kurt Forster and Kenneth Frampton. This painting presents not a finished architectural monument, but rather a site under construction, where scaffolding, unfinished entablatures, and standing Greek columns coexist within a natural landscape. Rather than offering an idealized view of antiquity, Schinkel portrays building as an active, unfolding process, offering an image that resonates directly with his tectonic readings of classical fragments and the formative logic of *Grundformen*. Kenneth Frampton refers to Kurt Forster's description of the painting:

> The main activity in the painting, the construction of a great monument, centers on a sturdy scaffolding in the middle of the picture: the scaffolding is, of course, a temporary device, required merely for construction, but its prominence and pivotal role surely signify the activity of building as much as its material result. Construction is indeed the very building of social and cultural fact. This image of ancient building also lends its framework to Schinkel's example of modern architecture.[129]

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[127] Bergdoll, 64.
[128] Bergdoll, 49.
[129] Frampton, 1995, 61.



Figure 2.11 *A View of Greece in Its Flowering*, 1841. The painting depicts an imaginative reconstruction of ancient Greece under construction.

The painting *A View of Greece in Flowering* precisely illustrates the connections between Schinkel's design thinking and the educational theories of *Bildung*. This is especially important for this thesis, which, in this chapter, emphasizes *Bildung* as a part of educational philosophy and a crucial influence on Schinkel's design approach. This philosophical framework shaped Schinkel's architectural vision, where the concepts of making and formation are essential. Bergdoll describes this relationship as follows:

> The study of language was thus a means rather than an end, a pedagogical ideal that would have a profound impact on Schinkel's own quest for a language of architecture that could serve as a powerful instrument of the spirit of *Bildung*.[130]

This philosophy aligns with the broader intellectual currents of nineteenth-century thinkers, who explored the connection between pedagogical objectives and architecture itself. While Alois Hirt suggested "a teaching museum," Humboldt proposed a "public museum of art be created under the auspices of Berlin University" since he understood "monumental civic architecture as an instrument of

[130] Bergdoll, 1994, 47.

Humboldtian *Bildung*."[131] This theoretical convergence can be seen as a strong foundation for the rich interactions between architectural theory and philosophical frameworks that ultimately sparked the renowned "tectonic debate." These early exchanges became pivotal in shaping the tectonic discourse, particularly in distinguishing structural (*Kernform*) and symbolical (*Kunstform*) elements.

Tektonik Debate: Towards Artform and Coreform

Schinkel's influence on Bötticher's thinking, particularly in shaping his theoretical perspective on architectural form, is already recognized. To understand this intellectual lineage, however, we must first describe the broader *Tektonik* debate. This discourse established a foundation for later theoretical advancements, including Bötticher's differentiation of *Kunstform* (artform) and *Kernform* (coreform), which emerged as a response to earlier discussions on tectonics and style. The distinction between symbolic and technical aspects shaped the architectural theories of their time and continues to influence contemporary architectural discourse, highlighting their enduring relevance in architectural practice.

Tectonics emerged as one of the significant theoretical frameworks in nineteenth-century architecture, deeply intertwined with cultural, technological, and philosophical discourse. The early nineteenth-century archaeologists coined the German term *Tektonik* to describe structural qualities in Greek temples. It became synonymous with "the technical redefinition of architectural styles as structural systems composed of elements that served pragmatic as well as aesthetic functions."[132] In the context of nineteenth-century architectural theory, tectonics is regarded as a theoretical movement, offering a system for architectural knowledge. This movement was notably developed through the contributions of theorists such as

[131] Bergdoll, 71-72.
[132] Wolf, 17.

Karl Friedrich Schinkel, Karl Bötticher, Gottfried Semper, Rudolf Redtenbacher, and Otto Wagner. Tectonic "debates" provided productive theoretical ground for both the nineteenth century and the following centuries, encompassing much more than structural concerns and representing a multidimensional and often conflicting discourse defining a rational framework for architecture.[133] The diversity of definitions within the tectonic discourse not only fueled debates in the century of *Verstandesarbeit* (work of understanding, intellectual labor of architecture) but has also influenced recent architectural knowledge. The reflexive dualities of joints-disjoints, ornament-structure, technical-symbolical form, and/or ontological-representational form correspond to discursive strands in both philosophical and architectural frameworks. In this section, these strands will be explored through references to various architects and scholars. While tracing the definitions of tectonics, multiple subdefinitions of -form(s) will also be addressed. Building on this understanding, the first discussion explores Karl Bötticher and Gottfried Semper's contributions to tectonic discourse.

Karl Bötticher and Artform and Coreform (*Kunstform* and *Werkform*/*Kernform*)

Karl Bötticher was a German archaeologist and architect, who studied at the Academy of Architecture in Berlin, as one of the Schinkel's students. His renowned work on *Tektonik, Der Tektonik der Hellenen* has influenced the discourse of the century and following theoretical foundations. Drawing from Schinkel's concepts, Bötticher, in his book *Der Tektonik der Hellenen* defines the term "*Tektonik*" in that book as the "activity of forming a building".[134] He further explains the concept of "spatial tectonics" by emphasizing the process of architectural design, or rather of architectural formation. According to Bötticher, "Architectural design

[133] Schwarzer, 1995.
[134] Mitchell Schwarzer. "Ontology and Representation in Karl Bötticher's Theory of Tectonics." *Journal of the Society of Architectural Historians 52*, no. 3 (1993): 275.

does not occur through formal imitation. On the contrary, design is both creative and practical. The problem for the architect is not to replicate historical models, but to understand the operations of a building's reason itself."[135]

Instead of beginning with a historical model in mind, Bötticher recommended that architects start with an analysis of social and physical forces, allowing a building's structure to emerge from its specific context.[136] His thinking evolved through interactions with debates led by figures such as Alois Hirt, Heinrich Hübsch, and his teacher Schinkel. Within this framework, Bötticher introduced one of his most influential theoretical contributions: the distinction between *Kunstform* (artform) and *Werkform* or *Kernform* (coreform).[137] As Frampton states, Bötticher "interpreted the term tectonic as signifying a complete system binding all the parts of the Greek temple into a single whole…"[138] He explains Bötticher's distinction between these terms: the first, *Werkform* (*Kernform*), refers to the coreform of the timber rafters in a Greek temple, while the second, *Kunstform*, represents the artistic depiction of the same elements as petrified beam ends found in the triglyphs and metopes of the classical entablature.[139] This intriguing distinction between the two forms suggested by Bötticher significantly contributes to architectural theory strands. Mitchell Schwarzer summarizes the distinction further by referring to architectural making processes:

> Bötticher removed the *Kunstform* from the arena of historical change. The need for an ahistorical *Kunstform* arose from his conviction that the original forms of historical static relations-the modes of the *Werkform*-were only intelligible within their historic cultures. Considered as the embodiment of

[135] Schwarzer, 275.
[136] Schwarzer, 275.
[137]The author presented a paper referencing this part of the research, titled "A (Dual) Glossary of Tracing *Kunstform*: Cornice and Dantel" at the AHRA Body Matters Conference, Norwich University of the Arts, U.K., 2024, and an article "Dantel as Kunstform: Knitting Ladies and Ören Bayan Magazine" will be published in Architectural Histories, edited by Rebecca Carrai and Gregorio Astengo, in 2025.
[138] Frampton, 4.
[139] Frampton, 16.

> structural relations, the *Werkform* emerges solely from the sphere of technological advancement and invention. As building needs change according to cultural demands and new technological and material possibilities become available, new varieties of *Werkform* emerges.[140]

The development of these ideas can be traced across the various editions of Bötticher's *Die Tektonik der Hellenen*, where shifts in terminology and emphasis reflect the evolving clarity of his theoretical framework. *Die Tektonik der Hellenen* includes three books (Figure 2.11) that were printed and reprinted in several editions in 1852 (Potsdam), 1862, 1873, 1874, and 1881 (Berlin) and offer insight into the development of his tectonic theory over time.[141]

The introductions to these editions vary notably. In the earlier editions (1852 and 1862), Bötticher titles the preface "*Zur Philosophie der Tektonischer Form*" (On the Philosophy of Tectonic Form), and refers more generally to *Tektonik* as symbolic and compositional. The specific terms *Kunstform* and *Werkform/Kernform* do not appear in these titles; instead, he uses phrases such as *Tektonische Symbole* (tectonic symbols) (Figures 2.12 and 2.13). However, by the 1874 edition, there is a marked shift has occurred: the title of the introduction changes to "*Zur Lehre der Tektonischen Kunstformen*" (On the Theory of Tectonic Art Forms), and the subtitles begin to feature detailed references to *Kernform* and *Kunstform* (Figure 2.14). This

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[140] Schwarzer, 1993, 278.

[141] Karl Bötticher, *Die Tektonik der Hellenen*, vol. 1: *Einleitung und Dorika* and vol. 2: *Jonika mit Einschluss der Attisch-Ionischen Weise* (Potsdam: Ferdinand Riegel, 1852), https://doi.org/10.11588/diglit.5140; vol. 3: *Fünfundvierzig Kupfertafeln zur Tektonik der Hellenen* (Berlin: Ernst & Korn, 1873), https://doi.org/10.11588/diglit.4579; vol. 1 (rev.): *Die Lehre der tektonischen Kunstformen: dorische, ionische und korinthische Bauweise* (Berlin: Ernst & Korn, 1874), https://doi.org/10.11588/diglit.4580; vol. 2 (rev.): *Der Tempel in seiner räumlichen Anordnung und Ausstattung* (Berlin: Ernst & Korn, 1881), https://doi.org/10.11588/diglit.4581. https://www.deutsche-digitale-bibliothek.de/searchresults?isThumbnailFiltered=false&query=DİE%2BTEKTONİK%2BDER%2BHELLENEN&viewType=listM, https://www.e-rara.ch/zut/content/search/1626695?query=*Tektonik*%20hellenen, https://www.digitale-sammlungen.de/en/view/bsb10221107?page=36,37.

shift signals the increasing precision of Bötticher's terminology and the maturation of his conceptual framework.

In nearly all editions, Bötticher consistently analyzes architectural elements in relation to the evolving rules of the Doric, Ionic, and Corinthian orders. The overall structure contains many fragments organized around specific themes or definitions, transitioning from architectural elements to concepts within the theory of tectonics. The evolution of the terminology across editions reflects how Bötticher's theoretical framework, and especially his distinction between *Kernform* and *Kunstform*, matured over time, with a clearer articulation emerging in the editions of the late nineteenth century. Furthermore, the 1874 edition's emphasis on *Kunstform* is particularly interesting, as the tables in the book focus on *Kunstform*, serving as curated collections of architectural fragments gathered from a wide geographical scope. This highlights how *Kunstform* took precedence in the representational discourse of Bötticher's tectonic theory. The introduction also includes the terms *Formen-bildung* and *Bildungsgesetze*, revealing an understanding and emphasis on architectural processes.

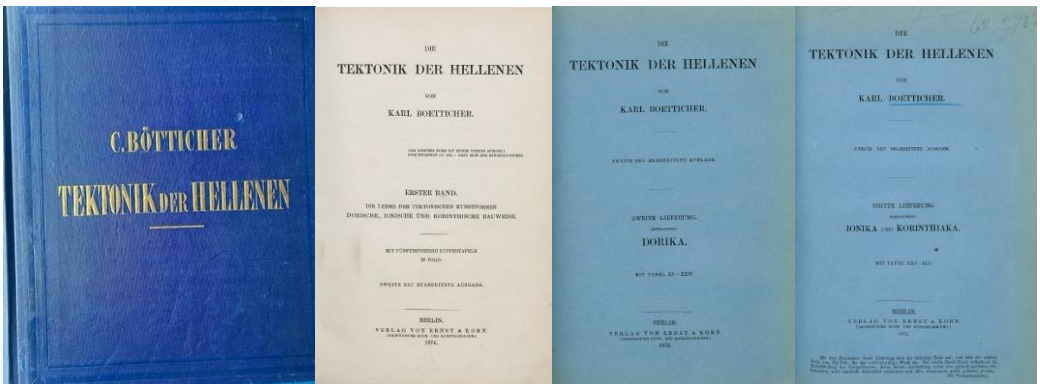
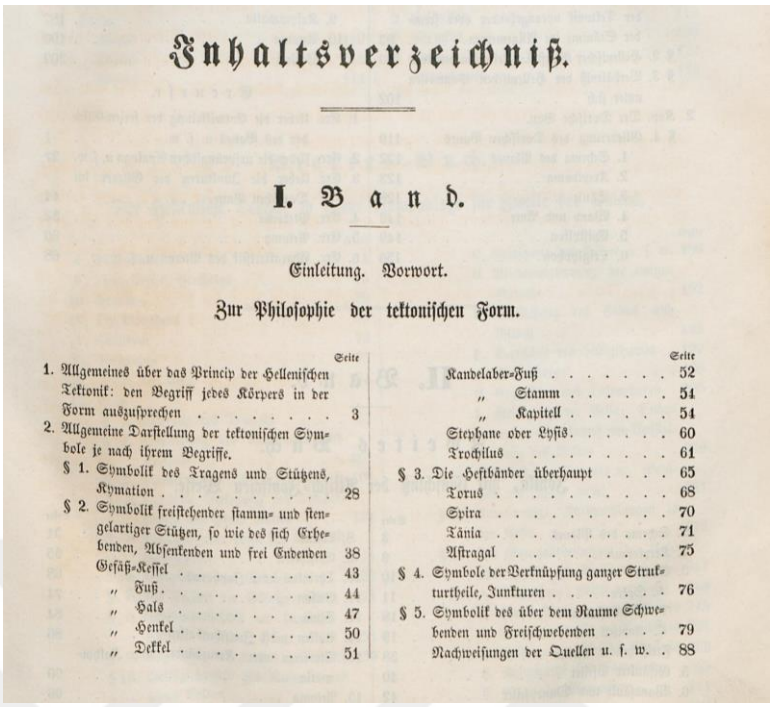


Figure 2.12 Covers and title pages from various volumes and editions of Karl Bötticher's *Die Tektonik der Hellenen*, published by Ernst & Korn in Berlin.



Inhaltsverzeichniß.

I. Band.

Einleitung. Vorwort.

Zur Philosophie der tektonischen Form.

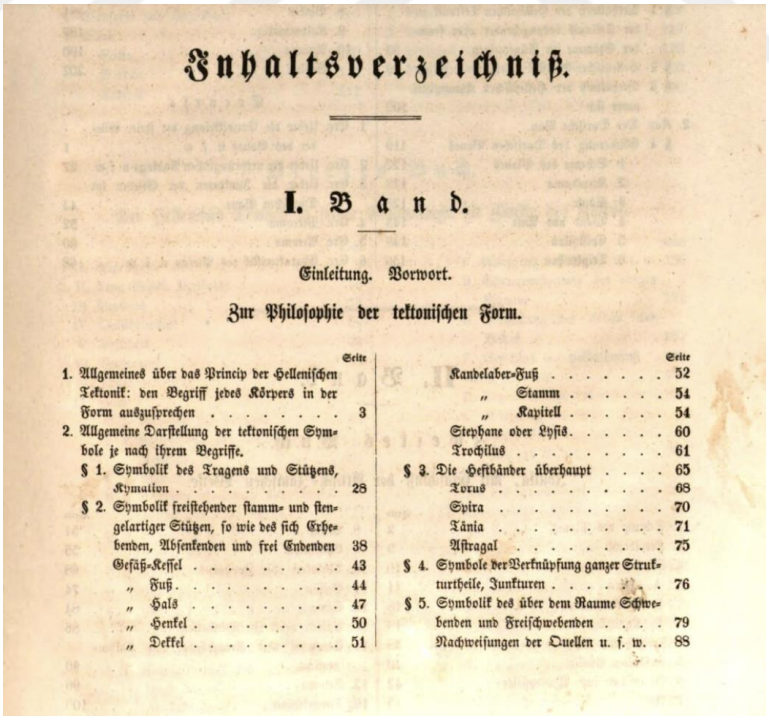
Seite

1. Allgemeines über das Princip der Hellenischen Tektonik: den Begriff jedes Körpers in der Form auszusprechen 3
2. Allgemeine Darstellung der tektonischen Symbole je nach ihrem Begriffe.
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§ 2. Symbolik freistehender stamm- und stengelartiger Stützen, so wie des sich Erhebenden, Absenkenden und frei Endenden 38
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§ 4. Symbole der Verknüpfung ganzer Strukturtheile, Junkturen 76
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Nachweisungen der Quellen u. s. w. . . 88

Figure 2.13 Content page of Bötticher's *Die Tektonik der Hellenen*, the terms *Kernform/Werkform* and *Kunstform* are not used, 1852 edition.



Inhaltsverzeichniß.

I. Band.

Einleitung. Vorwort.

Zur Philosophie der tektonischen Form.

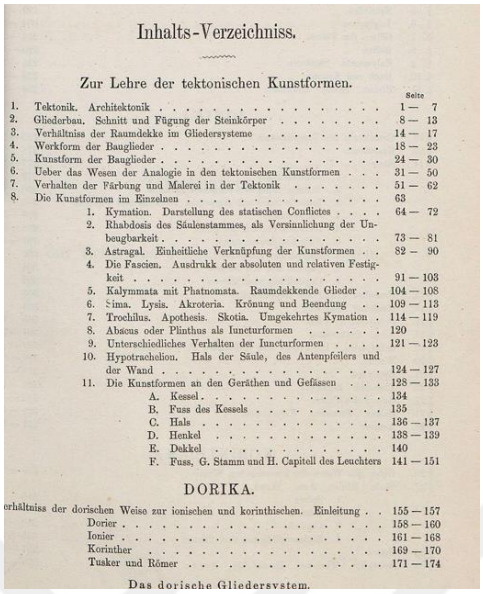
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§ 5. Symbolik des über dem Raume Schwebenden und Freischwebenden 79
Nachweisungen der Quellen u. s. w. . . 88

Figure 2.14 Content page of Bötticher's *Die Tektonik der Hellenen*, the terms *Kernform/Werkform* and *Kunstform* are not used, 1862 edition.



Inhalts-Verzeichniss.

Zur Lehre der tektonischen Kunstformen.

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1. Tektonik. Architektonik . . . . . 1 — 7
2. Gliederbau. Schnitt und Fügung der Steinkörper . . . . . 8 — 13
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4. Werkform der Bauglieder . . . . . 18 — 23
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6. Ueber das Wesen der Analogie in den tektonischen Kunstformen . . . 31 — 50
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   2. Rhabdosis des Säulenstammes, als Versinnlichung der Unbeugbarkeit . . . . . 73 — 81
   3. Astragal. Einheitliche Verknüpfung der Kunstformen . . 82 — 90
   4. Die Fascien. Ausdrukk der absoluten und relativen Festigkeit . . . . . 91 — 103
   5. Kalymmata mit Phatnomata. Raumdekkende Glieder . . 104 — 108
   6. Sima. Lysis. Akroteria. Krönung und Beendung . . 109 — 113
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   8. Abacus oder Plinthus als Iuncturformen 120
   9. Unterschiedliches Verhalten der Iuncturformen . . . . 121 — 123
   10. Hypotrachelion. Hals der Säule, des Antenpfeilers und der Wand . . . . . 124 — 127
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Das dorische Gliedersystem.

Figure 2.15 Content page of Bötticher's *Die Tektonik der Hellenen*, *Kernform/Werkform* and *Kunstform* are indicated, 1874 edition.

The focus is on the introduction of Bötticher's work, as it outlines the "philosophy" and, inevitably, the theory and history of *Tektonik* prior to giving information on specific elements and relationships in physical making. The first part of the 1874 edition is "*Tektonik. Architektonik*". In the introduction to the 1874 edition, Bötticher expands on the philosophical underpinnings of tectonic formation by grounding his terms in ancient Greek concepts of making. Referring to the Greeks, Bötticher underlines three terms that the act of *Bildung*, (formations) of relationships and shapes, generates:

> The creative drive for representation in humans, which stimulates the reflective mind for the formation (*Bildung*) of ideal relationships and shapes, coupled with the ability to render these mental formations perceptible through appropriate means, is what the ancient Greeks referred to as "Techne" (τἐχνη). A person who engages in this activity is called a

"Technites" (τέχνιτης), and the result of their work is known as a "Technasma" (τέχνασμα).[142]

With this conceptual trio, Bötticher emphasizes that architectural form arises not merely through physical construction but through an intellectual and imaginative act, a formative process that closely links design, craft, and symbolic expression. The interesting point in the definition of these terms is that they primarily encompass the thinking and representation of the "formations." Bötticher references the ancients and emphasizes that they "neither referred to the entire form system of a building nor to any individual part of it "architecture", as is mistakenly done today, but only to the activity of directing the process (thus *ἀρχιτέκτων*, architect)."[143]

The definition of *Tektonik* and *tekton*, has been underlined with their "theoretical guidance" for teaching and building supervision.[144] Bötticher explains how the definition of *tekton* changed from a broader sense that included artistic and craft skills as "master builder, the chair maker, cartwright, machinist, or horn worker, shipwright, carpenter, and metal worker"[145] to "a master of graphical representation, and a leader of the building, but no longer personally works on the material; instead, he leaves it to the subordinate *tektones."*[146] The definition of *tekton* remained "inventor"; however, its relation was limited to building supervision and it became *tektonarch* or architect. Architecture and architectonics are thus defined solely by the building and its physicality. However, based on the initial understanding of *tekton* and *technasma*, the emphasis on thinking and "formation" should be reclaimed to

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[142] Karl Bötticher, *Die Tektonik der Hellenen: Die Lehre der tektonischen Kunstformen, dorischer, ionischer und korinthischer Bauweise*, 2nd rev. ed. (Berlin: Verlag von Ernst & Korn, 1874).
"*Der schöpferische Darstellungstrieb im Menschen, welcher die Denkkraft des sinnenden Verstandes zur Bildung ideeller Verhältnisse und Gestalten an-regt, gepaart mit der Fähigkeit das in der Idee Gebildete auch durch entsprechende Mittel sinnlich wahrnehmbar auszuwirken, ist jene Thätigkeit welche von den ältern Hellenen mit Techne (τέχνη) bezeichnet wird: es heißt jeder so wirkende Mann Technit (τέχνιτης), das Erwirkte Technasma (τέχνασμα).*"
[143] Bötticher.
[144] Bötticher.
[145] Bötticher.
[146] Bötticher.

foster a stronger relationship between "invention and execution," which were not separate from one another for the ancients.[147] Another concept, "form," must also be understood in relation to its ancient origins. Bötticher refers to the concept of "form" within the process of "*tektonischen Bildungen*" (tectonic formations).[148] He develops a twofold reading to specify *Kunstform* and *Kernform* further:

> Tectonics, on the other hand, uses a material that has already become, originally formless, which can only be bounded, structured, and shaped from the outside: the entire structure is also composed of individual parts, each worked on separately. How the bounding of the material into form, as well as the gathering and unification of all individual parts into a whole, is made possible is irrelevant: it is only recognized that, in principle, nature and ancient art go hand in hand in shaping the form for the concept.[149]

Following his references to nature and ancient art, Bötticher distinguishes between the aforementioned two components of architectural form: the *Werkform* (work form) and the *Kunstform* (artistic form). The *Werkform* refers to the *Körperschema* (body schema), which involves functional and material aspects that must fulfill specific static and physical requirements. In contrast, the *Kunstform* includes every additional form given to the *Körperschema* that is not essential to its structural performance but is dependent on it. The *Kunstform* is primarily symbolic or representational and does not contribute to the building's physical support. The *Kunstform* depends on the discovery and imitation of existing aesthetics, while

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[147] Bötticher.

[148] This, and all other quotations from this text was translated by the author and corrrected with the help of online dictionaries. Bötticher.19. "*Hintsichtlich des Begriffes im Verhältnis zur Form findet das Gesagte auch volle Anwendung auf die künstlich geschaffenen, die tektonischen Bildungen: nur tritt hier an Stelle jener Urform des Keimes ein intellektuelles Urbild, welches von der Idee aus dem tektonischen Begriffe erst gefunden und nach ihm gestaltet ist."*

[149] Bötticher, 19.

"*Die Tektonik dagegen benutzt einen schon gewordenen, ursprünglich formlosen Stoff, der sich nur von Aussen her eingrenzen gliedern und formen lässt: auch wird das ganze Gebilde aus lauter einzelnen für sich gearbeiteten Thei-len zusämmengesetzt. Durch welche Manipulation die Eingrenzung des Werkstoffes zur Form, wie die Gewinnung und Vereinigung aller einzelnen Theile zum Ganzen ermöglicht wird, ist dafür gleichgültig: man erkennt nur wie in dem Grundsatze die Form für den Begriff zu bilden, Natur und alte Kunst Hand in Hand gehen."*

the *Werkform* emerges purely from the requirements of material performance and structural necessity, depending on the *Körperschema* that "moves within circles of mathematical corporealities."[150] The corporeal understanding of both forms is further elaborated in the book. For the "coreform/workform", in the section titled "*Werkform der Glieder* (Coreforms of elements)", in the 1874 edition, the first paragraph has a strong reference to bodies in nature and formation:

> Nature has everywhere used bodily form (*Körperlichen form*) as an organ in order to express, through it, the essence and concept of every organic entity in all its relationships. In this way, both in plants and in living creatures, the concept underlying their existence has appeared as an entirely identical image of itself in the bodily form of the material: this intimate interplay between concept and form can also be found in all things that have been able to develop undisturbed in their corporeality. From the form that has emerged, the concept can then be unmistakably recognized. But if such a structure always develops from an embryo or seed, then not only will its primal form already be prepared in all its parts, but it must also be fully organized according to the concept. While the structure goes through specific stages to reach the full development of its physical form, from the very moment of its development, nothing external can be added. The primal form must already contain all the microscopically smallest parts that are to appear in its completed state.[151]

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[150] Bötticher, 20.

[151] Bötticher, 18. "*Die Natur hat sich überall der körperlichen Form als Organ bedient, um in dieser das Wesen und den Begriff eines jeden organischen Gebildes nach allen Beziehungen auszusprechen. Auf solche Weise ist bei den Vegetabilien wie bei lebenden Geschöpfen, der ihrem Dasein zu Grunde liegende Begriff, als ganz identisches Abbild seiner selbst, in der körperlichen Form des Stoffes zur Erscheinung gelangt: auch findet man diesen innigen Wechselbezug zwischen dem Begriffe und der Form, bei allen welche sich ungestört in der Körperlichkeit haben entwikkeln können. Aus der gewordenen Form, kann der Begriff dann auch zweifellos erkannt werden. Entwikkelt sich aber ein solches Gebilde stets aus einem Embryo oder Kong Keime, dann wird in diesem nicht bloss seine Urform in allen Theilen bereits vorbereitet liegen, sondern auch schon dem Begriffe vollständig entsprechend organisirt sein müssen. Denn wohl geht das Gebilde bestimmte Stadien hin- durch um zur vollständigen Entfaltung seiner Körperform zu gelangen, in- dem aber von dem Augenblikke seiner Entwikkelung an, nicht das Mindeste von Aussen hinzutreten kann, muss die Urform schon mit allen mikroskopisch kleinsten Theilen versehen sein, die in der erreichten Vollendung zur Erscheinung kommen sollen.*"

In the section titled *Kunstform der Glieder* (Artforms of Elements) in the 1874 edition, Bötticher draws on Vitruvian definitions to articulate his understanding of *Kunstform*. He defines it as "a characterized cover clothed on its *Werkform*," emphasizing its symbolic and representational nature. [152] According to him, "all *Kunstform* could only move within the circle of reminiscences of perceived objects, which, must have existed, before the invention of the core-form."[153] He consolidates his distinction with the terms that ancients used: "that the ancients called the artistic form "*κόσμος*" (kosmos), "*ornamentum*," "*decoratio*," while the structural element is called "*membrum*."'"[154] This terminology is elaborated by Bötticher with reference to the emphasis of Viturivius on the same distinction: "for him the column, pillar, epistyle, beam, zophorus, and corona are members (*membra*), the capital, volute, cymation, abacus, plinth, astragal, torus, trochilus, and hypotrachelium are artistic forms of those elements, always "*ornamenta membrorum*" (ornaments of the members)."[155] This distinction, as summarized by Schwarzer, removes *Kunstform* from historical change, positioning it as a ahistorical element reflecting cultural relations.[156] He projects Vitruvian distinction onto his theory and structures the duality with static and pictorial references:

> the schemata of all bodies and body systems, which remain confined within the realm of static performance like those of *Werkformen* (work-forms), can be found abstractly and mathematically from this performance: all purely pictorial comparisons, on the other hand, as they are meant to be allegorically expressed by *Kunstformen* (art-forms), are only made possible through pre-existing models that allow such a comparison.[157]

In addition to his dual definition of *Werkform* and *Kunstform*, Bötticher argues that architecture shares "common roots" with the arts of sculpture and painting. As a

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[152] Bötticher, 25.
[153] Bötticher.
[154] Bötticher, 31.
[155] Bötticher.
[156] Schwarzer, 1993, 278.
[157] Bötticher.

result, the methods of architectural creation draw on similar representational strategies. According to him:

> The only way in which the two fine arts can express ideas is by applying the metaphorical method of pictorial language, in which pictorial signs or artistic symbols take the place of the idea. Pictorial art cannot represent an idea as such but must represent it through a symbol and thus embody it. Architecture follows the same method. It takes its symbols and art-forms only from those natural objects that embody an idea analogous to the one inherent in the members of the architectural system. Therefore, an idea for which no analogue exists in the external world cannot be represented by pictorial art nor for that matter by architecture. The essence of pictorial art and its relation to nature rests in this interaction between concept and object, between invention and imitation.[158]

Bötticher's emphasis on the interaction between concept and object, as well as between invention and imitation, can be seen as a core theoretical stance not only within his own work but also in the broader context of modern architectural historiography. Mitchell Schwarzer highlights this significance, noting that Bötticher's theory marked a shift away from classical aesthetics grounded in imitation, toward a new epistemological framework that distinguishes between ontology and representation, constituting a conceptual division that has been fundamental to the development of modern architectural thought over the past two centuries.[159] As he points out, architectural theorists have long recognized the distinctions between structure and ornament; however, no one has explored these distinctions within a new aesthetic framework. Therefore, Bötticher's association of structure and ornament with ontology and representation was a novel contribution to architectural thinking.[160] As Schwarzer states: "The artistic system, described by

[158] Bötticher, 163.
[159] Schwarzer, 1993.
[160] Schwarzer.

Bötticher as *Kunstformen* (art forms), was to be understood as the representational language of *Werkformen* (structural members)."[161]

In this system, *Kunstform* does not simply embellish structure but expresses it symbolically, making visible the static forces at work in the building. Schwarzer offers compelling examples from Bötticher's own writing, such as the classical cymatium, which makes the structural conflict between the cornice and the roof's weight visually legible (Figure 2.15). [162] This logic of articulation links directly to Schinkel's influence, whose *Lehrbuch* had already proposed that decoration should not obscure form but emerge from within it, which he called "the embodiment of tectonic systems, the raising of architecture to art." [163]

Schwarzer's interpretation affirms how "Bötticher's *Kunstform* intricately mirrors the external relations, qualities, and conceptual relations of its *Werkform*. This mirroring is not superficial but deeply integrated, with Bötticher aspiring to a "philosophical *Architektonik*" combining the "meaning and unity of mechanical processes and natural forces through artistic symbols and tectonics, [struggling] to create an integrative system for art and structure within architecture."[164] This approach is far from the misguided inclusions of the term "tectonics" as well as "modern". According to his theory, "new varieties of *Werkform* emerge, as building needs change according to cultural demands and new technological and material possibilities become available."[165] Schwarzer summarizes Bötticher's spatial tectonics with an emphasis on the necessity of being both creative and practical. He states that architectural design does not proceed by formal imitation. He continues:

[161] Schwarzer, 273.
[162] Schwarzer, 69.
[163] Schwarzer, 276.
[164] Schwarzer, 273.
[165] Schwarzer, 273.

“The problem for the architect is not to replicate historical models but to determine the operations of a building's reason itself.”[166]

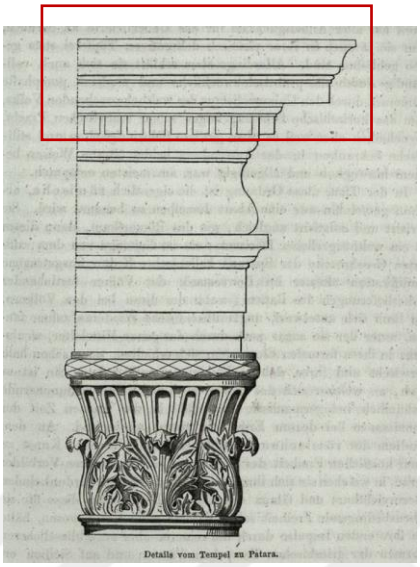


Figure 2.16 Image from "Der Stil in den technischen und tektonischen Künsten, oder, Praktische Aesthetik : ein Handbuch für Techniker, Künstler und Kunstfreunde" (1860).

Overall, Bötticher offers a lens through which architectural elements develop in response to both *Kernform* and *Kunstform*. His concept of *Tektonik* goes beyond construction to embrace a theoretical and aesthetic dimension, influencing later architectural interpretations. In emphasizing *Bildung* as a process of formation and transformation, Bötticher’s theory is especially relevant to this study. His conception of *Tektonik* highlights how structural necessity and artistic expression are not opposites but co-constitutive forces, constituting an understanding that aligns closely with the architectural logic of *Bildung* proposed in this thesis.

[166] Schwarzer, 276.

Gottfried Semper and Art-scheme and Core-scheme (*Kunstschema and Coreschema/Strukturschema*)



Figure 2.17 Antike Gläser, Plate XVI. Source: Gottfried Semper, *Der Stil in den technischen und tektonischen Künsten, oder, Praktische Ästhetik*, vol. 1 (Frankfurt am Main: Verlag für Kunst und Wissenschaft, 1860–1863), Tafel XVI. Courtesy of Universitätsbibliothek Heidelberg, https://doi.org/10.11588/diglit.9507.

Figure 2.16 shows the last plate from Gottfried Semper's study of historical materials and ornamentation, which illustrates fragments and forms of ancient glass while emphasizing color, texture, and artisanal technique as part of his broader inquiry into material culture and the origins of form. This focus is closely tied to the influence of Bötticher's definitions of *Kunstform* and *Werkform* (artform and coreform), which informed Semper's development of tectonic theory. Following a similar thread as

Bötticher, Semper introduced a series of new concepts and ideas. As Wolfgang Hermann states, Semper studied Bötticher's book and recorded several quotations in his own notes. Under the heading "On Bötticher's *Tektonik*," he extracted a sentence by Bötticher that defines artform as "the characterization by which the mechanical-statical function is made apparent" and coreform as "mechanically necessary and statically functional."[167] Semper understands this double as the representational and ontological aspects of tectonic form, which are related to symbolic and technical aspects. Kenneth Frampton explains that Semper differentiates between the symbolic and technical dimensions of construction, a distinction that Frampton associates with the representational and ontological aspects of tectonic form. In Semper's view, the "skin" of a building reflects its symbolic function, while the "core" expresses structural and material essence.

Moving forward from these symbolic and ontological distinctions, Semper's own classification system grounds architecture in material technologies. His theory categorizes the fundamental elements of building based on their physical properties and cultural roles. This duality becomes especially clear in his classification of building elements: components like earthwork, framing, and roofing belong to the building's ontological base, whereas the hearth and infill walls serve more symbolic or representational roles. [168] At the same time, Semper acknowledges a fundamental ambiguity between these aspects. Frampton emphasizes this tension, describing how each architectural "formation" emerges from distinct yet interdependent conditions. In this way, Semper's framework departs from Bötticher's stricter functionalism, yet still extends it through a more dialectical and integrated logic:

> Unlike Semper, who insisted upon the inseparability of structure and art in the historical development of architecture, Bötticher claimed that the essence

[167] Wolfgang Herrmann, *Gottfried Semper: In Search of Architecture* (Cambridge, MA: MIT Press, 1984), 141.
[168] Frampton, 16.

> of the *Werkform* is to be found in constructive performance and not in historical imitation.[169]

Semper adopted a related set of terms: *Kunstschema* and *Kernschema* (Art-scheme and Core-scheme), which build on Bötticher's earlier duality.[170] However, Semper redefined this pairing. While Bötticher treated the *coreform* as primarily structural and the *artform* as ornamental, Semper proposed a more integrated relationship. For him, the *Kernschema* included not only structure but also the underlying principles of material behavior. The *Kunstschema*, meanwhile, expressed the aesthetic potential that emerged from these material logics. Rather than maintaining a clear separation between structure and ornament, Semper emphasized how artistic and technical aspects evolved together through shared processes of material formation. Semper also extracted and commented on Bötticher's "Excursus on Implements," which explores the distinction between tools and monuments. He dwells on "the fundamental difference between implement (*process*) and monument, which consisted in the mobility of the one and the stability of the other, two qualities that had to be given formal expression."[171] While both thinkers emphasized formation processes, they differed in their emphasis. Semper believed that materials and motifs evolve over time. As materials shift, he argued, older forms are often carried over into new one, albeit transformed, creating continuity in artistic development from ancient times into the modern era.[172]

As Schwarzer states, Semper defines tectonics as "the production of cultural memory through material/technological metamorphosis".[173] Therefore, Semper's tectonic discourse includes a certain epistemological relation as well as its contribution to the physical aspects of architectural formation. According to him, the evolving forms

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[169] Schwarzer, 1993, 278.
[170] Gottfried Semper, *Der Stil in den technischen und tektonischen Künsten, oder praktische Ästhetik*, vol. 1 (Frankfurt am Main: Verlag für Kunst und Wissenschaft, 1860), 444.
[171] Hermann, 145.
[172] Hermann, 149.
[173] Schwarzer, 2017, 198.

carry forward varying aspects that are hermeneutically re-casted from historical "styles" through the act of architectural thinking. This could be further elaborated through his four-part conceptual definition and the preconditions of architectural knowledge and form. This definition offers not just a physical division of architectural construction based on elements and materials but also a conceptual division of architectural formation grounded in knowledge and time. Accordingly, he organizes architectural knowledge around four primary material categories—textiles, ceramics, masonry, and wood—each corresponding to both historical function and technical process. These four fundamental elements are linked to both historical periods and architectural material technologies: "textiles, representing enclosure", "ceramics are associated with the hearth, masonry forms the mound or foundation, and wood encompasses carpentry, roofing, and tectonic construction.[174] These categories were also based on the properties of materials and their uses for technical purposes. He explains them as follows:

> 1)flexible materials, which are highly resistant and suitable for bearing loads;
> 2)soft, malleable substances that can take various shapes but retain their form once hardened;
> 3)rod-shaped, elastic materials that are primarily relative in nature;
> 4)and solid materials characterized by a dense aggregate state that resist crushing and buckling.[175]

One of the categories, "textiles," is especially significant to Semper since, according to him, textile is the "*Urkunst*" and "*Urbild*," or the origin, the root-art, which is considered as the tectonic influence for architectural form and formation. Textile as "*Urkunst*" reveals another keyword that Semper emphasizes: "joint." "Joint" is referred to as "*Körperbilden*" by Semper, which is closely related to the "formation" of structural members. In English translation, it means body-form, which stands for

[174] Semper,198.
[175] Semper.

the formal totality within the architectural "body". Learning from textile knot, Semper conceptualizes “joint” as the essence of architecture:

> Semper's emphasis on the joint implies that a fundamental syntactical transition is expressed as one passes from the stereotomic base of a building to its tectonic frame and that such transitions are of the very essence of architecture.[176]

Semper’s theoretical framework, and particularly his interpretation of tectonic form, is more fully developed in his major work *Der Stil in den technischen und tektonischen Künsten oder praktische Ästhetik* (“The Style in the Technical and Tectonic Arts or Practical Aesthetics”), which was published in two volumes, each divided into distinct sections.

The first volume, *Die textile Kunst, für sich betrachtet und in Beziehung zur Baukunst* (“Textile Art, Considered in Itself and in Relation to Architecture”), was published in 1860. In this work, Semper explores the role of textiles as the *Urkunst*, or the origin art, laying the groundwork for his theory of tectonics, where construction and design are intertwined through the art of joining materials. The second volume is *Keramik, Tektonik, Stereotomie, Metallotechnik: für sich betrachtet und in Beziehung zur Baukunst* (“Ceramics, Tectonics, Stereotomy, Metallotechnics: Considered in Themselves and in Relation to Architecture”).[177] This volume expands his exploration to other material arts, such as ceramics, woodwork, and stone cutting, further developing his idea that architectural form is closely connected to material technology and craftsmanship.
The introduction of the second volume largely revolves around Vitruvian terms. Semper expands these terms to include Hübsch’s concept of "*Bildungsmomenten*," which parallels his use of "*Gestaltungsmomenten*," highlighting the significance of

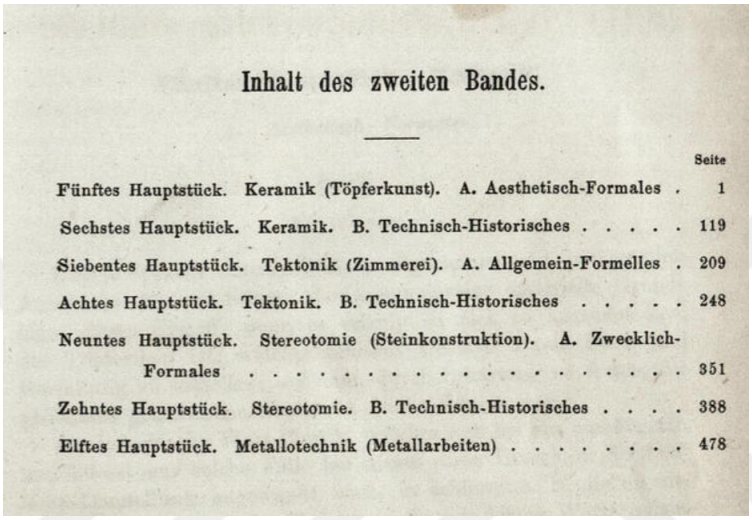
[176] Frampton, 86.
[177] The direct translation of Baukunst into English is “building-art”, however, its translation as “architecture” carries parts particular significance in the context of Semper’s work.

formation and form in architectural theory. In his theory, Semper employs clear categories that correspond with each other to define complex relationships for understanding architectural form and formation processes. These categories are defined within the duality of the strands of artform and coreform. These conceptual strands, especially with Semper's emphasis on the expressive capacities of material, culminate in his *Bekleidungstheorie*, or theory of cladding, which redefines the decorative not as superficial but as structurally and culturally integral. In the book, he also dwells on the theory of "*Bekleidung*," or dressing. After giving a developmental history of art's primeval artistic motives, having their genesis for the most part in primitive arts such as textiles and ceramics, the book presents the *Bekleidungstheorie* and its importance to classical architecture.[178] Hermann notes that while Semper was developing his theory of cladding (*Bekleidungstheorie*), he was unaware of Bötticher's work at that time. With "*Vergleichende Baulehre*", he discovered the power of "the carpet in its capacity as protecting wall had... on the evolution of certain architectural forms."[179] However, "to his surprise that he could not find any authority to refer to for support that the carpet-wall plays an important role in the history of art."[180]

In the second volume of *Der Stil in den technischen und tektonischen Künsten,* Semper discusses *Keramik*, *Tektonik*, and *Stereotomie*, organizing each category into two parts with aesthetic-formal and technical-historical aspects (Figure 2.18). The volume opens with *Keramik,* examining its aesthetic and formal attributes (*Aesthetisch-Formales*), followed by the historical and technical aspects (*Technisch-Historisches*). Similarly, *Tektonik* is divided into a general-formal overview (*Allgemein-Formelles*) and a technical-historical overview (*Technisch-Historisches*). The section on *Stereotomie* (construction with stone) mirrors this layout, first exploring functional-formal components (*Zwecklich-Formales*) and then

[178] Mallgrave & Ikonomou 32.
[179] Hermann, 140.
[180] Hermann, 140.

providing a technical-historical assessment (*Technisch-Historisches*) (Figure 2.17). The concluding part, *Metallotechnik*, addresses metalwork in a similar manner. In this structure, Semper adheres to the dual framework of tectonic theory, emphasizing the relationship between *Kernform* and *Kunstform* and linking it to his method of analysis across various materials and construction techniques.



Inhalt des zweiten Bandes.

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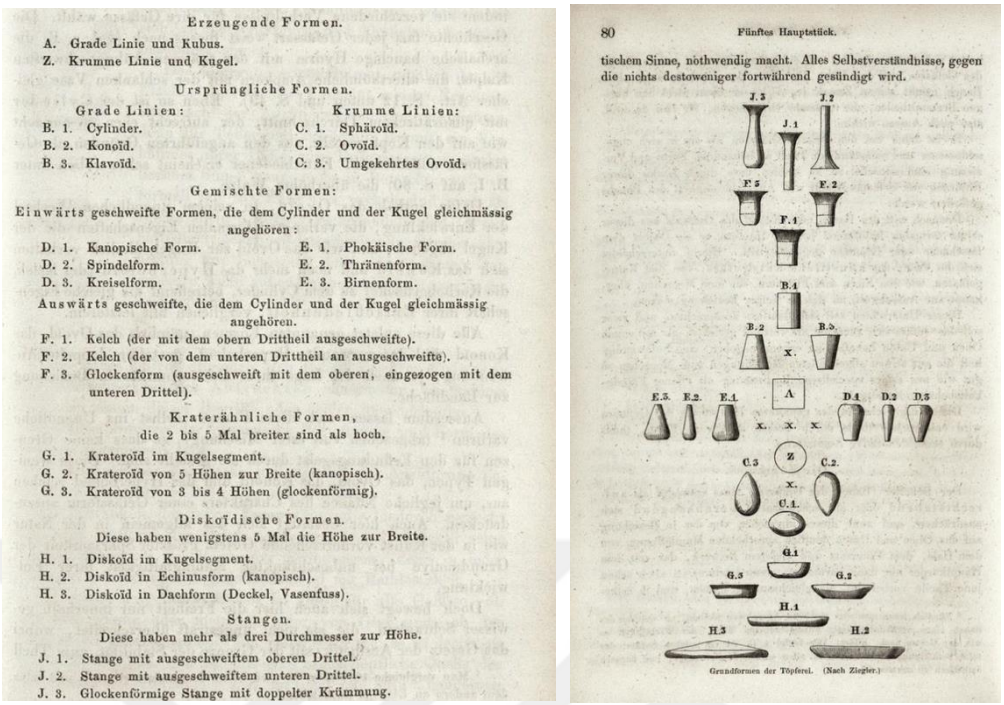
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Figure 2.18 Table of contents from volume two of Gottfried Semper's *Der Stil in den technischen und tektonischen Künsten, oder praktische Ästhetik*.
Source: Gottfried Semper, *Der Stil*, vol. 2 (Munich: Friedrich Bruckmann, 1863).

The categorization of forms in Semper's theory within the *Keramik* chapter in Semper's theory resembles Schinkel's idea of *Grundformen*. Semper defines forms of vessels with various classifications, such as *erzeugende Formen* (generative forms), *ursprüngliche Formen* (original forms), *gemischte Formen* (mixed forms), *Kraterähnliche Formen* (crater-like forms), *Diskoïdische Formen* (disk-shaped forms), and *Stangen* (rod forms (Figure 2.18). Although the reference is not architectural, the form categories defined for vessels focus more on the limiting figures of forms that hint at a process of abstraction, similar to Schinkel's *Grundformen* defined for architectural forms.



Erzeugende Formen.

A. Grade Linie und Kubus.
Z. Krumme Linie und Kugel.

Ursprüngliche Formen.

Grade Linien:	Krumme Linien:
B. 1. Cylinder.	C. 1. Sphäroïd.
B. 2. Konoïd.	C. 2. Ovoïd.
B. 3. Klavoïd.	C. 3. Umgekehrtes Ovoïd.

Gemischte Formen:

Einwärts geschweifte Formen, die dem Cylinder und der Kugel gleichmässig angehören:

D. 1. Kanopische Form.	E. 1. Phokäische Form.
D. 2. Spindelform.	E. 2. Thränenform.
D. 3. Kreiselform.	E. 3. Birnenform.

Auswärts geschweifte, die dem Cylinder und der Kugel gleichmässig angehören.

F. 1. Kelch (der mit dem obern Drittheil ausgeschweifte).
F. 2. Kelch (der von dem unteren Drittheil an ausgeschweifte).
F. 3. Glockenform (ausgeschweift mit dem oberen, eingezogen mit dem unteren Drittel).

Kraterähnliche Formen, die 2 bis 5 Mal breiter sind als hoch.

G. 1. Krateroïd im Kugelsegment.
G. 2. Krateroïd von 5 Höhen zur Breite (kanopisch).
G. 3. Krateroïd von 3 bis 4 Höhen (glockenförmig).

Diskoïdische Formen. Diese haben wenigstens 5 Mal die Höhe zur Breite.

H. 1. Diskoïd im Kugelsegment.
H. 2. Diskoïd in Echinusform (kanopisch).
H. 3. Diskoïd in Dachform (Deckel, Vasenfuss).

Stangen. Diese haben mehr als drei Durchmesser zur Höhe.

J. 1. Stange mit ausgeschweiftem oberen Drittel.
J. 2. Stange mit ausgeschweiftem unteren Drittel.
J. 3. Glockenförmige Stange mit doppelter Krümmung.

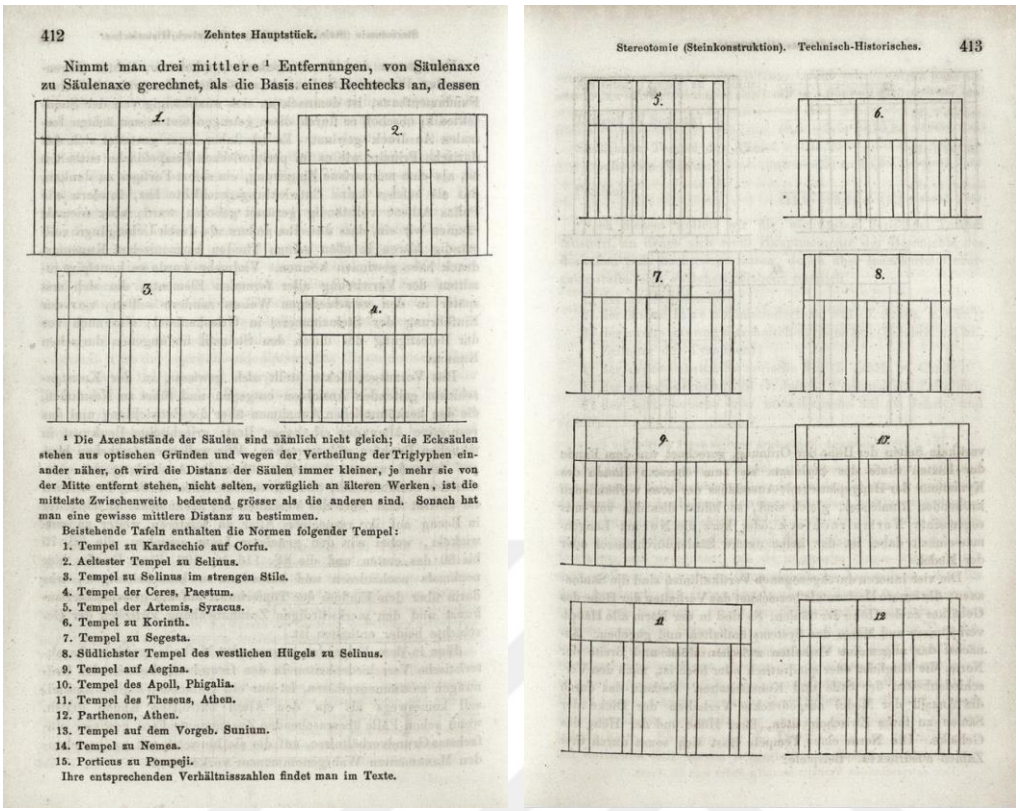
tischem Sinne, nothwendig macht. Alles Selbstverständnisse, gegen die nichts destoweniger fortwährend gesündigt wird.

Grundformen der Töpferei. (Nach Ziegler.)

Figure 2.19 Illustrations from Gottfried Semper's *Der Stil* demonstrating his material and formal analysis. Gottfried Semper, *Der Stil in den technischen und tektonischen Künsten, oder praktische Ästhetik*, vols. 1–2 (Munich: Friedrich Bruckmann, 1860–63).

The aesthetic section of the *Keramik* chapter offers a detailed inventory of forms and their components. This is followed by a historical section that outlines the formation processes behind them. (Figure 2.18). Semper defines tectonics as *Formensprache* (formal language), and the inventories represent this language. Following that, the categorization of forms is reiterated in another chapter where the tectonic formations of existing temples are depicted with abstract drawings (Figure 2.19).[181]

[181] Similar understandings across temporal layers: See Jean-Nicolas-Louis Durand, *Précis des leçons d'architecture données à l'École polytechnique* (Paris: Chez l'Auteur, 1802–1805); and Colin Rowe, "The Mathematics of the Ideal Villa," in *The Mathematics of the Ideal Villa and Other Essays* (Cambridge, MA: MIT Press, 1976), 1–28.



412 Zehntes Hauptstück.

Nimmt man drei mittlere[1] Entfernungen, von Säulenaxe zu Säulenaxe gerechnet, als die Basis eines Rechtecks an, dessen

1. 2. 3. 4.

[1] Die Axenabstände der Säulen sind nämlich nicht gleich; die Ecksäulen stehen aus optischen Gründen und wegen der Vertheilung der Triglyphen einander näher, oft wird die Distanz der Säulen immer kleiner, je mehr sie von der Mitte entfernt stehen, nicht selten, vorzüglich an älteren Werken, ist die mittelste Zwischenweite bedeutend grösser als die anderen sind. Sonach hat man eine gewisse mittlere Distanz zu bestimmen.

Beistehende Tafeln enthalten die Normen folgender Tempel:

1. Tempel zu Kardacchio auf Corfu.
2. Aeltester Tempel zu Selinus.
3. Tempel zu Selinus im strengen Stile.
4. Tempel der Ceres, Paestum.
5. Tempel der Artemis, Syracus.
6. Tempel zu Korinth.
7. Tempel zu Segesta.
8. Südlichster Tempel des westlichen Hügels zu Selinus.
9. Tempel auf Aegina.
10. Tempel des Apoll, Phigalia.
11. Tempel des Theseus, Athen.
12. Parthenon, Athen.
13. Tempel auf dem Vorgeb. Sunium.
14. Tempel zu Nemea.
15. Porticus zu Pompeji.

Ihre entsprechenden Verhältnisszahlen findet man im Texte.

Stereotomie (Steinkonstruktion). Technisch-Historisches. 413

5. 6. 7. 8. 9. 10. 11. 12.

Figure 2.20 Illustrations from Gottfried Semper's *Der Stil* demonstrating his material and formal analysis. Gottfried Semper, *Der Stil in den technischen und tektonischen Künsten, oder praktische Ästhetik*, vols. 1–2 (Munich: Friedrich Bruckmann, 1860–63).

While *Der Stil* provides a comprehensive framework for Semper's mature tectonic theory, many of its foundational concepts were first articulated in his earlier work, *Die vier Elemente der Baukunst* (The Four Elements of Architecture), published in 1851. In this earlier text, Semper's division of architecture into the four material elements of textiles, ceramics, masonry, and wood forms the basis of an essential tectonic framework. However, the book offers significantly more than just this typological scheme, engaging with broader theoretical questions about material, form, and the evolution of architectural expression. This framework laid the groundwork for his future writings on style and tectonics. A detailed look at the book's structure reveals significant connections and elaborations in the tectonic elements of Semper's theories. The volume introduces the theoretical foundation of style in relation to textile arts, materials, techniques, and cultural-historical

development. It includes chapters on raw materials (e.g., leather, rubber, wool), fabrication techniques (e.g., weaving, dyeing, embroidery), and the principle of cladding (*Bekleidungsprinzip*), concluding with comparative studies across ancient and non-Western cultures.

The overall text is primarily interpretative, featuring small diagrams and concluding with detailed textures in the tables at the end. In the first part, he discusses the relationships and distinctions between theories, emphasizing the connections among *Kunstlehre* (the theory/teaching of art), *Stillehre* (the theory of style), and *Schönheitslehre* (the theory of beauty). According to him:

> The empirical theory of art (Kunstlehre) is not merely pure aesthetics or an abstract theory of beauty. The latter considers form in itself; for it, beauty arises from the interaction of individual forms, creating a total effect that satisfies and delights our artistic sense. Therefore, all aesthetic properties of formal beauty are of a collective nature, such as harmony, eurhythmia, proportion, and symmetry. In contrast, the theory of style (Stillehre) comprehensively considers beauty as a product or result, not merely as a sum or series. It seeks the components of form that are not forms themselves but rather idea, force, material, and means; essentially, the prerequisites and fundamental conditions of form.[182]

While Semper framed his contributions under the title of 'style,' his architectural philosophy ultimately redefines style as a structural and cultural operation, one deeply aligned with tectonic thinking. Semper does not view style as a static, decorative attribute but as an intrinsic part of architecture's process of "becoming." Semper defines style as "the uniform result or junction of several variable values that unite in certain combinations and form the coefficients of a general equation; by giving these variables the values appropriate to the particular case, one will arrive at the solution of the problem: U = C(x,y,z,t,v,w. . . .)"[183] Though Semper defines

[182] Semper, iv.
[183] Semper, iv.

style as almost a mathematical function, his definition also refers to the linguistic roots of the term. Hermann translated Semper's words as follows:

> The word "style" originally signified a stylus, an instrument with which one impressed letters on wax tablets; later the term was used to convey the quality of the manner of writing in general. We have adopted the word together with its meaning. In Italy at the time of Petrarch, "style" was taken to mean a crayon for drawing or an instrument for artists; since we owe much of our artistic vocabulary to the Italians, we took over from them the application of the word to certain qualities of artistic representation whereby, however, an ever-increasing vagueness and confusion crept in.[184]

Semper emphasizes the core of the term style, highlighting its instrumentality, which varies according to the tools and themes of artistic representation. This indicates a strong connection with the definition of tectonics. The focus on style, attributing "artistic significance to the basic theme and to all intrinsic and extrinsic coefficients," intersects with the philosophy of tectonics.[185] In this regard, although the title of Semper's famous work begins with "stil," the discussion in this thesis is based on the "tectonic theory" in this research. However, it is necessary to indicate that according to Hermann, "…tectonics and analogy did not originally belong in Semper's terminology; these words appeared in his writings only after he became acquainted with Bötticher's book. From then on, the idea of "tectonics" played an especially important role in his aesthetic system."[186]

Hermann also refers to Semper's London years when he worked on "*Theorie des Formell-Schönen*." Semper's later unpublished writings, particularly as translated and contextualized by Wolfgang Hermann, offer deeper insight into how these foundational ideas matured. These manuscripts, including *Vergleichende Baulehre* ("Comparative Building Theory") and *Theorie des Formell-Schönen* ("Theory of Formal Beauty"), develop the notion of architecture as a process of formation, where tectonic elements evolve through material forces and

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[184] Hermann, 243.
[185] Hermann, 243.
[186] Hermann, 150.

cultural practices. [187] According to Semper, "architecture creates original formations," as he states under the title of "Essence of True Theory of Building." These formations are not bound to "fully finished natural forms," but they "evolved historically according to natural laws".[188] At some point, these formations have been fixed. However, they still retain their natural developmental relations. Semper also develops the concept of formation in his "*Theorie des Formell-Schönen*" by exemplifying and theorizing the art historical evolutionary process. According to him, in Hermann's words, there are three phases:

> He identified three phases: first, the transition into an amorphous state; second, the preparation for a new formation; and finally, the sudden crystallization into a new formation. The first phase was that of the violent destruction of art systems, which then often crumbled into several systems; the second phase, the fermentation before the rise of a new system, was so imperceptible that it was difficult to detect the borderline between the two phases; and the appearance of the third phase, "the third moment in the process of becoming," was still an unexplored mystery.[189]

Semper underlines natural formation processes and becomings within his *Theorie des Formell-Schönen.* Hermann's translation of Gottfried Semper's emphasis on processes of formation referring to "*Thierbildungen*" (animal formations) and "*Pflanzenbildungen*" (plant formations) as metaphors for the processes of formation and growth in both natural and architectural contexts. By highlighting these terms, Hermann captures Semper's focus on how structures are not static but constantly "becoming" through their interaction with both material and spatial forces. Semper distinguishes the "theory of building" and "theory of architecture".[190] His projection of understanding the *process of becoming* through the theory of building leads to a more dynamic and analytical approach to architectural theory, as opposed to the

[187] Hermann's translation reveals an intriguing nuance in his choice of terms, particularly in how he alternates between "formation" and "building," suggesting a conceptual overlap.
[188] Hermann, 193.
[189] Hermann, 162.
[190] Hermann, 259.

more static and historically focused theory of architecture.[191] These relations apparently affect the ways of making, which Semper classifies into three groups of actors for "contemporary architecture": the historians, the aestheticians, and the materialists.[192] Each category reflects a distinct emphasis in architectural knowledge production and making processes that can be expanded. The historians focus on the chronological and stylistic development of forms, the aestheticians prioritize formal and symbolic qualities, and the materialists center their approach around constructional techniques and material processes.

For Semper, Bötticher's *Artform* and *Coreform,* filtered through the lens of materiality, provided a more intertwined -or sometimes not- definition of *Artschema* and *Coreschema*. Outside of this, Semper made significant theoretical introductions within the tectonic debate. Semper's books, which further elaborate the dual strands of *Kernform* and *Kunstform* and their relationship, illuminate Semper's vision of architecture as an evolving process. By this view, materials and construction techniques are integral to the cultural and historical narratives that define architectural forms. Semper, along with the other aforementioned theorists, contributed to a rich intellectual foundation where architecture and philosophy intersect, allowing for the expansion of multiple definitions of form that continue to shape both disciplines.

Learning from Artform and Coreform: "Form" and Doubles of Aesthetic Philosophy

"Form" in the nineteenth century encompassed a variety of sub-definitions that provided a generative foundation for architectural theory. As Mallgrave and

[191] This distinction is intriguing when considered alongside the current connotations of "building" and "architecture." Currently, while "architecture" suggests a more process-oriented and evolving meaning, "building" often carries a more static implication. This contrast can be examined through the lens of conceptual history and how these terms have been interpreted over time.
[192] Hermann, 254.

Ikonomou state, contrary to conventions, architectural theories were highly influential for philosophers during this period. These philosophers discussed their ideas in relation to the architectural theories of Karl Bötticher and Gottfried Semper and these interactions are not sufficiently appreciated. In the introduction of the book "Empathy, Form and Space: Problems in German Aesthetics" they explain this as follows:

> In response to the crisis (of historicism in 19th century), architects - from Karl Friedrich Schinkel to Gottfried Semper, from Karl Botticher to Hermann Muthesius - began to seek intellectual guidance and succor from nontraditional sources in a way that had never been done before… What is doubly interesting and less known in this regard is the intellectual sustenance that aestheticians and art historians imbibed from this very same line of architectural theory. These fruitful interactions between aesthetic thought and the practice of architecture have not been sufficiently appreciated. More generally, the decade of the 1880s can be viewed as the vibrant crossover point between nineteenth-century aesthetic tendencies and twentieth-century visions of abstract art and architecture.[193]

These theories influenced thinkers such as Conrad Fiedler, Adolf Hildebrand, and Adolf Göller, and Heinrich Wölfflin. Harry Francis Mallgrave and Eleftherios Ikonomou's book presents a deep insight on this influence. It includes translations of the works by Robert Vischer, Conrad Fiedler, Heinrich Wölfflin, Adolf Göller, Adolf Hildebrand and August Schmarsow. It is a significant source in this regard; interesting parallels between the terms introduced by these scholars will be emphasized here to understand expanded and varied definitions of form. These parallels present reflexive strands of concepts that share a similar reference system: perceptual versus conceptual experience, visual and kinesthetic perception, inherent form versus effective form, and distant and near view.[194] By referring to the hermeneutic aspects of creation, perception within philosophy is defined in the same strands. In this section, theories of form within aesthetic philosophy are explained.

[193] Mallgrave and Ikonomou, 1994, 3.
[194] Mallgrave and Ikonomou, 3.

The emphasis is on the binary terms that differ with changing form and perception relations.

One significant point about focusing on the aesthetic philosophy within the German-speaking discourse is the language itself. As Mallgrave and Ikonomou underline, "certain crucial German words (such as *Vorstellung* (*presentation, performance, imagination, idea*) and its relentless conceptual permutations) simply have no English equivalent and, in fact, have an ambiguous philological history in German."[195] Another significant point about the focus being especially on the nineteenth-century aesthetic philosophy is the curiosity regarding "on the human mind and its various modes of conscious and unconscious activity", which allows a generative ground for ways of making.[196] These philosophical curiosities reflect a Kantian understanding of art and imagination:

> Kant also stressed the role of the imagination in this aesthetic process. In this scheme, art is doubly creative: first, in the sense that the artist creates forms, lines, and planes in a sensuous medium and, second, in the sense that the person experiencing the work of art structures these sensations as forms. Art differs from nature in that it is a "making," a free production; it promotes, says Kant, "the culture of the mental powers" in a way science or the handicrafts cannot.[197]

As the strands of Kantian theories branch within the multiple interactions between architecture and aesthetic philosophy, a similar condition could be assumed for the twentieth-century ideas in a retroactive approach. Mallgrave and Ikonomou state that "If we trace the ideas (concepts in twentieth century focusing on form and space) back through their philosophical development, we find that the issues of form and space can just as well be viewed preeminently as nineteenth-century aesthetic problems"[198]. The multiple definitions of forms reveal a twofold and reflexive

[195] Mallgrave and Ikonomou.
[196] Mallgrave and Ikonomou, 6.
[197] Mallgrave and Ikonomou, 6.
[198] Mallgrave and Ikonomou, 1.

translation that can be re-interpreted and reclaimed to understand within today's ways of making(s).

One of the theories that follows a twofold structure on form and perception with a twofold structure belongs to philosopher and aesthetician Robert Vischer (1847–1933). According to him, "forms are never empty or reducible to mathematical ratios, for they always display the emotional drama that the perceiver brings to the process."[199] He states that the act of scanning is more conscious than seeing, and "it sets out to analyze the forms dialectically (by separating and reconnecting the elements) and to bring them into a mechanical relationship."[200]Accordingly, he differentiates two types of perception: "sensory stimulation [as] the immediate sensation [*Zuempfindung*] and that of motor stimulation [as] the responsive sensation [*Nachempfindung*], and the latter must follow from the former."[201] Situating form in between the processes of **immediate perception** and **responsive imagination**, Vischer suggests another parallel double structure that could be followed within the other thinker's reflections on form:

> If we now compare imagination and perception as they relate to the character of the image, the former, as a substitute for the real presence of the latter, manifests the inner freedom of undisturbed, unlimited concentration. The imagination lacks the clarity of reality but also its illusions. The form becomes, so to speak, clarified-spiritualized by being internal. This independence from the narrow constraints of reality, on the other hand, may also make the material stimulus doubly effective.[202]

Another thinker, German art theorist and philosopher Conrad Fiedler (1841–1895), was also affected by Semper's theories and especially his work *Der Stil*. Fiedler highlights Semper's "*Bekleidung*" ("dressing") thesis and his definition of

[199] Vischer, Mallgrave and Ikonomou (trans.), 94.
[200] Mallgrave and Ikonomou, 94.
[201] Mallgrave and Ikonomou, 94.
[202] Mallgrave and Ikonomou, 101-102.

architectural form as an intellectual process.[203] Fiedler states that the "dressing" thesis introduces "a dematerialization of form, that is, its animation with symbolic or ideal (human) content."[204] He further states: "The denial of reality, of the material, is necessary if form is to emerge as a meaningful symbol, as an autonomous creation of man."[205]

Referring to Semper's theories, Fiedler also suggests that the creation of form is a continuous, autonomous, and changing thinking process. According to him:

> Creation of form must be imagined as a thought process in which the architectural forms themselves are the content. The course of this process may be recognized by the way in which, as the form changes, the material and the construction progressively disappear while the form, which is a thing of the mind, develops an increasingly autonomous existence. Architectural thinking is not merely invention and combination; nor is it a forming and designing in accordance with prescribed laws; rather, it is a process that is a law unto itself.[206]

Conrad Fiedler's theory expands the idea of form in terms of creation processes by proposing categories of cognitive experiences. He dwells on the different interactions with "reality", and how we experience form. He refers to the distinction between perceptual and conceptual experience. According to Fiedler, we engage with reality through two distinct modes of experience: **perceptual cognition**, which is rooted primarily in visual observation, and **conceptual cognition**, which emerges through abstraction and the systematic organization of perceptual information.[207]

Similar to his contemporary and friend Fiedler, philosopher **A**dolf Hildebrand (1847–1921) presents dualities in between **visual and kinesthetic perception** and

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[203] Fiedler, Mallgrave and Ikonomou (trans.), 129.
[204] Mallgrave and Ikonomou, 103.
[205] Mallgrave and Ikonomou, 103.
[206] Mallgrave and Ikonomou, 130.
[207] Mallgrave and Ikonomou, 20.

inherent form and **effective form**. These definitions are directly related to Hildebrand's understanding of seeing and scanning. He says:

> Now seeing becomes scanning, and the resulting ideas are not visual [*Gesichtsvorstellungen*] but kinesthetic [*Bewegungsvorstellungen*]; they supply the material for an abstract vision and idea of form. These two extremes of visual activity are actually two different modes of seeing. The image received by the viewing eye at rest expresses three dimensionality only by surface signs through which coexisting elements are simultaneously apprehended. At the other extreme, the eye's mobility enables it to scan a three-dimensional object directly from a close vantage point and to transform the perception into a temporal sequence of images. All modes of perception between these extremes.[208]

Hildebrand states that "everything depends on reciprocity", which can result in various conditions of perception as well as creation.[209] According to him, in visual perception, the eye takes a "**distant view**," while kinesthetic perception relates to a "**near view**."[210] These changes in position transform the two- and three-dimensional formation of the perceived object. Accordingly, he posits another distinction in between "inherent form" and "effective form" and describes an antinomy that mirrors Fiedler's distinction between conceptual and perceptual modes of experience. He defines inherent form as the mathematically measurable and stable aspect of natural forms, or an abstract value that remains constant regardless of its environment. In contrast, effective form is defined as the way a form is perceived within a given context, shaped by variables such as light, shadow, color, and the presence of surrounding elements, making it relative and changeable.[211]

Hildebrand states that visual ideas of form derive from two-dimensional content: lines and surfaces. The three-dimensional imagination derives from abstract

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[208] Hildebrand, Mallgrave and Ikonomou (trans.), 229.
[209] Mallgrave and Ikonomou, 230.
[210] Mallgrave and Ikonomou, 37.
[211] Mallgrave and Ikonomou, 37.

perception to execute geometric shapes by changing the vantage point.[212] In strong relationship with these definitions, the "concept of relief," as emphasized by Hildebrand, is a precise theory that defines ways of seeing, creating various processes of forms.[213] The perceptual principle of relief, combining both planar and volumetric properties, was a significant relation for Hildebrand in terms of formation and imagination. He explains that, similar to the other fine arts, architecture faces the challenge of organizing forms to produce effects of relief. He sees this successfully realized in the Greek temple, where the sequence of columns acts like the front layer of a relief, guiding the viewer's perception backward into depth. Through this arrangement, Hildebrand suggests, a clear sense of volume is created, with a surface extended into three-dimensional space.[214]

Similar to Hildebrand, Adolf Göller defines memory image (*Gedachtnisbild*) as an input for perceptual imagination. He says, "*Gedachtnisbild* is not a perfectly true reproduction of the viewed image but its subjectively construed copy."[215] This process of perception is based on a formation from "image" to "thought, knowledge" and, at the end, a three-dimensionality of form. Göller defines two processes: first, the cultivation of a **memory image (*Gedachtnisbild*)**; and, second, the baneful effect of **jading (*Ermüdung*)**.[216] Göller projects this distinction onto methods of architectural formation. According to him, the combination of memory images and the process of jading those suggests various creations based on "the designer's intention to alter the basic composition of the architectural masses, to create new combinations of conventional decorations and artistic forms consistently, or to

[212] Mallgrave and Ikonomou, 230.
[213] Sezin Sarıca, *Relief-spaces: Transpositions in Display Environments* (Unpublished M.Arch. thesis, Middle East Technical University, 2019).
[214] Göller (trans. Mallgrave and Ikonomou), *233*
[215] Mallgrave and Ikonomou, 203.
[216] Göller, Mallgrave and Ikonomou (trans), 194.

intensify and enhance the shapes of old forms."[217] Including the subject of "architect", he suggests two methods for them "to find pleasure in new works".[218]

Göller presents these methods by reflecting on Bötticher's distinctions. These two methods are the learned selection of earlier forms and the transformation of earlier forms:

> …the "lie" that Bötticher saw in the Roman adaptation of the Greek entablature molding to the archivolt of the arch was for Göller, simply the normal course of formal development. He identified no less than fourteen ways in which forms come into being or undergo change under the general rubrics of transference, transformation, and combination. The Baroque style, for instance, might borrow certain form ideas from the Renaissance (combine), intensify their shapes (transform), and transfer or apply a decorative motif derived from one form to another (change a column into a pilaster). Artistic creativity also plays a role in style change, so does geometrical play. *Architecture in its historical growth becomes, in effect, an ever-expanding repository of formal ideas, continually undergoing variations and combinations.* At least this held true, Göller argued, up until the start of the nineteenth century, when the simple exhaustion of formal possibilities now threatened to put an end to this process.[219]

Reflecting on architectural theories, Göller presents approaches to architectural creation that draw upon aesthetic philosophy and notions of becoming. One approach suggests the following: "The individual parts (cornices, columns, architraves , stone arches, frames, and surface patterns of all kinds) are always combined differently and thereby produce numerous new results that constantly lead to the formation of new memory images and constantly renew their charm."[220] Another method involves

[217] Mallgrave and Ikonomou, 194.
[218] Mallgrave and Ikonomou, 208.
[219] Mallgrave and Ikonomou, 54.
[220] Mallgrave and Ikonomou, 209.

"intensifying the charm of old forms-they elaborate on whatever has previously pleased them most."[221]

Finally, for Heinrich Wölfflin, the two architectural theorists he refers to in his text, Karl Bötticher and Gottfried Semper, are important in terms of the conceptual development of their ideas. Although his "formal method" can be viewed as a stricter approach, the duality in his work must be recognized within the theories of form. He defines "*Formkraft*" as the force of form, offering another perspective on the understanding of form in the nineteenth century, which also implies its changing and reciprocal properties, unlike the contemporary notion of form defined through shape and limit. Wölfflin's interpretation of form draws from bodily relations, which could be seen as a direct reference to Semper's theories:

> Matter is heavy; it presses down and wants to spread out formlessly on the ground. We know the force of gravity from our own body. What holds us upright and prevents a formless collapse? It is the opposing force that we may call will, life, or whatever. I call it force of form [*Formkraft*].[222]

His definition for *Formkraft* is strongly related to his conceptions within the chapter titled "Architecture." He differentiates **closed (finished) form** and **open (unfinished) form** in terms of their architectural relationships. Furthermore, he describes the tectonic style as characterized by a strict, visible order and a clear adherence to structural laws. In contrast, the atectonic style reflects a more hidden or less overt expression of order, where conformity to underlying principles exists but without strict, obvious constraint.[223] He uses the term "style" as a formative system related to architectural conditions. According to him, there is a distinction between tectonic style and atectonic style. The tectonic style produces a closed, finished form

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[221] Mallgrave and Ikonomou, 209.
[222] Wölfflin, Mallgrave and Ikonomou (trans), 159.
[223] Heinrich Wölfflin. "Principles of Art History: The Problem of the Development of Style in Early Modern Art: One Hundredth Anniversary Edition". Getty Publications, (2015): 228.

with constraints, which is more orderly and has visible limits, whereas the atectonic style results in an open, unfinished form with fluidity that is still orderly but has less obvious limits. Based on this distinction, he explains change in architectural form:

> Furthermore, the tectonic style includes everything that serves the effect of containment and repleteness, whereas the atectonic style opens closed form; that is, it converts replete proportions into ones that are less so. Finished form is replaced by apparently unfinished form, bounded by the unbounded. The impression of repose is replaced by the impression of tension and movement.[224]

Wölfflin's definitions align with the dual definitions of his contemporaries, but his distinctions are more stringent than those of the previously mentioned thinkers. It is important to note that the formal method he proposes establishes a more fixed sense of style, unlike that of the early nineteenth century.

Overall, form, as a key concept, relates to both conceptual frameworks and architectural parts, including the concepts of "tectonics" and "style." The elaboration of form underlines the essential hermeneutic processes in architectural thought, highlighting the concept of "becoming." Form is viewed here as the continuity of architectural strands that are articulated within perception in aesthetic philosophy. This relationship between architecture and philosophy is highlighted to reveal the complexity of the concept of "form" and how the double structure of architectural theories affected the thoeries of aesthetic philosophy.

At the turn of century, Hermann Muthesius's work on the terms "***Stilarchitektur* (style-architecture)**" and "***Baukunst*(building-art)**" constituted another significant development for the definition(s) of form. His engagement with the English Arts and Crafts movement and the challenges of industrial production marked a decisive shift

[224] Mallgrave and Ikonomou, 228.

in the architectural discourse on form and influenced many strands of thought, particularly within the German context.[225] As Anderson states: "The difference for Muthesius, and the German movement of which he was to be a significant figure, was the relationship of art and culture to the system of industrial and technological production."[226] As the century included many ideas, contrasts, and definitions, "the emphasis on the very words *decorative* and *ornamental* took on exalted meaning."[227] The theoretical production at the turn of the century was affected by these definitions, the spread of machines, and the decline of handicrafts. On the other hand, the long debate on "style" was another significant source of input for Muthesius in positioning his theories. Anderson explains this as follows:

> The negative pole of the title of Muthesius's book, *Stilarchitektur*, asserted again a resistance to the "battle of the styles" of the nineteenth century, a battle that had resulted in the devaluation of all earlier modes of building and finally left the architect with "nothingness." [228]

Muthesius underlines the values of craft and consequently "*Baukunst*," or building-art, which are fully independent of style. Form and form-making thus became other keywords since "crafts were still a matter of form" and "unornamented form was not necessarily inartistic."[229] Dwelling on simplicity, *Baukunst* is defined through concepts that exclude deeply rooted styles and introduce the pure objectivity of "*Sachlichkeit*" in designing. In promoting simplicity and a direct approach to design, particularly in contrast to the excesses of late historicism and the decorative tendencies of Jugendstil, Muthesius, like Streiter before him, emphasized the

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[225] Please see the section in Chapter Three on "*Vorbilderbewegung*."
[226] Hermann Muthesius, *Style-Architecture and Building-Art: Transformations of Architecture in the Nineteenth Century and Its Present Condition*, trans. and introd. Stanford Anderson (Santa Monica, CA: Getty Center for the History of Art and the Humanities, 1994): 5.
[227] Muthesius, Anderson (trans), 10.
[228] Anderson, 10.
[229] Anderson, 11.

"generation of form" driven by necessity, health concerns, material properties, and construction methods.[230]

Interestingly, Muthesius' definition of "generation of form" circles back to the beginning of a nineteenth-century debate that saw style and form not as a static image but as a method that could evolve according to changing conditions. Similar to the early nineteenth-century definitions, Muthesius suggests that "the new movement should treat materials according to their nature and with sound workmanship, and continue its pursuit of a unity of form and color." He opposes the understanding of "style" at the turn of the twentieth-century and reminds us of multiple strands that have process-oriented understandings for the concepts of style and form.[231]
In summary, the two terms discussed by Muthesius are doubles that contrast with and help to define each other. As Anderson states, Muthesius's perspective favors building-art and opposes style-architecture:

> The term style-architecture for him meant high style and the established architectural profession, exacerbated by too much history and the malign influence of professors of art and aesthetics… In contrast, building-art is allied with vernacular buildings, guilds, the lower and middle classes, and

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[230] Anderson, 16.

[231] In this context, the Deutsche Werkbund was a significant group that included "artists (mainly architects) and producers (at the scale of craft production but soon to be joined by fully industrialized firms)." The discussions and productions within the group have a wide influence in Germany that still continues. One discussion includes the concept of *Typisierung,"* a word that caused such concern among some members and does not appear in *Stilarchitektur."* The term could be regarded as a synthesis of the effects from the Arts and Crafts to generate a more interpretative concept as a "mediator between formal invention and standardization, between personal style and the appropriate form for the *Zeitgeist*". Anderson also underlines the creative power of the term referring to Muthesius and van de Velde's discussions. He states that in most interpretations of the debate, *Typisierung* has often been understood as "standardization," implying a conformity to the demands of industrial production, and Muthesius's position has been seen as favoring industrial norms over the creative autonomy of artists and designers. However, it can be argued that during the debate itself, neither Muthesius nor van de Velde intended *Typisierung* to carry such a meaning. Instead, the term referred to the development of "types" or standardized models that could be applied across the fields of craft, industrial production, and architecture. For more see Hermann Muthesius, *Style-Architecture and Building-Art: Transformations of Architecture in the Nineteenth Century and Its Present Condition*, trans. and introd. Stanford Anderson (Santa Monica, CA: Getty Center for the History of Art and the Humanities, 1994).

> humbler dwellings. Even the "art" in building-art should be understood more in its archaic sense of matter, craft, artifice.[232]

This section has shown how nineteenth-century aesthetic philosophy reconceived *form* as a process shaped by perception, cognition, and cultural context. Thinkers including Vischer, Fiedler, Hildebrand and Wölfflin explored dualities—such as perception/imagination or inherent/effective form that parallel architectural distinctions like *Kernform* and *Kunstform*. In both fields, form is not fixed but is something becoming and plural, rather than something given.

Foundations of Architectural *Bildung*

Beginning with the heterogeneity in nineteenth-century German thought, a discursive analysis of the tectonic debate and its foundations, contents, and projections will be helpful in identifying the necessary keywords to define an architectural *Bildung* and reveal the parallelism between nineteenth-century German architectural theory and later developments. Exploring the works of Hübsch, Schinkel, Bötticher, and Semper reveals how their theories are elaborated in relation to the duality of *Kunstform* and *Kernform*. The resolution of *Bildung* at the beginning of this chapter, and especially its twentieth-century understandings, established a backdrop for these narratives while simultaneously acting as a key filter for the works of these scholars. *Bildung*, within intellectual history highlighting different interpretations and combining imitative and formative doubles for reflexivity, parallels the accumulative terminology of the specific architectural debate that this section addresses. The first part of the glossary thus identifies the architectural counterparts of *Bildung* by beginning with the tectonic debate in a connection that is not coincidental but rather deeply rooted. The revisiting of the tectonic debate in different temporal layers and terms is traced throughout this section.

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[232] Anderson, 30.

Scenographical and Technological: Re-readings on Nineteenth Century Architectural Theories in the 1990s

The second set of doubles is closely related to the revisited conceptions of symbolic and technical understandings of nineteenth-century tectonics in the twentieth century. The 1980s and 1990s were crucial periods for the revival of nineteenth-century tectonic theories. This interest began with multiple translations of German texts on tectonic theories into English by various scholars, including Harry Francis Mallgrave (b. 1947, architectural historian and translator), Wolfgang Herrmann (1927–2020, architectural historian), Barry Bergdoll (b. 1955, architectural historian and curator), and Rosemarie Bletter (b. 1940, architectural historian), and in the 1990s, Kenneth Frampton (b. 1930, architect and historian) and Mitchell Schwarzer (b. 1957, architectural historian), followed by Mari Hvattum (b. 1966, architectural historian) in the early 2000s.[233] It continued with subsequent interpretations that highlighted the technical aspects of the nineteenth century. A significant point here is that German architectural theory was primarily translated and disseminated during the late mid-twentieth century, especially within the North American academic scene. The Second World War triggered a major intellectual migration from Europe to the United States, which had a profound impact on North American architectural academia. This migration, combined with a surge in theoretical production, shaped much of the architectural discourse. Most English translations of German theoretical texts were produced and circulated in this context.

These translations between European and American academia, of course, rearticulated specific theories and diversified the discourse. While the foundation of tectonic theories remained steady, either the scenographical or the technical dimension was lost due to multiple readings. In the early twentieth century, modern interpretations of tectonics largely abandoned the scenographical strand, focusing

[233] The original texts and related research were written in German, and since the English translations appeared later, the wider dissemination of these works occurred only in the late twentieth century.

more on the functional and structural aspects of architecture. However, postmodern assumptions, particularly in the latter half of the century, shifted the emphasis back to the scenographical dimension, reflecting the scenographic elements that had been integral to earlier understandings of tectonics.

This evolution in thought suggests that the revisits to the tectonic debate have been fruitful, yet it often seems that only one strand -be it technical or scenographical- has been chosen at a time. The dual nature of tectonics, however, as initially presented, is reflexive, embracing the relationship between both the technical and the scenographical. The previous section clearly demonstrated that the interaction between these strands is essential for grasping the full scope of tectonic theory, highlighting that these aspects are not mutually exclusive but rather complementary. In this section, four categories are proposed with each contribution emphasizing different aspects of architectural discourse.

These contributions are organized under the four titles of "Translations," "Buildings," "Philosophies," and "Questions," each relating to a specific concern and mode of production. "Translations" as a title refers to the scholarly efforts of Wolfgang Hermann, Harry Mallgrave, Stanford Anderson, and Barry Bergdoll during the 1980s and 1990s, who were instrumental in translating and contextualizing nineteenth-century German architectural theory for a wider audience. "Buildings" pertains to Kenneth Frampton's exploration in *Studies in Tectonic Culture*, where he analyzes how the tectonic principles of nineteenth-century German theorists influenced modern architecture with highly visual content. Contrasting with Frampton's work, Mitchell Schwarzer's *German Architectural Theory and the Search for Modern Identity*, which is a highly textual work, is presented in "Philosophies," as he repositions the historical theories within the broader philosophical and cultural shifts of modernity. His work emphasizes how debates on form, style, and tectonics in the nineteenth century shaped the intellectual foundations of modern architectural thought. Finally, "Questions" is inspired by *ANY* Issue 14 (1996), titled "Tectonics Unbound: *Kernform* and *Kunstform*

Revisited," which critically reexamines the duality of *Kernform* and *Kunstform* while considering contemporary architectural concerns. The second glossary entry, "Scenographical and Technological" serves as the title for this section, but its contents offer an expanded interpretation of the terms. While this section may appear to be a survey, its importance lies in how these different contributions revisit, translate, and reinvent key terms of nineteenth-century theory. The convergence of these works offers not only a valuable archive of knowledge but also a demonstration of how architectural concepts can be continuously recontextualized.

Translations: Wolfgang Hermann, Harry Mallgrave, Stanford Anderson, and Barry Bergdoll in the 1980s-90s

Translations have always played a crucial role in the dissemination and exposition of knowledge. In architectural theory, this impact became particularly significant in the second half of the twentieth century. With the establishment of graduate programs in architectural theory worldwide, translations became essential to knowledge production, contributing to critiques and expansions within contemporary architectural discourse. Although many scholars referred to German architectural theory in their works, particularly in the early and mid-twentieth century, proper translations largely gained momentum in the 1980s and 1990s. Wolfgang Hermann and Harry Francis Mallgrave are highlighted here as the first such translators. Tracing specific German terms and their translations provided an interface that was interpretative and influential in theory-making.

Wolfgang Herrmann was a significant scholar in architectural theory, contributing to the dissemination of early European modern theories through his translations. His career began in 1925 as an assistant keeper of prints and drawings at the Staatliches *Kunstgewerbemuseum* in Berlin, a position that helped his understanding of the history, theory, and philosophy of artistic and architectural production. With the rise

of the Nazi regime, Herrmann fled to London in 1933. His multilingual abilities allowed him to connect various architectural theories, particularly those from German and French traditions, and reinterpret them in new contexts. From the 1960s onward, Herrmann focused on translating and analyzing foundational works in architectural theory, such as those by Claude Perrault and Marc-Antoine Laugier. His expertise in Gottfried Semper's theories particularly stood out, contributing to the broader understanding of *Tektonik* and *Stil*. Some notable works include *Gottfried Semper: In Search of Architecture* (1989) and *In What Style Should We Build? The German Debate on Architectural Style* (1992). Herrmann also co-edited *The Four Elements of Architecture and Other Writings* (1989) with Harry Francis Mallgrave, making Semper's ideas accessible to a new generation of scholars. These works collectively shaped modern scholarship and expanded access to critical debates within architectural history.

Harry Francis Mallgrave is another influential scholar in architectural theory, known for his extensive studies on Gottfried Semper and German aesthetic theory in the 19th century. In 1983, he completed his Ph.D. in architecture at the University of Pennsylvania with a dissertation on Semper, laying the groundwork for his publications on Semper's work and its broader impact, including German aesthetics, modernism, and Otto Wagner's contributions. Some key works by Mallgrave are *Otto Wagner: Modern Architecture* (Getty, 1988) and *Otto Wagner: Reflections on the Raiment of Modernity* (Getty, 1993), exploring Wagner's approach to modernism. His *Modern Architectural Theory: A Historical Survey, 1673–1968* (Cambridge, 2005) provides a comprehensive overview of architectural theory, while *An Anthology from Vitruvius to 1870* (Blackwell, 2005) and its follow-up, *An Anthology from 1871–2005* (co-edited with Christina Contandriopoulos, 2010), compile pivotal theoretical texts in architecture. Mallgrave's in-depth analysis of Semper is evident in works such as *Gottfried Semper: Style in the Technical and Tectonic Arts* (Getty, 2004) and *Gottfried Semper: Architect of the Nineteenth Century* (Yale, 1996; German translation, 2001). He also collaborated with

Eleftherios Ikonomou on *Empathy, Form, and Space: Problems in German Aesthetics* (Getty, 1996), which examines German aesthetic theory, a foundational element of the intellectual impact achieved by Semper and his contemporaries. Mallgrave's co-editing of *The Four Elements of Architecture and Other Writings* (Cambridge, 1989) made Semper's writings accessible to a new generation of scholars and practitioners. Both the translations and Mallgrave's own readings provided productive grounds for a deeper understanding of nineteenth-century theories, which benefitted the present work, as well.[234]

The works of Hermann and Mallgrave are chosen as key secondary literature sources because they are the earliest translations addressing specific nineteenth-century German architectural and aesthetic theories, and they influenced later works. Additional contributions will also be mentioned here, with some elaborated on in the context of specific themes in this chapter.

Barry Bergdoll is another significant figure who has contributed to the dissemination of nineteenth-century German discourse, particularly during the 1980s and 1990s. Notable works from this period include "Archaeology vs. History: Heinrich Hübsch's Critique of Neoclassicism and the Beginnings of Historicism in German Architectural Theory" (1983). In this article, Bergdoll examines Heinrich Hübsch's critique of neoclassicism, emphasizing the early development of historicism in German architectural thought. Another significant work, *Karl Friedrich Schinkel: An Architecture for Prussia* (1994), investigates Karl Friedrich Schinkel's designs and their significance to Prussian identity. *European Architecture 1750–1890* (1994), a broader publication, focuses particularly on German developments, analyzing how architectural design interacts with emerging theories of history and science during a period of major transformation.[235]

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[234] These lists were compiled using both the Google Scholar database and the Internet Archive.
[235] These lists were compiled using both the Google Scholar database and the Internet Archive.

Stanford Anderson, a prominent architectural historian, also significantly contributed to architectural theory and history during the 1980s and 1990s. Noteworthy works from this period include "The Fiction of Function" (1987) in *Assemblage,* which critically evaluates the concept of function in architecture by exploring the symbolic and cultural aspects of architectural forms. His work on Peter Behrens is especially significant. His "Introduction" to Peter Behrens's "On Art for the Stage" (1990) in *Perspecta* introduces Behrens's work and its relationship to modern architecture. Another work, *Peter Behrens and a New Architecture for the Twentieth Century* (2000), was the result of Anderson's long research on Peter Behrens. This study traces Behrens's works and thinking between 1900 and 1917. Anderson also made a significant contribution to the dissemination of German architectural theory through his translation of Hermann Muthesius's seminal work. In 1994, he translated and introduced Muthesius's *Style-Architecture and Building-Art: Transformations of Architecture in the Nineteenth Century and Its Present Condition*. Initially published in 1902, this work critically assesses nineteenth-century architecture and is considered a foundational text in early modernist architectural discussions.[236]

Before these translations, Rosemarie Haag Bletter significantly explored Expressionism, modernism, and how technology influences architectural thought. While she has not exclusively focused on nineteenth-century German theory, her research delves into crucial elements connected to tectonics, style, and materiality, which are fundamental to theorists such as Gottfried Semper, Karl Bötticher, and Heinrich Hübsch. [237]

The 1990s constituted a productive period in which numerous scholars extensively revisited core architectural theories and philosophical ideas from the nineteenth

[236] Anderson.
[237] Adolf Behne, *The Modern Functional Building*, trans. and ed. Rosemarie Haag Bletter (Santa Monica, CA: Getty Research Institute for the History of Art and the Humanities, 1996).

century. In particular, Kenneth Frampton, Mitchell Schwarzer, and Gevork Hartoonian focused on rereading and reinterpreting these foundational concepts. Gevork Hartoonian (1946–2024), as one of these significant scholars, was an architectural historian, theorist, and educator whose seminal work, *Ontology of Construction: On Nihilism of Technology in Theories of Modern Architecture* (1994), deserves special recognition.[238] Published a year prior to Kenneth Frampton's *Studies in Tectonic Culture* (1995) and Mitchell Schwarzer's *German Architectural Theory and the Search for Modern Identity* (1995), Hartoonian's book offers a distinctive philosophical perspective on tectonics, illustrated through his interpretation of "buildings." Notably, while his case studies intersect with those in Frampton's work, their interpretive frameworks differ significantly. The preface, written by Frampton, can be understood as a scholarly courtesy, acknowledging Hartoonian's insights despite the chronological precedence of his publication.[239]

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[238] Gevork Hartoonian. "Ontology of construction: On nihilism of technology in theories of modern architecture." (1994). Hartoonian's perspective was shaped by a transcontinental academic and cultural trajectory. Born and trained as an architect in Iran, he completed his Ph.D. and began his academic career in the United States. As an Australian-American-Iranian-Armenian scholar, his multifaceted identity helped deepen his theoretical insight. The book explores the historical development of architectural thought, starting from classical ideas of *techne* to the challenges posed by industrialization. It specifically focuses on the divide between design and construction, as well as evolving perceptions of technology. Hartoonian seeks to define an "ontology of the present" in architecture, arguing that montage acts as a mediating agent for reinterpreting tradition in the face of technological transformation.[238] He also exemplifies these rereadings by examining the philosophies and contributions of prominent architects such as Le Corbusier, Frank Lloyd Wright, Adolf Loos, and Mies van der Rohe.

[239] Hartoonian. Hartoonian's definition of architecture as "type-tectonic" is another highly relevant phrase that strengthens the arguments presented in this study. He emphasizes a crucial point regarding how nineteenth-century theoretical doubles were gradually dismantled, often by eliminating one member of the pair. For instance, in the early twentieth century, scenographical strands were largely abandoned, while later, in the late twentieth century, there were attempts to revitalize scenographics without the technological counterpart. Such selective revivals, he argues, inevitably distort the original integrity of tectonic theory and the logic of making. His combined understanding of "tectonic" and "type" suggests a reflexive idea that encompasses both imitative and formative qualities, capable of critiquing modernism's positivist thought as well as contemporary scenographical references to history. The title of the final chapter of his book, "Construction of the Not Yet Construed," signals a conception of creativity rooted in a "perpetual state of postponement," a "deliberately unfinished technostatic event," which again underscores the process-oriented understanding of tectonics that refers to both philosophical and physical aspects.

After the mid-1990s, in the late 1990s and the early twenty-first century, the works of Mari Hvattum and Caroline van Eck played significant roles, particularly in relation to nineteenth-century German architectural theory. Hvattum is an architectural historian who specializes in nineteenth and twentieth-century ideas, concentrating particularly on figures such as Gottfried Semper and Karl Bötticher. Her works include *Gottfried Semper and the Problem of Historicism* (2004) and *Routes, Roads and Landscapes* (2011), focusing on the relationships among historicism, material culture, and architectural form. Similarly, Caroline van Eck, a scholar of art and architectural history, has worked on the influence of classical rhetoric on architecture and the visual arts. While her work does not always directly engage with the core theories of German architectural discourse, her research has profoundly influenced broader debates about form, representation, and historiography.

These translations and editorial efforts laid the groundwork for more interpretive engagements. Herrmann, Mallgrave, Anderson, and Bergdoll were selected for discussion here due to their key roles in making nineteenth-century German architectural theory accessible and shaping its reception in late twentieth-century discourse. While a more comprehensive source analysis could have been undertaken, this selection aligns with the aims and format of the glossary, which focuses on representative figures whose work enabled specific conceptual rereadings. The next sections, "Buildings," "Philosophies," and "Questions," offer more focused rereadings of nineteenth-century theories, each emphasizing a distinct lens: material articulation, philosophical grounding, and conceptual critique, respectively.

Buildings: Kenneth Frampton's Revisitation in "Studies on Tectonic Culture"

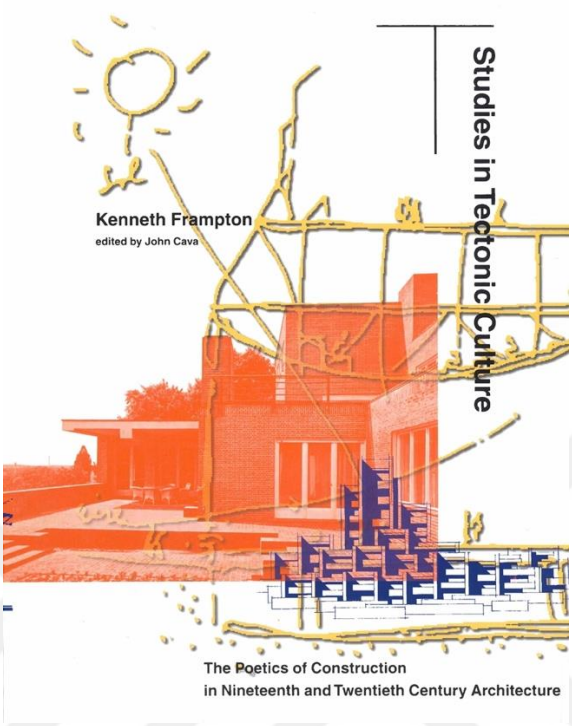


Figure 2.21 Bookcover of Kenneth Frampton's book "Studies on Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieht Century Architecture". Source:https://www.naibooksellers.nl/studies-in-tectonic-culture-the-poetics-of-construction-in-19th-and-20th-century-architecture-kenneth-frampton.html

In this part of the glossary, *building* refers not only to physical construction but to conceptual formation that is an operation that bridges material assembly and imagination.[240] Although the phonetic resemblance between *building* and *Bildung* does not correspond to a direct translation, it reveals a conceptual intersection between the terms, particularly in relation to the conceptual structure of tectonic theory. Understanding Frampton's work in this regard, his book *Studies in Tectonic Culture* is significant in understanding how tectonics is revisited not merely as constructional technique but as an intellectual act (Figure 2.20).

[240] Here, Semper's Theory of Building, that refers not only to product but the changing processes could be remembered.

Kenneth Frampton is a renowned British architect, historian, and educator celebrated for his impactful contributions to architectural theory and criticism. Born in 1930 in England, he studied at the Architectural Association School of Architecture, London. Over the years, Frampton has taught at various institutions, including the Graduate School of Architecture at Columbia University, where he currently holds a professorship. His academic work and lectures have established him as a prominent figure in the architectural discourse. Frampton's most influential works include *Modern Architecture: A Critical History* (originally published in 1980), providing a comprehensive overview of modern architectural movements, and *Studies in Tectonic Culture* (1995), where he examines the connection between architecture and technology, highlighting the significance of tectonic construction.

Studies in Tectonic Culture revisits tectonics as a form of knowledge and presents a wide range of architectural histories, concepts, and objects. The ideas largely originated from the inaugural Francis Craig Cullivan lecture held in 1986 at Rice University in Houston, Texas. Schwarzer explains that Frampton views tectonics as the architect's effort to gain control over the processes of building production - an attempt to refine construction in order to give architecture an enduring character. However, Schwarzer notes that this is not the only aspect; alongside presenting tectonics as a counter-hegemonic strategy, Frampton also acknowledges it as a fundamental condition of architectural knowledge.[241]

By approaching tectonics as both theoretical and practical knowledge, Frampton's work emphasizes the dual processes of "building" as both conceptual formation and material practice. His book presents extensive knowledge on various rereadings of tectonics as "how elements come together," highlighting architectural thinking and making processes. A variety of architectural buildings, including definitions, materials, and spaces, are presented and reread within the framework of the "tectonic

[241] Mitchell Schwarzer, "Tectonics Unbound: *Kernform* and *Kunstform* Revisited," *ANY: Architecture New York* 14 (Special Issue: *Tectonics Unbound: Kernform and Kunstform Revisited*) (1996): 15.

debate" and demonstrate how the understanding of tectonics goes beyond mere "structural" detail. Rather than exploring the work in detail, this section of the thesis seeks to present an overview of his work, positioning it as one of the most comprehensive sources for reclaiming and rereading the tectonic debate in the 1990s.

In doing so, this section aims to interpret his critical revisitation of tectonic theory through selected architectural cases. His work is approached here as a key source for linking the terminology of the tectonic debate to the conceptual foundations of architectural *Bildung*, helping to extend this dialogue into a broader and evolving architectural vocabulary. This correlation highlights a strong resemblance between the conceptual structures that underpin interpretations of *Bildung* and those of tectonic theory. Frampton's book serves as a particularly precise resource for identifying the material and conceptual correspondences between these frameworks, thereby clarifying their mutual relevance.

The structure of Frampton's book reinforces this interpretive potential. As outlined in the Table of Content, it covers historical shifts in form, starting with the "Greco-Gothic and Neo-Gothic Origins of Tectonic Form," followed by the "Rise of the Tectonic in the German Enlightenment." Further chapters explore the impact of prominent architects: "Frank Lloyd Wright's Text-Tile Tectonic," "Auguste Perret and Classical Rationalism," "Mies van der Rohe's Avant-Garde Continuity," "Louis Kahn's Modernization and New Monumentality," "Jørn Utzon's Transcultural Tectonic Metaphors," and "Carlo Scarpa's Adoration of the Joint." The text concludes with a postscript on "Tectonic Trajectory (1903–1994)" and "The Owl of Minerva: An Epilogue," reflecting on tectonics' philosophical and practical evolution.

Frampton's revisitation of tectonics responds implicitly to postmodern interpretations, especially those by Robert Venturi and Denise Scott Brown that tend to frame modernism as a break from historical continuity. This explains Frampton's

motivation to "remind" readers of intricate connections within the tectonic debate. He presents these connections not as external to modernism and only acknowledged later by postmodernism, but rather as essential elements that have always coexisted alongside modern design and construction theories. Through this perspective, Frampton emphasizes how tectonic knowledge has informed modern architectural theory and practice, reemphasizing its fundamental role.

Referencing numerous scholars, Frampton reiterates several foundational ideas. First, he emphasizes *topography and site,* which he defines as the environment, a primary factor in architectural creation. He also explores the *body* as a metaphor, highlighting the corporeal experience of an environment. Frampton's differentiation between ontological and representational perspectives leads to a detailed dual expression of the technological and scenographical. His presentation of these concepts reveals obvious relations:

> Semper draws between the symbolic and technical aspects of construction, a distinction that I have attempted to relate to the representational and ontological aspects of tectonic form: the difference, that is, between the skin that re-presents the composite character of the construction and the core of a building that is simultaneously both its fundamental structure and its substance. This difference finds a more articulated reflection in the distinction that Semper draws between the ontological nature of the earthwork, frame, and roof and the more representational, symbolic nature of the hearth and the infill wall. In my view, this dichotomy must be constantly rearticulated in the creation of architectural form, since each building type, technique, topography, and temporal circumstance brings about a different cultural condition.[242]

Building on this dichotomy, Frampton draws on Sekler's concept of the atectonic to further clarify the duality between tectonic and atectonic forms, arguing that atectonic tendencies often align with representational strategies that foreground

[242] Frampton, 16.

scenographical expression over structural logic.[243] On the other hand, "technological" qualities correspond to the ontological aspects of form. The terminology and distinctions among the terms "technic," "technique," "tectonics," and "technology" are significant here, as the interchangeable use of these terms is quite common and often misunderstood. While "technics" corresponds to a broader framework of "know-how of making," referring to the original German meaning, "technique" is a translation conveying a more specific meaning: the tool or operation of making. "Tectonics" clearly includes double references to representational and ontological aspects, while "technology" implies a specific meaning referring to the tools and settings of making, and mostly their advancement.[244]

Frampton cites Gregotti to further articulate this double articulation, in which "one has to mediate between technology as a productive procedure and craft technique as an anachronistic but renewable capacity to reconcile different productive modes and levels of intentionality."[245] In presenting key terms for understanding tectonics and tectonic form, Frampton highlights the extensive knowledge embedded within tectonics. Central to this is the notion of "double articulation": the simultaneous engagement of core structure (*Kernform*) and representational form (*Kunstform*). Frampton sets the stage for a broader reading of tectonics as a process of *cultural formation*. In this sense, tectonics becomes an analogue for *Bildung*: a processual logic through which architecture learns, accumulates, and transforms.

[243] Author presented this part of her research, titled "Permanence and Endurance: A Re-reading of (A)tectonic," at the EAHN Thematic Conference Architecture and Endurance, Ankara, Turkey, 2021.
[244] On this topic, see the "Analogous Roots" section in *Shape and Form*.
[245] Frampton, 26.

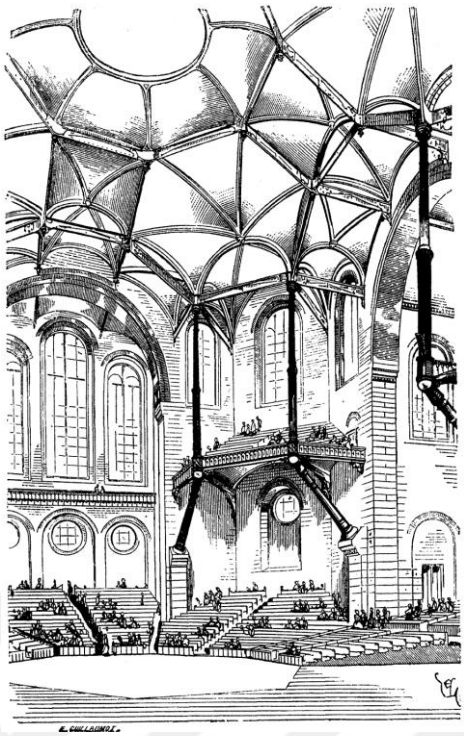


Figure 2.22 Referred in Frampton's book: Eugene-Emmanuel Viollet-le-Duc, project for a 3,000-seat hall, interior.

To trace these articulations, Frampton begins his examination with Greco-Gothic examples, focusing on French theory and construction processes. His discussion on "The Anglo-French Origins of Tectonic Form" explores the variety within tectonic principles, which shift with material uses and definitions. This diversity is illustrated through Greco and Neo-Gothic tectonic forms, which showcase how Greek horizontal and vertical relations evolved into a structural articulation that fuses horizontality and verticality. The material "iron" and inevitable techniques that this technological advancement introduced defined a new tectonic formation (Figure 2.21). The Anglo-French lineage serves as a conceptual and material precursor to the German theoretical articulations of tectonics, where figures like Schinkel, Bötticher, and Semper formalized the dualisms that Frampton traces, most notably through the distinction of and interplay between *Kernform* and *Kunstform*.

Frampton's reading of Schinkel's *Friedrichswerdersche Kirche* also exemplifies this dual articulation, demonstrating how structural and representational layers are

deliberately interwoven. He identifies a deliberate reversal of core and artform: the exterior presents structural clarity through a traditional brick envelope, while the interior reveals a lighter, ornamental Gothic shell. This inversion challenges conventional tectonic hierarchies, suggesting that structural and representational roles are relational rather than fixed. Schinkel's design also blurs the boundary between the core and artform by maintaining a parallel articulation between the window openings in the brick casing and the openings in the nave. In doing so, he reverses the typical relationship between the core and the artform, placing the core on the exterior and the decorative artform on the interior (Figure 2.22).[246]

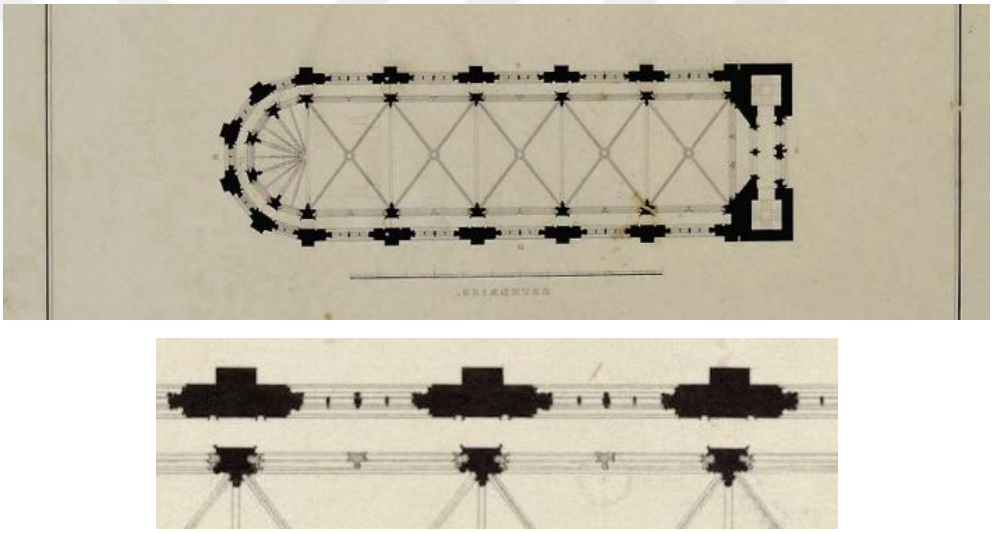


Figure 2.23 Floor plan of the Friedrichswerdersche Kirche in Berlin. Designed by Karl Friedrich Schinkel. Source: https://smb.museum-digital.de/object/86717

In subsequent chapters, Frampton presents a variety of notable architects and architectural practices, uncovering complex relationships, developments, and the dual articulations present in tectonic theory. His significant approach involves using a curated set of drawings that reveal interpretations of the theories, which also encompass "architectural building." This approach enables readers to engage with

[246] Frampton, 75.

the concept of tectonics as an integral part of the essence of architectural form and formation.

Frampton's readings of Wright, Perret, Mies, and Scarpa reveal how tectonic thinking generates a flexible architectural vocabulary that aligns with the conceptual structure of *Bildung*. First, Wright's textile blocks articulate tectonics as both material specificity and conceptual formation, embodying a woven synthesis of technique and symbol. Wright's textile block inherently defines its joints when it is poured and "becomes thin but solid reinforced slabs and yields to any desire for form imaginable" (Figure 2.23).[247] The architectural element of the textile block thus becomes part of an evolving architectural vocabulary that is a part of this glossary to define architectural *Bildung*. This evolving vocabulary increasingly intersects with *Bildung*'s plural interpretations, encompassing both imitative traditions and formative processes and revealing continuous reinterpretations.

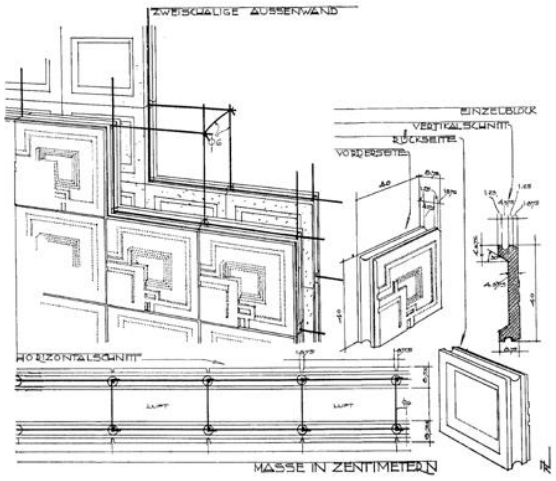


Figure 2.24 Construction detail of Frank Lloyd Wright's textile block system. Source: Kenneth Frampton, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture,* ed. John Cava (Cambridge, MA: MIT Press, 1995).

[247] Frampton, 109.

Similarly, Perret's experiments with concrete and classical syntax create new intersections between artform and coreform. His buildings offer tectonic dualities wherein material construction and representational logic intersect. Perret's tectonics results in conditions of different emphasis that invent both artform and coreform in new architectural elements and their relations. Thus, his "buildings" reveal architectonic fragments of the dual articulations of the terms. Frampton emphasizes Perret's focus on the frame, which aligns with Semper's tectonic concept, where the frame defines architectural form. This emphasis on frame structure is evident in Perret's understanding of concrete advancements, e.g., *Le Palais de Bois* (Figure 2.24). Meanwhile, the column design in *Travaux Publics* evokes classical architecture within a modern context, creating what Frampton describes as an "unexpected atectonic effect" (Figure 2.25).[248]



Figure 2.25 Interior view of Le Palais de Bois, Porte Maillot, Paris (1924), designed by Auguste Perret. Referenced in the source: Kenneth Frampton, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, ed. John Cava (Cambridge, MA: MIT Press, 1995).

[248] Frampton, 148.

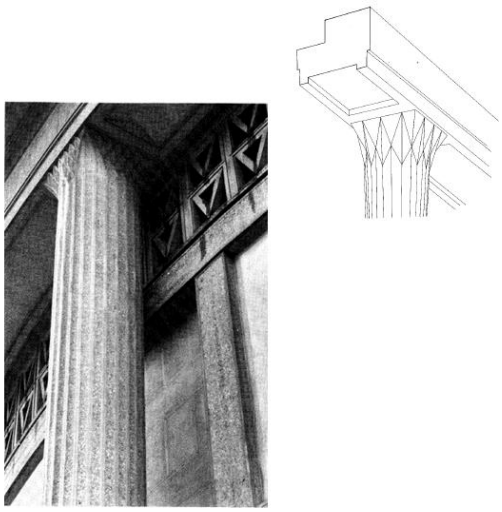


Figure 2.26 Detail of capital, City Hall, Le Havre (1949), designed by Auguste Perret. Referenced in the source: Kenneth Frampton, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, ed. John Cava (Cambridge, MA: MIT Press, 1995).

Mies van der Rohe's work represents yet another mode of tectonic articulation—one that emphasizes the relationship between scenographical and technological concerns without privileging one over the other, echoing *Bildung's* dual structure of imitation and formation. His viewpoint sees form as a continuously evolving set of parameters, an understanding of tectonic form that underlines the assembly and separation of elements (Figure 2.26). The tectonic form embodies a complex interplay between scenographical and technological elements, including both artform and coreform, as well as tectonic and atectonic qualities.



Figure 2.27 Column-footing joint and cruciform steel column detail from the Barcelona Pavilion by Ludwig Mies van der Rohe. Photograph: ArchDaily, "AD Classics: Barcelona Pavilion / Mies van der Rohe." Drawing: Kenneth Frampton, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, ed. John Cava (Cambridge, MA: MIT Press, 1995).

As a final case, Scarpa's architecture foregrounds disjunctive narratives and detail as philosophical devices, rejecting fixed typologies in favor of layered, materially expressive relations, with each instance reinforcing the view of architecture not as fixed product but as a continual process of formation. Scarpa's fragmented yet cohesive search reflects the multiscalar and complex correspondences inherent in tectonic philosophy. Frampton describes this transitional unity as follows, illustrating Scarpa's seamless integration of theoretical and material concerns within his architectural approach:

> Nothing surely could be more tectonic than this return to "thingness" that, in Scarpa's case, is as evident in the framing of an object as in the fabric of the building in which it is housed. Here as elsewhere in his architecture, it is the working of the material itself that carries the semantic charge. We are presented with a tactile syntax that is grounded in difference, turning, that is, on evident transitions from rough to smooth, from polished to matte, from worked to unworked *(*Figure 2.27*)*.[249]

[249] Frampton, 243.

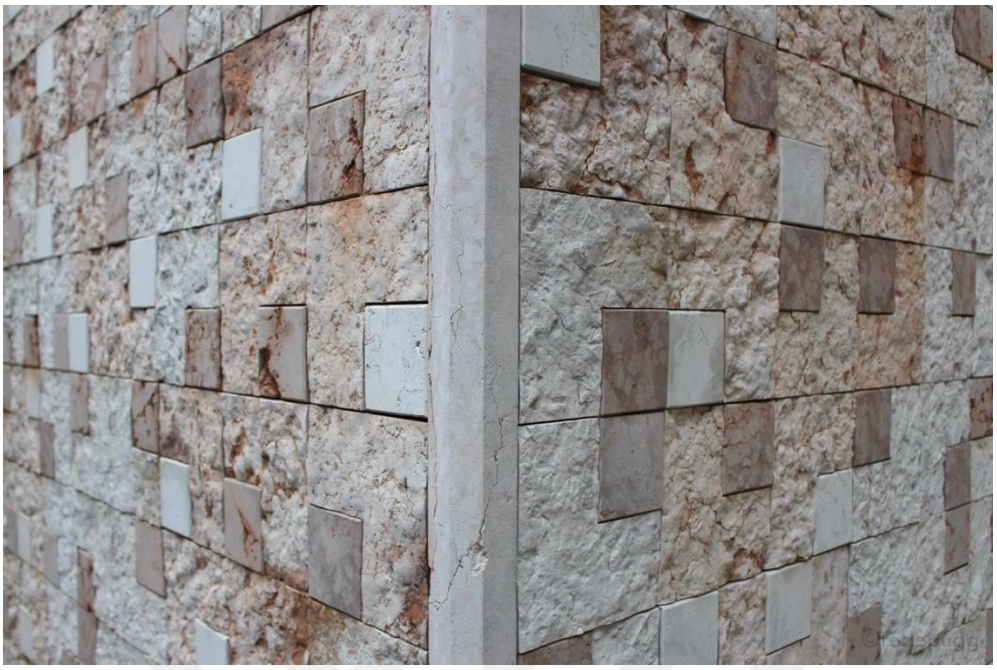


Figure 2.28 Detail of the Sacello exterior wall at the Museo di Castelvecchio, Italy. Source: https://images.divisare.com//images/c_limit,f_auto,h_2000,q_auto,w_3000/v1481490800/dzuxxqrhfb95oqkafwwv/carlo-scarpa-federico-puggioni-museo-di-castelvecchio.jpg.

This very relationship between philosophical intent and material expression once again intersects with what *Bildung* suggests: an interpretative process through which architecture is not merely construction, but rather *formation*, which is a continual relation between method and material.

Overall, Frampton's work revisits tectonics as a complex network of concepts and diverse physical aspects of making, underlining "building" through a blend of conceptual and material perspectives. Recognizing tectonics as the art of "how elements come together," it emphasizes architectural thinking and making that transcends structural detail to consider materials, spaces, and forms as integrated within the broader tectonic debate. Frampton's concluding reflections crystallize this layered understanding of tectonics. He asserts that "the tectonic resists and has

always resisted the fungibility of the world," emphasizing tectonics' continuous negotiation between invention and tradition. [250]

Frampton's curation of examples offers an expanded reading of tectonic theory not only through textual analyses but also through physical architectural fragments. These examples contribute to an evolving vocabulary for defining architectural *Bildung*, intersecting a variety of double articulations intersecting within the flexible structure of tectonic theory: based on *artform* and *coreform*, defining scenographical and technological, and representational and structural.

Philosophies: Mitchell Schwarzer's Revisitation in "German Architectural Theory and the Search for Modern Identity"

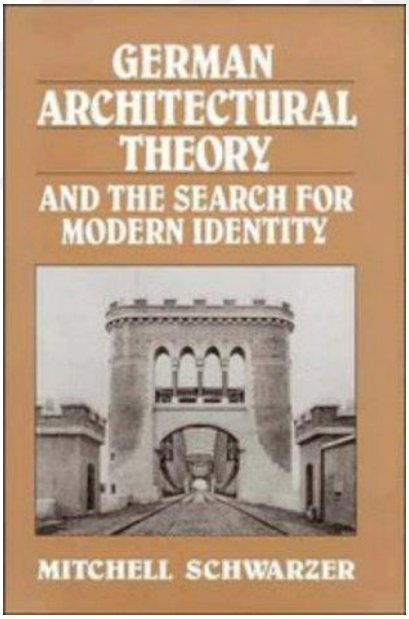


Figure 2.29 Bookcover of Mitchell Schwarzer's book "German Architectural Theory and the Search for Modern Identity".
Source: https://www.abebooks.co.uk/German-Architectural-Theory-Search-Modern-Identity/10643476748/bd#&gid=1&pid=1

[250] Frampton, 375.

Mitchell Schwarzer's *German Architectural Theory and the Search for Modern Identity* (Figure 2.28) is another significant source that revisits and rereads the tectonic debate and expands it into the 1990s, driven by the same concern that motivated Kenneth Frampton's *Studies in Tectonic Culture*: a shared effort to recall the richness of nineteenth-century architectural theory and its formative influence on modern architecture. The book was produced as a result of his Ph.D. studies conducted with Stanford Anderson at MIT. Schwarzer's Ph.D. thesis, titled *Adolf Loos and Theories of Architecture and the Practical Arts in Nineteenth-Century Austria and Germany*, forms the basis of *German Architectural Theory*, which significantly influenced my own thesis. His book provides a comprehensive historical and philosophical examination of tectonic concepts and the nineteenth-century avant-garde. I have titled this section "Philosophies" to highlight the book's comparative, text-based depth, which, unlike Frampton's strong visual-textual relationships, offers a rigorous, text-centered exploration of theoretical connections. Recognizing Schwarzer's emphasis on nineteenth-century German architectural theory is particularly important for this thesis, as his work serves as one of the foundational references in developing the glossary for defining architectural *Bildung*. It traces the conceptual richness of the period and its lasting influence on modern architectural thinking, especially through overlooked key terms, double articulations, and epistemological shifts that resonate with the reflexive structure this research aims to frame.

Schwarzer highlights a significant gap in architectural theory, which his work, along with contributions from other scholars, specifically addressed in the 1990s, with a growing interest in exhibiting the works of Semper and Schinkel. He defines this gap as the relative lack of attention given to German architectural writings compared to the extensive historical analyses of English and French architectural theory from the same period. While the latter have been recognized as intellectually rigorous

discourses, German architectural theory had long been overlooked and received only limited scholarly engagement.[251] As he describes:

> Significantly, Anglo-American scholarship ignored most of nineteenth-century German architectural theory. Its comments generally skipped from the age of philosophical aesthetics to the early twentieth century. Ignoring German architectural theory, Anglo-Americans habitually located the immediate roots of twentieth-century German modernism in the eighteenth-century 'Picturesque and nineteenth-century Arts and Crafts movements in England.[252]

Acknowledging Schwarzer's insightful assertion, this thesis does not aim to fill such a gap, as it has already been thoroughly explored since the time of Schwarzer's writing. Nonetheless, it recognizes these contributions, particularly considering how shifts at the beginning of the twenty-first century, influenced by the digital turn, have overshadowed these essential reconceptualizations of nineteenth-century theory. Despite this shift, the foundational theoretical roots remain crucial; without the complex relationships within tectonics, "form" in architecture risks being reduced to a simplified, image-based category.[253]

Returning to Schwarzer's detailed analysis, his book revisits a constellation of thinkers who had been largely neglected in canonical modern architectural histories, including Heinrich Hübsch, Karl Bötticher, Gottfried Semper, and Hermann Muthesius, each of whom plays a central role in this thesis as well. This section focuses on specific chapters from Schwarzer's book while also providing a summary of the overall rereading. What makes Schwarzer's book particularly valuable for this study is his method of interrelating philosophical concepts with architectural terminology. This section is not intended as a summary of this key book; rather, it highlights Schwarzer's dense textual rereading compared to Frampton's approach.

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[251] Schwarzer, xi.
[252] Frampton, xii.
[253] Goldhagen, 154.

Schwarzer's work is understood here as a key reference for linking the terminology of the tectonic debate with the foundational framework of architectural *Bildung*. The philosophical network that Schwarzer's reading reveals corresponds with interpretations of *Bildung* and contributes to the expansion of an evolving architectural vocabulary. Thus, this section presents a significant collection of knowledge, which this thesis aims to document and critically extend.

Among the key concepts elaborated by Schwarzer is style, which he defines not merely as a formal category but as a cultural system that organizes knowledge. Schwarzer explains the nineteenth century as marked by a "battle of the historical styles," as architects sought new sources for architectural making after the decline of the classical paradigm. This debate initially focused on the Greek and Gothic revivals but eventually included styles such as those of the Italian Renaissance, German Renaissance, and Austrian Baroque. Schwarzer defines both tectonics and style as "systems" that organize knowledge. According to him: "The styles were models for the creation of a new, unified cultural system" and styles provide "promised artistic and monumental continuities" for architectural cultures.[254]

Schwarzer argues that styles, "despite their intentions," were closely tied to the fragmenting forces of modern knowledge, and he notes that the subjective imagination encouraged by historic styles, as celebrated by medieval revivalists, was, by definition, modern.[255] These styles, he suggests, expressed the dual articulations of structure and art, or more precisely, technological and scenographical qualities. He states that the union of these double articulations, favored by some theorists of Hellenic forms, is also modern.[256] Schwarzer also underlines that styles as systems relate historical making(s) to contemporary cultures. Most architectural theorists attempted to create a bridge between historical realities and contemporary

[254] Schwarzer, 36.
[255] Schwarzer, 37.
[256] Schwarzer, 37.

culture, treating styles as both theatrical expressions and theoretical frameworks for examining continuity and transformation within architectural practice.[257] Parallel to the first argument of this thesis, this bridge accommodates various theoretical inputs. Following the understanding of the style as a system, Schwarzer refers to Hübsch's definition, which defines style "as an analysis of contemporary material conditions."[258] He also underlines Semper's identifications of style, highlighting his philosophical view of style as a developmental and evolving process.[259] According to Schwarzer, "important images of permanence and continuity were undone by the accumulation of historical knowledge itself."[260] The nineteenth century, viewed as a century of *Verstandesarbeit* (intellectual labor), was significant in this regard because the exploration of past knowledge was primarily epistemological. According to Schwarzer, since architectural theory could not construct a relationship between "individual and society through historical consciousness," historical styles became fragmented and competing paradigms that are isolated to be defined through complete distinctions.[261] He proposes that: "The more the styles were sequestered, the less apparent was their connection to either architectural traditions or contemporary problems."[262] In his book, Schwarzer examines this issue and various other theoretical developments across different chapters, each addressing specific aspects of architectural theory and its historical ruptures.

Schwarzer's rereading is significant because it reassesses historical styles and reveals an overlooked connection between these styles and modern theories. He illustrates how styles encompass both scenographical and technological elements throughout their historical development. Through this perspective, Schwarzer emphasizes that style is not merely a collection of categories but a complex cultural

[257] Schwarzer, 37.
[258] Schwarzer, 51.
[259] Schwarzer, 73.
[260] Schwarzer, 83.
[261] Schwarzer, 87.
[262] Schwarzer, 87.

system, far more intricate than its traditional, one-dimensional classification. This reinterpretation highlights the strength of style as a dynamic, evolving, and "modern" concept.

In a related chapter, Schwarzer addresses "the industry of tradition," analyzing how applied arts and architecture responded to the rise of industrial production. He shows that twentieth-century ideals of functionalism and utility were paradoxically rooted in nineteenth-century efforts to confine artistic production within historical and traditional frameworks. According to Schwarzer, the discourse of the period revolved around the tension between tradition and innovation.[263] In the 1850s and 1860s, the search for unity between art and industry gave rise to the *Vorbilderbewegung* (movement of historical prototypes), particularly in newly founded applied arts museums and schools. As a result, architecture itself became another "interface to unify art and industry."[264] These institutions positioned architecture as a mediator between artistic heritage and technical advancement. As Schwarzer notes:

> For *Kunstgewerbe* theorists, the importance of both historical art (from the academic tradition) and contemporary science (from the technical schools) resulted in interrelated theories of historicism and utilitarianism. The discourse on *Kunstgewerbe* contained the contradictory, yet integrative, impulses characteristic of modernity in architecture and the applied arts.[265]

These integrative yet conflicting impulses shaped the modern discourse in both architecture and the applied arts. The next chapter of this thesis will further explore the *Vorbilderbewegung*, focusing on its influence in modeling and form-making practices.

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[263] Schwarzer, 91.
[264] Schwarzer, 102.
[265] Schwarzer, 102.

Expanding these relationships, Schwarzer, using the key term "tectonics," examines the productive grounds of the nineteenth century caught between the extremes of realism (materials and construction) and idealism (abstract symbolism and art); the quest for balance between them resulted in new foundations for architectural knowledge. The tendency toward theoretical compromise, known as "tectonics," created the complex interplay of aesthetic idealism and scientific empiricism that later developed into modern theories of architecture.[266]

As discussed in the first part of the glossary under the title "*Kernform* and *Kunstform*," *Tektonik* was a significant architectural debate of the nineteenth century that engaged with and responded to the artistic symbolism associated with new materials and the construction technologies of industrial culture.[267] Schwarzer refers to Alan Colquhoun's statement: "This 'inner necessity' was capable of either an idealist interpretation (an invisible spirit giving direction to material causality) or a 'scientific' interpretation (based on efficient causes and empirical investigation)." The significant aspect of these double articulations stems from the complex and dual relationships between philosophy and architecture, which play a crucial role in structuring this research. Schwarzer also notes: "Like philosophers, nineteenth-century architectural theorists also contemplated the unification of nature and mind, building and art. However, in their schemes, neither natural matter nor inner thought was dominant."[268]

The theories of Bötticher, Semper, Wagner, and others borrowed a great deal from Hegel's philosophy and its repercussions in German aesthetics, and philosophers also referred to the double articulations of Bötticher, Semper, and other thinkers and makers of the nineteenth century.[269] As Schwarzer highlights the strong relation of

[266] Schwarzer, xiv.
[267] Schwarzer, 167.
[268] Schwarzer, 170.
[269] Mallgrave and Ikonomou.

architecture to epistemologies as well as ontologies, the *Tektonik* debate could be thought of as one of the most significant generators of this expansion in the understanding of architecture.[270] The following sentence summarizes his position in the most precise way:

> Knowledge, as much as building, was a mode of production. Consequently, it was unclear how to coordinate new functional demands with emerging technologies for building. And it was another matter altogether to envision how a set of unifying symbols would embrace, explain, and elevate these technologies.[271]

Schwarzer also examines how these tensions influenced the development of new artistic movements, such as *Moderne*, *Jugendstil*, and the *Werkbund*, between 1890 and 1910. These movements built on earlier romantic traditions but placed greater emphasis on psychological and physiological aspects. In response to increasing fragmentation, architectural debates in nineteenth-century Austria and Germany aimed to re-stablish a shared design language. These discussions continue to be relevant today, as they reflect ongoing efforts to address the challenges of modernity.[272] Their internal contrasts helped lay the groundwork for later architectural theories.

One of these significant contrasts in the nineteenth century followed the work of theorist Ferdinand Tönnies "*Community and Society (Gemeinschaft und Gesellschaft),* as Schwarzer mentions. He makes distinctions between two terms.

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[270] The core ideas in Schwarzer's rereadings are discussed in detail in the first part of the glossary, particularly in relation to the foundational concepts of nineteenth-century tectonic theory.

[271] Schwarzer, 212.

[272]Schwarzer.

The contrasts between unity and plurality, individuality and commonality, and subject and state were the most significant contributions to nineteenth-century architectural theory. During these debates, architectural theory was still influenced by the writing traditions found in classical treatises. Marc Antoine Laugier, Claude Perrault, Leon Battista Alberti, and Vitruvius were frequently referenced by nineteenth-century scholars. The blending of premodern and modern identities was one of the greatest sources of conflict within nineteenth-century architectural theory.

While *Gemeinschaft* connotes order, totality, collective, and perfect unity; *Gesellschaft* connotes disorder, separation, isolation, individuality, and arbitrariness.[273] In between *Gemeinschaft* and *Gesellschaft,* "expressive feeling and scientific exactitude"[274], "tradition and innovation"[275], the nineteenth century contradicts the non-diverse relationship with "historicism" linked to the discourse of that time. Therefore, the diversity of relations with historical consciousness will be emphasized.

This multiplicity was later captured by Heinrich Goesch, who, as Schwarzer notes, identified four possible theoretical hues of relations between architectural design and historical consciousness.[276] *Neuschaffung* ("new creativity") represents radical innovation, divorced from historical models and anticipating modernist positions. *Anknüpfung* ("seamless connections") involves adapting traditional systems to new conditions. *Wiederbelebung* ("restoration") revives past styles without transformation, marking the most conservative strand. This approach is less interpretative, and it is not diachronic like *Anknüpfung*. It represents the most conventional and non-interpretative "historicist" approach associated with nineteenth-century discourse. Finally, *Bereicherung* ("enrichment") draws from history with imaginative interpretation, offering an overlooked but significant path bridging past and future. This final approach may be the most neglected within early twentieth-century architectural theories, as it has a clear relation to the so-called "historicist" tendencies of plurality in premodern ideas. These hues present the transition of architectural knowledge from archaeological, which is fixed, to historical, which is changing and interpretative.

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[273] In different texts, both Richard Sennett and Mitchell Schwarzer mention the distinction between *Gemeinschaft* and *Gesellschaft* as drawn by Tönnies.
[274] Schwarzer, 50.
[275] Hvattum, 1. In his manifesto *Das Kunstwerk der Zukunft* (1850), Richard Wagner characterised the nineteenth century as a time of crisis. "It is a dilemma played out in the tension between continuity and innovation: the desire to maintain tradition while at the same time find genuine expressions for contemporary culture."
[276] Hvattum, 21.

Schwarzer's rereading is highly significant and foundational for the present study. Although his work was published more than two decades ago, its discussions remain relevant today. According to Schwarzer, the nineteenth century was labeled as "unmodern". He argues that, unlike the incomplete state of modernity in the nineteenth century, the modern movement of the twentieth century was viewed as a fully actualized historical condition.[277] Schwarzer further clarifies this simplification by noting that canonical historians, rather than acknowledging the complexities of historicism, simplified and codified modernity within a rigid framework. As a result, modern architecture was portrayed as a clear, progressive trajectory toward a singular, liberating formal language, overlooking the nuanced and intricate debates that characterized the nineteenth century. Schwarzer proposes that "the contemporary altercations are more constitutive of architectural modernity than the rather short-lived period of the modern movement as an epistemological paradigm."[278] He recognizes late twentieth-century debates as a significant epistemological layer to better understand nineteenth-century discussions on modern architecture, which can be expanded to the millennial turns.

Schwarzer's rereading of nineteenth-century architectural theory is also significant in positioning style, tectonics, and aesthetic philosophy within a broader intellectual framework. The tensions between historicism and modernity, scenographical and technological, and unity and plurality are highlighted in his work on various scales and continue to impact contemporary architectural discourse. Schwarzer's insights and philosophical inquiry contribute to the ongoing reassessment of nineteenth-century thought.

Importantly, Schwarzer's work also resonates with the epistemological structure of *Bildung*, particularly in its emphasis on the evolving relationship between historical understanding and architectural formation. His interpretations mirror the

[277] Schwarzer, 14.
[278] Schwarzer, 25.

reflexive double structure of *Bildung* by tracing how architectural terms and concepts developed through dialogical and often conflicting traditions. In this way, *Bildung* becomes not only a background theme but an operative framework through which architectural modernity can be reinterpreted. This thesis positions *Bildung* as a critical lens for rethinking architectural knowledge, making his work a central reference throughout this study.

Questions: ANY Issue 14, 1996, "Tectonics Unbound: *Kernform* and *Kunstform* Revisited"

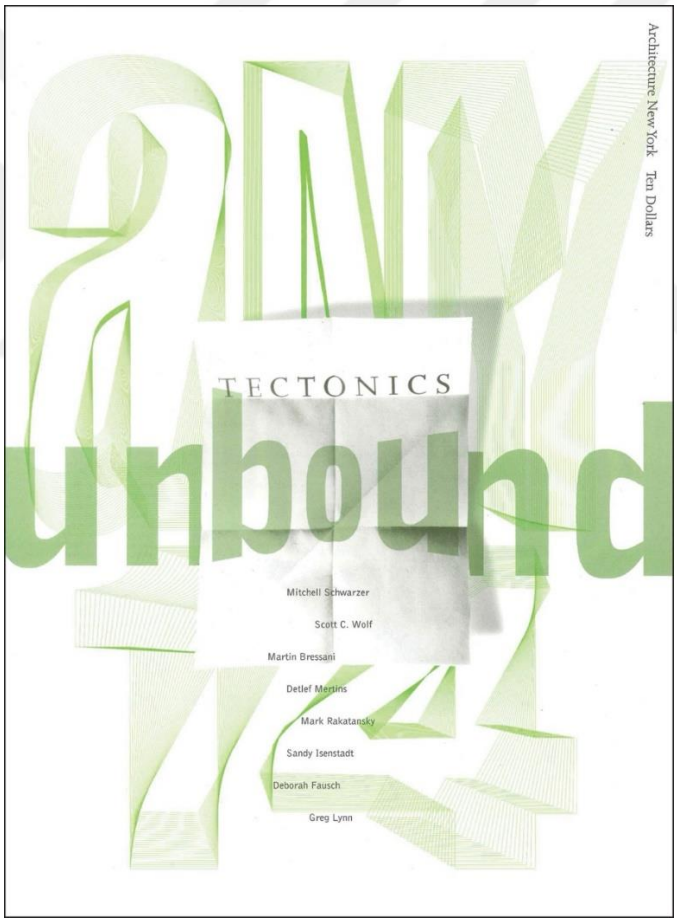


Figure 2.30 Cover of *ANY 23:* "Tectonics Unbound, a special issue of ANY (Architecture New York)" exploring contemporary interpretations of tectonics. Contributors include Mitchell Schwarzer, Scott C. Wolf, Martin Bressani, Detlef Mertins, Mark Rakatansky, Sandy Isenstadt, Deborah Fausch, and Greg Lynn. Source: *ANY: Architecture New York* 14 (Special Issue: *Tectonics Unbound: Kernform and Kunstform Revisited*) (1996).

As stated in the previous section, the 1980s and 1990s were significant periods concerning the resurgence of nineteenth-century tectonic theories. The intriguing point here is that while the input of tectonic theories remained consistent, they lost both their technical dimension with postmodern readings on the one hand and their scenographical dimension on the other. Around this time, Mitchell Schwarzer edited a special issue of *ANY: Architecture New York*, titled "Tectonics Unbound: *Kernform* and *Kunstform* Revisited" (Figure 2.29). This discussion is presented separately from that of Schwarzer's other research, because unlike his earlier historical studies, this *ANY* issue shifted the discourse toward newer theoretical positions, reinterpreting tectonics through a contemporary lens.

This section, titled "Questions," brings together essays that challenge or reframe the nineteenth-century dualism of tectonic theory. Schwarzer notes that the *ANY* issue seeks to move beyond the limitations of the so-called "rational project" of tectonics, recovering overlooked strands and proposing a more open, hybrid discourse on architecture's constructional and representational dialogues.[279] Contributions by Scott C. Wolf, Martin Bressani, Detlef Mertins, and Mark Rakatansky trace the development of tectonic thought from the 1830s to the 1960s. Each focuses on a specific trajectory. Bressani considers Viollet-le-Duc, Mertins dwells on Benjamin's transformation of Bötticher's dual terms and the hermeneutics of origins into an immanence within representation, and Rakatansky examines the tectonic acts of desire and doubt through the lens of Kahn's architectural thinking.[280] Deborah Fausch, Sandy Isenstadt, and Greg Lynn reconsider tectonics over the last twenty-five years to discuss postmodern pluralism. Isenstadt proposes a third category of *Sitteform* in addition to *Werkform* and *Kunstform*, based on the German word for "custom" or "convention." This term requires from architecture an account of human

[279] The definition of tectonics as mixed discourse is a paralel theoretical reflection to define *Bildung* within the cultural codes of architecture. Mitchell Schwarzer. Tectonics Unforeseen, Tectonics Unbound: Kernform and *Kunstform* Revisited, ANY: Architecture New York 14 (1996).
[280] For more see: Tectonics Unbound: Kernform and *Kunstform* Revisited, ANY: Architecture New York 14 (1996).

agency, but it allows that agency may at times be institutional inform.[281] Both Fausch and Isenstadt explore new definitions, while Lynn redefines tectonics in a more figurative way.

Revisiting this issue is especially relevant in the context of attempts in the 1990s to reframe tectonic theory. These reinterpretations resonate with the concept of *Bildung*, which this thesis approaches as both an epistemological and operational framework for architecture. Rather than surveying every contribution in the issue, this section focuses on a selection of key propositions, particularly those put forward by Deborah Fausch. The issue includes essays that question rigid distinctions between the constructional/functional core of the discipline and aspects of art/theory. Schwarzer, in the editorial text, defines tectonics as a "product of ideas as well as a construction of products" and describes tectonics as discourse, which serves as a key definition for tracing tectonics within the context of an architectural *Bildung*, remembering its definition as "both the process and the product."

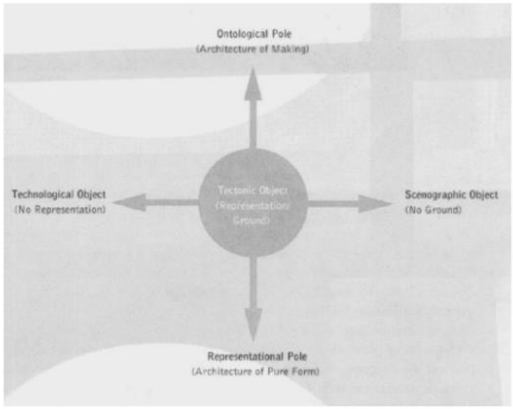


Figure 2.31 Deborah Fausch's diagram positioning the "Tectonic Object" at the intersection of four conceptual poles: Ontological (Architecture of Making), Representational (Architecture of Pure Form), Technological object (No Representation), and Scenographic object (No Ground). *Source: ANY: Architecture New York* 14 (Special Issue: *Tectonics Unbound: Kernform and Kunstform Revisited*) (1996).

[281] Sandy Isenstadt, "Spectacular Tectonics," *ANY: Architecture New York* 14 (Special Issue: *Tectonics Unbound: Kernform and Kunstform Revisited*) (1996): 47.

Deborah Fausch's contributions serve as a central point of departure here, and particularly her conceptual diagram, which plays a key role in this discussion. In this thesis, the diagram is reinterpreted as a model that visualizes the conceptual field of the glossary. Referencing Deborah Fausch's diagram, this chapter highlights the projected terms "scenographical" and "technological" as representational and ontological, as they illustrate the hybrid condition of the tectonic object and can pave the way for other contributions to expand it. Referring to the introductory diagram (Figure 2.30), Fausch's description can be regarded as the juxtaposition between imitative and formative approaches in the late twentieth century, which learns from the shifts within the nineteenth-century. Fausch frames her core argument around a critical question: What relevance does tectonic theory hold for postmodernism? She suggests that, despite their apparent differences, the two postmodern responses of "architecture of making" and "architecture of pure form" share a common theoretical foundation. Both are reactions to the reduction of modern architecture to surface imagery, and both are attempts to move beyond representation by returning to questions rooted in nineteenth-century tectonic theory. They engage with the same structural framework of architecture as representation, yet each seeks a renewed objectivity from opposing directions.[282]

Fausch builds on this foundation by asking why Mark Wigley returns to a definition of architecture that separates structure from representation, a division rooted in nineteenth-century tectonic theory. This conceptual split became central to postmodern discourse, renewing interest in tectonic frameworks. To navigate this, Fausch draws on Kenneth Frampton's distinctions between the technological, tectonic, and scenographical object. Of the three, the tectonic object holds a hybrid position, encompassing both technical and symbolic dimensions. Frampton notes a

[282] Deborah Fausch, "The Oppositions of Postmodern Tectonics," *ANY: Architecture New York* 14 (Special Issue: *Tectonics Unbound: Kernform and Kunstform Revisited*) (1996): 49. In the diagram, Fausch defines a tectonic object as being in between ontological and representational poles and technological and scenographical objects.

complexity within the tectonic object, which includes both structural-technical and structural-symbolic aspects, representing both construction and interpretation.[283] He describes the tectonic object as existing in a delicate balance between opposing forces, particularly between the ontological and the representational.[284] Here, it is significant to underline the plurality of positions in terms of architectural making processes by considering the conceptual interval between the scenographical and technological aspects in which the tectonic object is defined. Accordingly, Fausch presents the previously mentioned diagram to illustrate the position(s) of the tectonic object and adds two layers (Figure 2.30). She states that two major reactions to the transformation of modernism into an architecture of image, or what she terms the "architecture of making" and the "architecture of pure form," are inherently linked despite their apparent contrast. She argues that both approaches stem from the same theoretical framework and respond to a shared problem. Each is situated within the nineteenth-century tectonic tradition, which conceptualizes architecture as representation, yet both attempt to move beyond its limitations in pursuit of a new, objective foundation for architecture.[285] Fausch's definition of the architecture of making corresponds to the ontological aspect of Frampton's technological object. This theory focuses on construction, emphasizing the physical entities of structures and eliminating any representational elements. On the other hand, the architecture of pure form defines the architectural form devoid of any extra formal meaning. It can be argued that this viewpoint aligns with the representational aspect of the scenographical object in Frampton's framework, where opposites are balanced:[286]

> In the search to resolve the problem of representation, the two poles of Frampton's dyad move in opposite directions. While the architecture of making reacts to the increasing abstraction of commodity culture by asserting architecture as presence, thus tending toward the expressive position of the technological object, the architecture of pure form celebrates this loss of body

[283] Deborah Fausch refers to Frampton's renowned article "Rappel d'ordre". Fausch, 50.
[284] Fausch, 50.
[285] Fausch, 49.
[286] Fausch, 50.

> (human, structural, even, material) as referent - indeed, the absence of any referent whatever - and moves toward the sublime groundlessness of the scenographic commodity.[287]

Deborah Fausch's diagram expanding Frampton's theoretical structure on tectonics is significant as it illustrates the in-between condition of the tectonic object and can pave the way for including new dualities in this glossary. While the "architecture of making" and the "architecture of pure form" appear to be diametrically opposed approaches to postmodern architecture, Fausch argues that they are united by a shared theoretical foundation in nineteenth-century tectonic theory. Both movements arose in response to the reduction of modernism as an "architecture of image" and aimed to create an objective foundation for architecture that transcends the challenges of representation. Both the "architecture of making" and the "architecture of pure form" inherit this framework, but they differ in their methods of achieving objectivity beyond representation. Although these two definitions are significant in further elaborating on Frampton's tripartite distinction, a critique of the use of the words "making" and "form" corresponding to the ontological and representational poles is also necessary. Crucially, understanding these positions contributes to a broader interpretation of *Bildung* as a dynamic interplay between form and formation. The terms "making" and "form," when reconsidered through the lens of *Bildung*, move beyond their ontological and representational poles. In nineteenth-century German architectural thought, "making" encompasses not only physical construction but also cultural and intellectual production, while "form," with its etymological depth and conceptual contrast to *Gestalt*, denotes a processual and plural mode of shaping. As such, both terms point toward a reflexive condition—*Bildung*—in which architecture is understood not merely as an object or system, but as an evolving, epistemological practice.

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[287] Fausch, 50.

Fausch exemplified the "architecture of making" through examples from Mario Botta's work, extending the logic of tectonic theory by pursuing objectivity in materiality and presence. This emphasis on "making" aims to eliminate representation entirely and ground architecture in a direct experience of the built form. Fausch refers to the significance of site in the architecture of making by underlining site as "an essential grounding principle that architecture presences from its grounding in the site."[288]

In contrast, "architecture of pure form" is exemplified through Peter Eisenman's work, which shifts the focus from material presence to formal autonomy and seemingly rejects the "originary logic" of tectonic theory. In this case, instead of focusing on materiality, "pure form" seeks objectivity in a formal method, aiming to create an architecture based on abstract, self-referential systems. Eisenman explores various strategies, including transformational grammar, decomposition, and the concept of "presentness." Fausch also underlines that while seemingly detached from material concerns, Eisenman's work still acknowledges the inherent materiality of architecture.

Eisenman himself defines architecture not as a binary but as a three-term system comprising presence, absence, and "presentness," or a suspended state between form, function, and being.[289] This formulation resonates with the core of this thesis: the structure of architectural *Bildung*. The "third term" emerges as an exploration of the in-between, projecting the reflexive position of the tectonic object within this framework. Here, reflexivity emerges as the "third term," mediating between imitative and formative processes.

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[288] Fausch, 56.
[289] Fausch, 55. Fausch cites: Peter Eisenman, "Post/El Cards: A Reply to Jacques Derrida," Assemblage 12 (August 1990): 16.

In sum, the "architecture of making" and "architecture of pure form" reflect divergent strategies that nonetheless share a common theoretical lineage. Both reinterpret the legacy of tectonic theory by addressing the relationship between construction and representation. Fausch's analysis, anchored in Frampton's categories, offers a conceptual bridge to this thesis's glossary of reflexive doubles, reinforcing the value of revisiting nineteenth-century debates through contemporary frameworks.

This emphasis on theoretical continuity is further explored in the *ANY* special issue with Scott C. Wolf's re-reading of Schinkel, which offers a deeper understanding of the philosophical foundations of historical tectonics. Drawing from Schinkel's notebooks, Wolf traces the architect's engagement with Johann Gottlieb Fichte's notion of *Selbstdarstellung* (self-representation), uncovering a four-phase development in Schinkel's thought. This analysis is especially significant for revealing the metaphysical underpinnings of Schinkel's tectonic theory and its implications for architectural *Bildung*.Wolf says:

> Schinkel's devotion to Fichte's Theory of *Selbstdarstellung* (Self-representation) is widely acknowledged, but there is little discussion of exactly how his theory of tectonics was grounded in Fichte's radical metaphysics and notion of self-representation. Fichte briefly transformed metaphysics to emphasize an absolute subjective reality that overcomes the dualism of mind and nature.[290]

In his article, Scott outlines four distinct phases of Schinkel's research on tectonic form, providing a crucial reevaluation that frames Schinkel's architectural thinking within the context of philosophical influences. Wolf defines Schinkel's first phase as occurring between 1815 and 1825. Schinkel's early phase focused on exploring

[290] Wolf, 18.

"primal forces" in nature and humanity as foundational to tectonic forms. Wolf refers to Schinkel's notebook:

> Architecture's necessary signs are thus the universal forces of the human will made visible in the building's tectonic forms and inner structural relations. Schinkel declared these immanent forces to include: Striving, sprouting, crystallizing, thrusting, dividing, bending, carrying, placing, cuddling, uniting, holding - lying and resting; the latter are opposed to the moving attributes but also imply a visible order and, as such, must be considered living acts; these are the prerequisites indicating life in architecture.[291]

In the second phase, after 1825, Schinkel articulated *Grundformen*, or "ground forms," as abstractions of historical motifs that reveal static forces and their aesthetic qualities. These forms focused less on technical construction and more on aesthetic perception, creating "a new objective order of reality." Wolf explains that in Schinkel's tectonic ground forms, visible structural forces are no longer representations of external things; instead, they act as "paratactic signs" of dynamic forces. As perceptual objects, they remain within the realm of illusion, using physical distortions such as entasis to enhance their visual and psychological impact.[292] After 1830, Schinkel's third stage marked a shift toward the creation of innovative designs without relying on historical styles. This phase saw the emergence of a "pure style of architecture" as Schinkel distanced himself from classical Greek models, experimenting with technical innovations like low vaults and minimalist ornamentation. He described this progression as an "escape from the Phantasma of history," signaling a freedom aligned with technological modernity. His final phase redefined architecture as a synthetic art form that can create entirely new perceptions and systems of knowledge. Schinkel regarded architecture as transcending language, which he criticized as "ambiguous" and insufficient for describing perceptual realities. Wolf describes Schinkel's ideas as follows:

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[291] Wolf, 20.
[292] Wolf, 20.

> While Schinkel admits that all representation exists in the domain of language, he considers words to be a mere collection of expressive sounds and individual perceptions of objects that become codified and eventually form ambiguous meanings. Historical tectonics defined language as a flawed means to describe perceptual reality because it lacks immediate reference to subjective existence. As such, language fades into a murmur of voices, the significance of which lies only in its dominant mood or sentiment. In effect, Schinkel made language like architecture: subject to tectonic perception.[293]

The four phases of Schinkel's tectonic research had a significant effect on architectural theories and methodologies and expanded to aesthetic philosophies of the era. Scott Wolf summarizes the significance of Schinkel's contributions. He states that historical tectonics, serving as the primary architectural theory under transcendental idealism, broke away from the rationalist French tradition by highlighting culturally relative perceptions, the evolving impact of technological advancements, and the complex network of social relations associated with architecture. After the decline of German Romanticism, Schinkel's successors redefined tectonics from a more positivist perspective, emphasizing a unified, technostatic expression that integrated the subject with structural transparency. As industrial modernism progressed, architectural history adopted this technostatic aesthetic, upholding the illusion of theoretical continuity. Schinkel's tectonic theory is especially intriguing due to its inherent contradictions, striving to reconcile tangible societal issues with deeply subjective representations and seeking to merging critical philosophical thought with architectural practice.[294] Schinkel's tectonic theory, as reinterpreted by Wolf, is especially intriguing in its inherent contradictions—reconciling societal concerns with subjective ideals, and to merge critical philosophical thought with architectural practice. This fusion of the material and conceptual forms a bridge to the final contribution in the *ANY* special issue: Greg Lynn's speculative take on the limits of tectonic discourse.

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[293] Wolf, 21.
[294] Wolf, 21.

In the final section, Lynn's essay, "Why Tectonics Is Square and Topology Is Groovy," revisits the historic ambitions of tectonic theory. In the introduction to his work, Lynn explains that tectonic discussions historically struggled to balance the specific and the universal. "Specific" refers to local and contingent aspects such as construction methods and spatial organization techniques, while "universal" relates to enduring spatial typologies embodying broader ideals. Tectonic theory has always involved negotiating between these localized present-day concerns and timeless typological models, but, as Lynn notes, traditional tectonic discourse had never addressed the emergence of the "blob" form.[295]

Consequently, Lynn states that blobs cannot be simplified into a typological essence: each blob is unique, its form and organization being deeply influenced by context and relying on exigent conditions for internal organization.[296] Lynn presents the "blob" as a challenge to traditional tectonic theory and states that the name comes from software that creates "Binary Large Objects." Blobs challenge typological classification and resist being simplified into basic geometric forms. Each blob is distinct, with its form determined by its context and the forces acting upon it. Here, the potential of complex geometries to define new architectural methods should be acknowledged. Although the discussion of "blobitecture" marked the beginning of a new architectural thinking, the focus on blob architecture was brief because Greg Lynn's approach overlooks a significant dimension of tectonic discourse: its role as a "knowledge system." Instead, his methodology emphasizes geometry generation, a focus that he claims contrasts with the perspectives of—in his words—"tectonic architects." On the contrary, the "blob" definition can be interpreted as reminiscent of the "internal-external" dialectic of form theories. The definition closely aligns with Hübsch and Semper's definitions of architectural style based on "formation," which does not rely on fixed a priori models but instead depends on external

[295] Greg Lynn, "Blobs, or Why Tectonics Is Square and Topology Is Groovy," *ANY: Architecture New York* 14 (Special Issue: *Tectonics Unbound: Kernform and Kunstform Revisited*) (1996): 58.
[296] Lynn, 58.

conditions and internal organization. Therefore, in contrast to Lynn's formulation, it can be said that blobs are strictly tectonic formations.

Greg Lynn remains consistent in his discourse, but his approach does not align with the dual articulation of tectonics that frames our discussion. However, revisiting his work within the context of its publication may still offer valuable insights. Lynn argues that the blob offers new possibilities for architectural design and construction. His exploration of the blob suggests a shift from an architecture based on predefined forms and typologies to one that embraces dynamic processes, relationality, and continuous variation. This approach challenged traditional tectonic theory and opened the way for new possibilities for architectural expression and construction in the late twentieth century, although it did not happen.

Other contributions in the *ANY* special issue by Martin Bressani, Detlef Mertins, Mark Rakatansky, and Sandy Isenstadt also enriched the 1990s' return to nineteenth-century tectonic theory. However, it is the essays by Fausch, Wolf, and Lynn that most sharply articulate how the legacy of tectonics continues to be reframed, reworked, and expanded within the context of contemporary architectural discourse.

An Evolving Vocabulary for Architectural *Bildung*

In examining the relationship between *Kernform* and *Kunstform*, it is clear that these ideas go beyond their historical roots, influencing architectural theory with greater complexity. Although Karl Bötticher's distinctions initially focused on structural logic and decorative expression, their reinterpretations reveal evolving perspectives on materiality, representation, and cultural relationships. In this section, these contributions have been organized under the four headings of "Translations," "Buildings," "Philosophies," and "Questions," each corresponding to a specific concern and mode of production. The relevant sources were specifically highlighted under each of these titles since their contents guided how this thesis traces scenographical and technological correspondences, particularly as they were

elaborated in the 1990s. By "revisiting" these "revisits," the intention here is to reveal the complexity of the tectonic debate and how revisits to the debate generate an evolving vocabulary contributing to this glossary defining an architectural *Bildung*.

Shape and Form: On Contemporary Definitions in the 2000s

This section of the glossary, titled "Shape and Form," represents the final reflexive double, following and synthesizing the previous two sets. Unlike the earlier doubles, however, it does not follow the same theoretical trajectory rooted in the German tectonic debate. Rather, it is included in the glossary as part of the broader trajectory because it proves significant for understanding the broader strands of architectural thought. While the previous doubles remain tied to nineteenth-century discourse, "Shape and Form" breaks free from the modern–postmodern debate, where the scenographical and the technological—together with the tectonic—have often been confined. By reframing these discussions through the lens of shape and form, this double opens up a more expanded field of reflection within the earlier contemporary architectural theory. This retroactive engagement, and its inclusion in the glossary, reflects a broader academic trend rather than an isolated method.

To better situate this glossary's final reflexive double, it is important to trace how recent scholarship echoes nineteenth-century epistemes through contemporary frameworks. The recent books, theses, and research practices has increasingly returned to nineteenth-century discourses and reconnected them with present-day architectural thinking. Before delving into early twenty-first-century interpretations of "shape" and "form," particularly through the lens of Robert Somol, an architectural theorist and professor at the University of Illinois Chicago, it is important to introduce several key works that frame this return to historical foundations. The contributions of Zeynep Çelik Alexander (architectural historian, Columbia University), John May (architect and theorist, Harvard Graduate School

of Design), Andrew Witt (architect and mathematician, Harvard Graduate School of Design), and Anna-Maria Meister (architectural historian and theorist, Karlsruhe Institute of Technology) are especially relevant here.[297] Each explores the analogues or genealogies of contemporary concepts from intersecting pedagogical, technical, mathematical, and bureaucratic perspectives. Their works reveal how present-day theoretical production is deeply rooted in longstanding ideas, practices, and instruments, reinterpreting them through the lens of "technics" and emphasizing their ongoing influence in shaping architectural knowledge.[298] Each employs a similar archaeological approach, incorporating diverse viewpoints, adding valuable insights to this research. By learning from the multiplicity and interplay between the doubles, such as machine innovation and formal innovation, visual resemblance and instrumental abstraction, technique and intuition, surveyed map and multivariable function, or hermeneuts and scanners, [299] this section of the glossary seeks to unveil a variety of concepts that may help revisit and better understand Somol's definitions of shape and form with a critical perspective.

This section is divided into three parts. First, it revisits a wide range of histories presented through the aforementioned scholars' works. Second, it examines Somol's definitions of shape and form, including his collaborative work with Sarah Whiting on the "Doppler Effect." Third, it projects definitions of shape and form onto broader discussions, expanding the discourse in terms of scales and methods, with particular emphasis on the reflections of Pier Vittorio Aureli and Hans Tursack. As an additional note, it is important to keep in mind that this initial part of the glossary aims to combine two seemingly unrelated areas of reading: current historical-theoretical discussions and turn-of-the-century discourse on contemporary

[297] These scholars' methodologies, and especially their focus on analogous roots and modes of making, align closely with the approach of this thesis, which seeks contemporary connections through historical conceptual frameworks; while there are other relevant researchers, the works presented here are among the most comprehensive in scope.
[298] Çelik Alexander and May.
[299] Andrew Witt, *Formulations: Architecture, Mathematics, Culture* (Cambridge, MA: MIT Press, 2022).

architectural thought. This combination reveals the unforeseen connections between them.

Revisiting "Analogous Roots":[300]

Although it may initially seem far removed from shape and form theory, this section introduces the shape/form double by tracing its resonance within contemporary architectural discourse. The approach here parallels the broader methodology of this thesis: revisiting historical frameworks and reactivating them in current debates. It begins with Andrew Witt's notion of "analogous roots," which foregrounds how contemporary architectural production draws from historical systems of knowledge, tools, and practices.[301] Rather than reviving them literally, these historical modes are adapted and transformed within present-day contexts. From that perspective, this section reassesses the multiplicity of influences that shape today's architectural theory, situating current ideas within deeper and often overlooked genealogies.

This research likewise adopts a nonlinear understanding of history as a dynamic reservoir of concepts and operations, not a static archive. In this context, we can say that contemporary architectural discourse often emphasizes non-architectural evaluations of computational tools. However, the knowledge and theory of the evolving hybridity of architectural thought should become the main focus. This approach necessitates a new hybridity that encompasses both analogous-historical-actual and digital-timeless-virtual relations. This section presents a range of contributions on these combinations, covering various relations including mathematical, psychological, pedagogical, philosophical, and bureaucratic filters.

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[300] Witt states "We ultimately find analogues of the contemporary graybox method in architecture's much earlier co-option of mathematical technique into design."
[301] Witt.

The work of Andrew Witt (b. 1979), an architect and researcher, is especially relevant in framing contemporary architecture's engagement with historical epistemologies. In his book *Formulations*, Witt introduces the concept of "Design's Knowledge Cultures" to describe how architecture draws from and interacts with other disciplines through shared tools and modes of representation. He explores the frontiers of creative rationality, positioned between historical lexicons, mathematical drawing, and painterly techniques that transitioned into algorithmic thinking.[302] He refers to "model" as a "static formal archetype" and "instrument" as encapsulating technologies of underlying rules in architectural cultures.[303] Witt's definitions include another renowned term, "cabinet," which is related to the collections of affinities that are the "amalgams of artifacts shap[ing] the creative horizon of the designer as a repository of ur-forms and desire-objects which inevitably inflect the acts of visualizing and making."[304] Witt's revisit to "analogous" roots refers to the cabinets and manuals, which are highly relevant in terms of understanding the strands of models and instruments, and even shape and form. He states:

> In an analogous way, collections of scientific models and instruments form specific relational organizations of objects, thus, particular ontologies and epistemologies. These organizations are displayed and socialized in exhibitions and collection cabinets, or in printed catalogs and manuals. Cabinets organize canons of objects, while manuals detail the use of these objects. To use the philosopher Jurgen Habermas's distinction, cabinets and manuals embody the difference between "know-that" and "know-how." The cabinet collects the "thats" (a collection of forms) and the manual outlines the "hows" (a collection of operations).[305]

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[302] Witt, 14-17.
[303] Witt, 19. "If the model was a static formal archetype, architects also encountered dynamic mechanical instruments that encapsulated mathematical knowledge. Such technologies -drawing, surveying, projecting, and seeing machines, for example-encapsulated the underlying rules of which physical models were individual specimens."
[304] Witt, 20.
[305] Witt, 20.

He mentions "tactics of cabinets," which is based on collecting and creating a cabinet of encoded forms. He reads the spatial inputs of computers through the analogous "tactics of cabinets" that "create a Wunderkammer of algorithms, a cabinet of form- and space-making tactics."[306] Another comparative/twofold relation that he underlines is the "changing definition of model" that could be both visual resemblance and abstract instruments. To better explain, Witt also refers to nineteenth-century double relationships: machine innovation and formal innovation, mathematical technique and intuition, surveyed maps or triangulation and multivariable functions or instruments.[307] Accordingly, he identifies two distinct types of models: the architectural model, which is based on visual resemblance and material expression, and the scientific model, which operates through numerical abstraction and underlying structural logic. When these two poles are considered together, they reveal a broad spectrum of design practices. While architectural models spark imagination through their physical forms, scientific models depend on abstract mathematical relationships. However, with the rising use of digital tools in design, the lines between these approaches have become increasingly blurred as techniques from the exact sciences subtly influence architectural processes.[308]

Witt's reading of model(s) is very relevant and interesting in terms of thinking about constructed nineteenth-century dichotomies today. He proposes a "continuum" between these definitions and focuses on models that lie on a spectrum between architectural and technoscientific that will help us to critique and blur the dichotomy between visual resemblance and instrumental abstraction that currently dominates model discussions.[309] Witt also emphasizes that the separation between instrumental knowledge and formal implications after the nineteenth century undermines the

[306] Witt, 25.
[307] Witt, 55.
[308] Andrew Witt, "Shadowplays: Models, Drawings, Cognitions," *Log*, no. 49 (2020): 29.
[309] Witt, 30. "By attending to models that are on a continuum between architectural and technoscientific the dichotomization of visual resemblance and instrumental abstraction that dominates discussion of models can be critiqued and perhaps overcome."

formal limits of architectural culture. He suggests that if instrumental knowledge had been recognized as a fundamental component of architectural knowledge, the machine culture within architecture could have been properly understood as part of the ongoing development of the field. This perspective would integrate our current computational culture as a continuous strand of history and epistemology dating back to the nineteenth century.[310]

Witt extends his model continuum by comparing the acts of reading and scanning, not as binary opposites but as complementary processes. Reading is a synthetic, interpretive act; scanning, in contrast, encodes visual data into machine-readable form.[311] Rather than a split between human and machine cognition, these modalities reflect architecture's hybrid nature. For Witt, mathematics serves as a bridge between the two, operating both as a hermeneutic tool and as a generator of form.[312] This dual operation parallels his continuum of models from visual resemblance to abstract instruments, showing how architectural knowledge-making remains embedded in both symbolic interpretation and technical execution. Mathematical relations can sustain and leverage the distinct properties of reading and scanning, ultimately extracting the interpretative qualities essential to architectural thinking.[313]

Although only a small part of Andrew Witt's work is referenced here, his research has significantly influenced this study. His combinatory suggestions regarding paired terms such as model and instrument, forms and operations, and scanning and reading, which are especially crucial for expanding the proposed double-structured glossary. Revisiting the analogous roots between mathematics and architecture aids

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[310] Witt, 57.
[311] Andrew Witt, "On Legibility: Machine Readable Architecture" in *Disruptive Technologies: The Convergence of New Paradigms in Architecture*, ed. Philippe Morel and Neil Leach (Chichester, UK : Wiley-Academy, 2005).
[312] Witt, 2022, 392.
[313] Witt, 392.

in understanding current perspectives that relate to the strands of millennial definitions of shape and form.

Another contemporary revisit to the nineteenth century is found in Zeynep Çelik Alexander's comprehensive study that highlights "kinaesthetic knowing" through the century's philosophical, psychological, and pedagogical theories. Her book, *Kinaesthetic Knowing: Aesthetics, Epistemology, Modern Design*, traces various operational frameworks and educational methods that influenced architectural thinking then and now. The book begins by explaining "kinaesthetic knowing" and its complex theoretical and practical relations, overlapping with philosophies, pedagogies, and psychologies in the nineteenth century. Each act in the following chapters, including looking, affecting, drawing, and designing, is explained through significant conceptual and institutional relations. The research presents the historical analogous roots that inevitably form a new narrative that refers not only to the "no longer" histories but also to the "not yet" discussions of today's ways of knowing and thinking.[314] The overall idea could be read as a precise historical exercise of post-human thinking, which is "the creation of new concepts and navigational tools to help us through the complexities of the present."[315] According to Çelik Alexander, "neither form nor formalism could have emerged to become the central concepts that they are in histories of aesthetic modernism without the specific techniques -looking, feeling, analyzing, describing, drawing, or designing- that were devised alongside them."[316] She says that the nineteenth-century project of kinaesthetic knowing related to expanding out of the renowned antinomies of Enlightenment.[317] The kinaesthetic knowing itself occurred within the complex networks of binary oppositions. This nineteenth-century way of knowing

[314] Rosi Braidotti, *Posthuman Knowledge* (Cambridge: Polity Press, 2019).
[315] Baridotti.
[316] Zeynep Çelik Alexander, *Kinaesthetic Knowing: Aesthetics, Epistemology, Modern Design* (Chicago: The University of Chicago Press, 2018), 22.
[317] Çelik Alexander, 60-61.

was unable to shake off the binary logic of these oppositions and "ur-types, ur-sensations, primary shapes and colors, or the preliminary course."[318]

The highly relevant and contemporary relation of nineteenth-century kinaesthetic knowing to the current complexities of knowing also includes other acts that are understood within comparative and binary positions. One of the many that Çelik Alexander highlights is the nineteenth-century binary of hermeneut versus the early twentieth-century scanner. The concept of non-reading, as she describes it, is "an activity for a subject suspended precariously between education and illiteracy."[319] She continues with a reference to the journalist Hans Siemsen:

> unlike the nonreader of the past, who, before widespread literacy campaigns, had to make do with looking at the pictures of the Bible, the twentieth-century nonreader in fact read a lot…. Instead of texts, however, the modern nonreader perused newspapers, illustrated magazines, ad pillars, billboards, and façades covered with advertising.[320]

This condition, Çelik Alexander argues, evolved alongside a new visual regime shaped by Wölfflin's model of *comparative looking* at the turn of the century. It transformed how individuals engaged with images, shifting from hermeneutic interpretation to rapid scanning. The nonreader was affected by the doubles of the late-century selfhood models: first by pedagogical *Bildung*'s hermeneutic techniques and then the mechanistic self-composed of disparate sensations. Thus, with the influence of comparative looking, the nonreader engaged with images differently than the nineteenth-century hermeneut and the twentieth-century scanner.[321] A related dimension in Çelik Alexander's study is seen in her attention to the comparative and binary positions embedded in drawing operations: copying, which includes redrawing (*nachzeichnen*), imitating (*nachahmen*), and reexperiencing

[318] Çelik Alexander, 60-61.
[319] Çelik Alexander, 87
[320] Çelik Alexander, 79.
[321] Çelik Alexander, 87.

(*nacherleben*), which is an interpretative drawing. She dwells on the curriculum of the Debschitz School, where copying and imitating were prohibited, unlike the academy, where copying was a prerequisite to imitation. Obrist and Debschitz promoted an embodied reexperiencing (*nacherleben*) of forms, dismissing techniques like redrawing (*nachzeichnen*) and imitating (*nachahmen*).[322] These interesting combinations, defined within the same time frames, are seen as creative inputs that are important to reconsider in today's discussions. Çelik Alexander's research, similar to Witt's, is among the most comprehensive research from which this thesis could draw in justifying why nineteenth-century theories, especially in architectural thinking, are worth revisiting and reclaiming due to their enduring relationship with aesthetics philosophy.

Similar to her book on kinaesthetic knowing, her work with John May, *Design Technics*, also follows the "analogous roots" of contemporary ideas, presenting alternative perspectives to understand ways of thinking within a framework that emphasizes the original "technics." The intersection of architectural practice and technological advancements is explored through various lenses: rendering, modeling, scanning, equipping, specifying, positioning, and repeating. Çelik Alexander states that the book pursues the possibility of the beginning of a new architectural theory through a reexamination of the question of technics.[323] In the introduction, she interrogates the term "technics" and its reduced understanding in current discussions. She observes that while technics has become increasingly central to architectural education and practice, reflected in technical coursework, software training, and the justification of design decisions as technical solutions, this growing emphasis has not been matched by critical analysis. Instead, she argues, the broader concept of technics has been narrowed, reduced mainly to technical know-how and problem-solving without deeper reflection.[324]

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[322] Çelik Alexander, 141.
[323] Çelik Alexander and May, xviii.
[324] Çelik Alexander and May, ix.

Her critique of the reductionist understanding of the term "technics" is followed by another interrogation, this time addressing the term "technology." She explains that the term "technology" underwent significant changes before the twentieth century. Originally, the English word "technology" merged two meanings inherent in the German word "*Technik*," which can refer to either artifacts or procedures. In English, these meanings became distinct as "technology" and "technique." As "technology" became more common in the Anglo-American world, especially after the 1930s, it shed its older meanings related to grammar rules and the study of useful arts, mechanical arts, or applied science. Meanwhile, the term "technics," which once closely mirrored the dual meaning of "*Technik*," became increasingly outdated.[325]

These inquiries into terms that are widely overused without knowledge of their origins and relations are beneficial as their origins reveal how these terms are in direct relation not primarily with the product but rather with the procedures, processes, and ways of making or becoming.

Çelik Alexander explains "scanning" by referring to two different scanning devices from the twentieth century to better decode the history of a concept that has been central to modernism in general and to the design disciplines specifically: the concept of form.[326] The variations between the two referenced devices stem from their scanning techniques for formal structures. One device detects patterns in fragments, while the other identifies the overall "*Gestalten*" that are known and familiar.[327] This double is explored in Adolf Hildebrand's aesthetic philosophy, particularly his distinction between two extremes of perception: the distant view, which presents a unified whole (*Gesamtbild*), and the near view, which assembles fragmented impressions. While the distant view yields form, the near view leads to formlessness,

[325] Çelik Alexander and May.
[326] Çelik Alexander, 71.
[327] Çelik Alexander, 71.

although Hildebrand notes that most perception lies between these poles.[328] In close relation to this double distinction, in the twentieth century, Anton unconcg defines two kinds of vision: "a clear, precise visualization that he called 'conscious planning' versus an imprecise, intuitive visualization that he dubbed 'unconscious scanning.'[329] Following these distinctions that are understood as twofold ways of thinking and perceiving or recognizing bodily interactions, Çelik Alexander also underlines the hybrid reflections of these definitions in pedagogical fields. Highlighting the parallels between formal structures and pedagogical relations, she explains how formal training that prioritizes drawing over writing actually completes what the pedagogical tradition of *Bildung* could not achieve. She states that this method of teaching and learning is the context in which the meaning of *Gestaltung* as self-formation merges with *Gestaltung* as design and form. Here, this convergence may be seen as an almost unconscious and incomplete aim of the term *Bildung* during that era. This parallel relationship explains why these doubles range from Hildebrand's "distant and near view" to Ehrenzweig's "conscious planning and unconscious scanning," and finally to Çelik Alexander's rereading of form.

Referring to Çelik Alexander's work on form "as an epistemological principle in modernism and a technique of knowing," Anna-Maria Meister contributes to the discussion by "offering a reading of form-making as an act of rule-making," as she explains in her Ph.D. thesis.[330] In her work, she investigates the norms and norm-makers of the twentieth century. Her thesis offers a comparative analysis not only of the discourse surrounding norms but also of the objects that are shaped by those norms.[331] Defining "norm" as a political and pedagogical project, Meister understands the historical strands of norm and norm-making as "a continuation of

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[328] See page 97 in this thesis.
[329] Anton Ehrenzweig. *The Hidden Order Of Art: A Study In The Psychology Of Artistic Imagination*. Univ of California Press, (1967): 32.
[330] Anna-Maria Meister, *From Form to Norm: Systems and Values in German Design circa 1922, 1936, 1953* (PhD diss., Princeton University, 2018): 4.
[331] Meister.

the larger history of German *Bildung*."[332] This statement is significant since it consolidates the plural and inclusive meanings of *Bildung* referring to the hybridization of human and non-human processes: culture, education, and formation itself. Her definitions of norm and norm-making refer to "form" and thus *Gestaltung*, a significant term that is also emphasized in relation to its connection with *Bildung* in this research. Meister states:

> Norms were an act of concrete form-giving, giving Gestalt to industrially produced objects. Such Gestaltung, as Detlef Mertins identified it, emerged in the 1920s as "at once form, formation, form creation, and configuration—verb as well as noun, process as well as product, force as well as form […] Gestaltung was the form-generating activity of all living being as well as of life itself. [333]

In Meister's thesis, the term *Gestaltung* encompasses different meanings in three contexts, each representing distinct "epistemological strategies": divisibility (*Teilbarkeit*), designing life (*Lebensgestaltung*), and scale-ness (*Maßstäblichkeit*). Here, "*Gestaltung*" could be underlined due to its close relevancy to the terms "shape" and "form." Referring to Detlef Martin's definition of "form, formation, form creation, and configuration—verb as well as noun, process as well as product, force as well as form," it underscores the multifaceted nature of the concept.[334] Meister explains that in German aesthetic theory, *Gestaltung* (design) is a highly associative and complex concept, difficult to translate precisely. It refers to the process of shaping or forming objects, with its result, *Gestalt* (form), gaining renewed significance in the late nineteenth century. By the early twentieth century, *Gestaltung* had evolved into a broader cultural project, no longer limited to industrial *Kernform* (coreform) or artistic *Kunstform* (artform) but embrace.[335] This layered

[332] Meister, 14.
[333] Meister, 4-5.
[334] Meister cites Martin, 134.
[335] Meister, 39.

reading of *Gestaltung* as bridging process, force, and product echoes the conceptual flexibility that *Bildung* requires today: an understanding of form as both embodied action and epistemic condition.

While *Gestaltung* is undeniably central to German aesthetic and architectural theory, this thesis prefers the term *Bildung* for its wider philosophical reach. *Bildung* not only encompasses shaping and forming but also accommodates non-human agents and reflexive modes of making, dimensions that *Gestaltung*, often more narrowly aesthetic or institutional, can obscure. It is significant to note that *Gestaltung* appears in most aesthetic discussions across the nineteenth and twentieth centuries and is often used interchangeably with *Bildung*. However, in the context of this thesis, *Bildung* is foregrounded because of its epistemic range and potential to reframe architectural making beyond formalist or anthropocentric boundaries.

Ultimately, this section emphasizes how reflexive double articulations between form and formation, shape and structure, or epistemology and aesthetics continue to frame contemporary architectural discourse. By tracing these relations from nineteenth-century theories to current scholarly reinterpretations, it becomes clear that what might seem like radical technological shifts are in fact continuous with long-standing epistemic frameworks. Rather than simply cataloguing parallels, the glossary draws out how these histories remain operative in shaping today's architectural knowledge. This more inclusive approach to architectural making recognizes that form is not just a product; it is also a conceptual operation, deeply embedded in pedagogical, perceptual, and procedural shifts. In this light, the renewed interest in shape and form at the start of the twenty-first century signals not a rupture but a reflexive return and an invitation within this research to rethink architectural *Bildung* under new conditions.

Shape Architecture and Shapers and Movers

This section explores the conceptual distinction between shape and form through Robert Somol's theory of "shape architecture," a framework that emerged in response to the perceived exhaustion of late twentieth-century architectural discourse. Although not covered in depth here, Robert Venturi and Denise Scott Brown's theories, particularly their exploration of "sign" and "image" in *Learning from Las Vegas*, remain highly influential. Their insights offer a critical lens for analyzing and understanding architectural making, enriching the comparative understanding of shape and form discussed in this chapter.[336]

At the beginning of the twenty-first century, Robert Somol introduced "shape architecture" as a response to the theoretical positions between modern and postmodern discussions of the previous century. In his 2004 essay "12 Reasons to Get Back into Shape," published in *Content*, Somol presents a list of traits that define "shape architecture," a mode of practice he advocates reviving. According to Somol, the "twelve reasons to get back into shape" are shape's being "illicit, easy, expendable, graphic, adaptable, fit, empty, arbitrary, intensive, buoyant, projective, cool" (Figure 2.31).[337] While Somol's proposal addresses the limitations and theoretical stagnation of late twentieth-century postmodern projections, it simultaneously introduces a new set of operational rules and categories to define symbolic properties.

[336] Venturi & Scott-Brown's work and processes are presented as visual inputs and represent the conceptual evolution of their architecture's becoming in the fourth chapter.
[337] Robert E. Somol, "12 Reasons to Get Back into Shape," OMA and Rem Koolhaas, eds., *Content* (12) (2004): 86.



Figure 2.32 Somol's twelve reasons to get back into shape. Source: Robert E. Somol, "12 Reasons to Get Back into Shape," OMA and Rem Koolhaas, eds., *Content* (12) (2004).

Somol reads the architectural production of the last forty years of the twentieth century as a reference to autonomy and heterogeneity as opposed to "the anonymous and homogenous building associated with the interwar rhetoric and postwar experience of the modern movement."[338] This pursuit of autonomy and diversity, marked by the tension between identity and multiplicity, often took shape through repeated misreadings of the modernist avant-garde.[339] Somol underlines that it is significant to differentiate two kinds of repetition:

> … one associated with postmodern historicism and the other with the constructive swerves, or misreadings, of the neo-avant-garde. The first model of repetition can be identified with icons, resemblances, and copies, while the second is aligned with simulacra or phantasms. The first repetition relies on an ideal of the origin or model, an economy of identity, and can be thought of as typologically driven (the vertical imitation of timeless precedents). In contrast, the second sets in motion divergent series and exists as a continual

[338] Robert E. Somol, "Dummy Text, or The Diagrammatic Basis of Contemporary Architecture" (reprint), *Risco: Revista de Pesquisa em Arquitetura e Urbanismo*, no. 5 (2007): 169.
[339] Somol, 169.

> process of differentiating. One points back to a static moment of being, while the other advances through modes of becoming.[340]

Somol positions the ways of architectural production in between being and becoming, which resembles the transitions of nineteenth-century terminology on architectural making. According to him, these positions and subjects include form/indexicality (represented by Peter Eisenmann), tectonic expressionism (Kenneth Frampton), sculptural virtuosity (Frank Gehry), and digital intricacy (Greg Lynn).[341] Somol also explains his response to the four-partite conceptions of the era: articulation, notation, decoration, and figuration. Although a wide range of projects and theorists could be connected to each, he identifies four prototypical examples for clarity: Kenneth Frampton's tectonics (articulation), Peter Eisenman's index (notation), Robert Venturi's shed (decoration), and John Hejduk's characters (figuration). Somol, drawing from J.L. Austin, links articulation and notation to descriptive acts while treating decoration and figuration as performative.[342]

Somol's differentiation between constative and performative descriptions helps to understand his conception of form and shape, as well as their apparent relations to tectonic distinctions. In "Green Dots 101," Somol elaborates on this distinction by underlining the dual operations of notation and articulation as well as decoration and figuration. He defines "the blob" as a product of the project of digital intricacy that is a result of a constative combination of the first two aforementioned operations, i.e., notation and articulation.**[343]** Similarly, he defines "logo" as an extension of the "performative pairing of decoration and figuration." He defines "the blob" as a product of the project of digital intricacy that is a result of a constative combination of the first two aforementioned operations, i.e., notation and articulation.**[344]**

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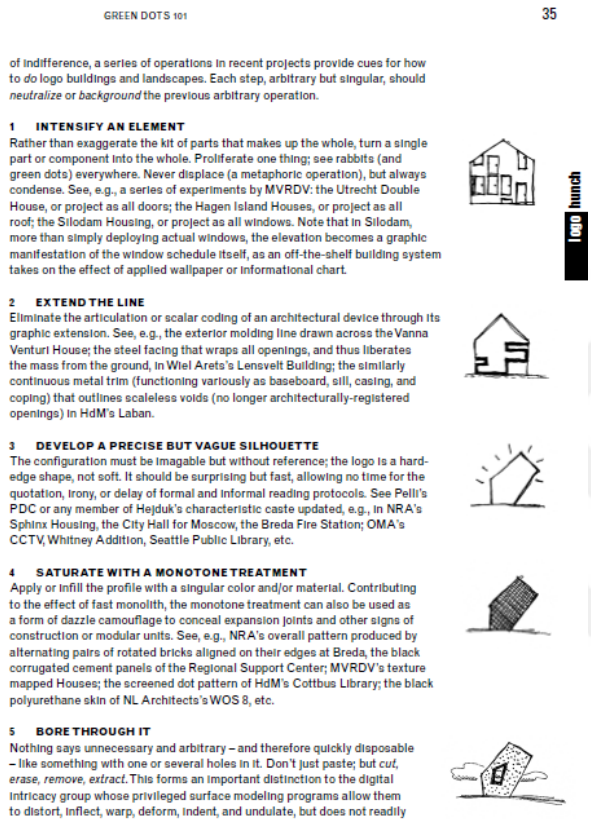
[340] Somol, 169.
[341] Hans Tursack. "The Problem With Shape." *Log 41* (2017): 46.
[342] Robert E. Somol. "Green Dots 101." Hunch 11 (2007): 30.
[343] Somol, 32.
[344] Somol, 32.

Similarly, he defines "logo" as an extension of the "performative pairing of decoration and figuration."[345] According to Somol, the architectural logo represents a hybrid form of figural decoration, moving beyond earlier models like the duck and the shed. It does so by intensifying the tension between mass and surface, ultimately merging them into a singular, saturated monolithic shape.[346] As stated, he proposes a set of rules to define the symbolic properties for logo buildings and landscapes. These rules are as follows:

> 1 INTENSIFY AN ELEMENT
> Rather than exaggerate the kit of parts that makes up the whole, turn a single
> part or component into the whole.
>
> 2 EXTEND THE LINE
> Eliminate the articulation or scalar coding of an architectural device through its
> graphic extension.
>
> 3 DEVELOP A PRECISE BUT VAGUE SILHOUETTE
> The configuration must be imagable but without reference; the logo is a hard edge
> shape, not soft.
>
> 4 SATURATE WITH A MONOTONE TREATMENT
> Apply or infill the profile with a singular color and/or material. Contributing
> to the effect of fast monolith, the monotone treatment can also be used as
> a form of dazzle camouflage to conceal expansion joints and other signs of
> construction or modular units.

[345] Somol, 32.
[346] Somol, 33.

5 BORE THROUGH IT
Nothing says unnecessary and arbitrary – and therefore quickly disposable
– like something with one or several holes in it. Don't just paste; but cut, erase, remove, extract.[347]



GREEN DOTS 101 35

of indifference, a series of operations in recent projects provide cues for how to *do* logo buildings and landscapes. Each step, arbitrary but singular, should *neutralize* or *background* the previous arbitrary operation.

1 INTENSIFY AN ELEMENT
Rather than exaggerate the kit of parts that makes up the whole, turn a single part or component into the whole. Proliferate one thing; see rabbits (and green dots) everywhere. Never displace (a metaphoric operation), but always condense. See, e.g., a series of experiments by MVRDV: the Utrecht Double House, or project as all doors; the Hagen Island Houses, or project as all roof; the Silodam Housing, or project as all windows. Note that in Silodam, more than simply deploying actual windows, the elevation becomes a graphic manifestation of the window schedule itself, as an off-the-shelf building system takes on the effect of applied wallpaper or informational chart.

2 EXTEND THE LINE
Eliminate the articulation or scalar coding of an architectural device through its graphic extension. See, e.g., the exterior molding line drawn across the Vanna Venturi House; the steel facing that wraps all openings, and thus liberates the mass from the ground, in Wiel Arets's Lensvelt Building; the similarly continuous metal trim (functioning variously as baseboard, sill, casing, and coping) that outlines scaleless voids (no longer architecturally-registered openings) in HdM's Laban.

3 DEVELOP A PRECISE BUT VAGUE SILHOUETTE
The configuration must be imagable but without reference; the logo is a hard-edge shape, not soft. It should be surprising but fast, allowing no time for the quotation, irony, or delay of formal and informal reading protocols. See Pelli's PDC or any member of Hejduk's characteristic caste updated, e.g., in NRA's Sphinx Housing, the City Hall for Moscow, the Breda Fire Station; OMA's CCTV, Whitney Addition, Seattle Public Library, etc.

4 SATURATE WITH A MONOTONE TREATMENT
Apply or infill the profile with a singular color and/or material. Contributing to the effect of fast monolith, the monotone treatment can also be used as a form of dazzle camouflage to conceal expansion joints and other signs of construction or modular units. See, e.g., NRA's overall pattern produced by alternating pairs of rotated bricks aligned on their edges at Breda, the black corrugated cement panels of the Regional Support Center; MVRDV's texture mapped Houses; the screened dot pattern of HdM's Cottbus Library; the black polyurethane skin of NL Architects's WOS 8, etc.

5 BORE THROUGH IT
Nothing says unnecessary and arbitrary – and therefore quickly disposable – like something with one or several holes in it. Don't just paste; but *cut, erase, remove, extract.* This forms an important distinction to the digital intricacy group whose privileged surface modeling programs allow them to distort, inflect, warp, deform, indent, and undulate, but does not readily

logo hunch

Figure 2.33 Diagram from Robert E. Somol's article "Green Dots 101" outlining five operations for the production of "logo" architecture: (1) Intensify an element, (2) Extend the line, (3) Develop a precise but vague silhouette, (4) Saturate with a monotone treatment, and (5) Bore through it. Source: Robert E. Somol, "Green Dots 101," *Log*, no. 17 (Fall 2009).

These five steps to create "logo" buildings primarily elaborate on his definition of shape architecture (Figure 2.32). However, he also explores the concept of form and its various implications through the distinction between shape and form. In doing so, he highlights the shift in architectural knowledge during the second half of the

[347] Somol, 36.

twentieth century. He defines this as a shift from "the drawing to the diagram."[348] He also addresses the shift within neo-avant-garde, in which "form would be precisely subjected to the functions of its linguistic descendants: informing, transforming, and performing."[349] As he indicates, the formulations of shape and form, as well as logo and blob, refer to distinct modes of making. The *blob* is geometric, representational, still indexical, and grounded in the "natural" world, whereas the *logo* is graphic, performative, and diagrammatic and belongs to a different realm altogether. This distinction is not merely geometric, such as the simplified contrast between the *blob* and the *box*.[350]

Although Somol's distinctions and descriptions often reference binaries, he adopts a position that follows an intermediate conception, requiring binary understandings to be interpreted together, which underlines the reflexivity of the concepts. The article "Doppler Effect" in *Perspecta* in 2002, published by Robert Somol and Sarah Whiting, presents the complex relations of these in-between positions in contemporary thinking. Somol and Whiting refer to Hays's canonic essay "Critical Architecture: Between Culture and Form." Somol and Whiting interpret Hays's critical architecture in between "culture and form," explaining that, as Hays's essay demonstrates, critical architecture operating within a textual framework depended on occupying a position "between" opposing discursive categories. They link "culture and form" to similar binaries: Greenberg's kitsch/avant-garde, Rowe's literal/phenomenal, Fried's objecthood/art, and Tafuri's capitalist development/design.[351]

According to them, Rowe's and Tafuri's discourses revealed the critical project of betweenness "whether within history/theory, as with Hays, or in terms of design, as

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[348] Somol, 2007, 5.
[349] Somol, 5.
[350] Somol, 37.
[351] Robert Somol and Sarah Whiting. "Notes around the Doppler Effect and other Moods of Modernism." *Perspecta 33* (2002): 73.

with the work of Peter Eisenman."[352] Defining the critical project by the dialectic and indexical, Somol and Whiting propose a post-critical project that is rather projective, diagrammatical and atmospherical. They also propose shifts in terms of architectural theory and representation. The first shift is from "dialectics" – "knowledge and form are based on norms and traditions", to "doppler"- knowledge and form are based on "active organism and discursive practice":

> …a Doppler architecture acknowledges the adaptive synthesis of architecture's many contingencies. Rather than isolating a singular autonomy, the Doppler focuses upon the effects and exchanges of architecture's inherent multiplicities: material, program, writing, atmosphere, form, technologies, economics, etc.[353]

As a part of the "Doppler architecture," Somol and Whiting's definition of projective architecture adapts a more flexible position. The Doppler understanding refers to disciplinarity as performance and practice, not "autonomy" or singularity. The understanding of disciplinarity as autonomy posits knowledge and form in reference to fixed principles, unchanging traditions, and norms. However, "Doppler" architecture suggests that discipline is not a fixed concept, "but rather an active organism or discursive practice, unplanned and ungovernable, like Foucault's 'unities forming a number of autonomous, but not independent domains, governed by rules, but in perpetual transformation.'"[354] Somol and Whiting also highlight a shift from indexical images to flexible diagrams—mirroring the move from dialectics to Doppler thinking.[355] As a loaded term in architectural theory "diagram" may be understood as a representational reflection of form-based thinking. According to Somol, a diagram within contemporary practice has the status of a drawing in the Renaissance. Since "the diagram is the product neither of craft-art

[352] Somol and Whiting, 74 Somol and Whiting, 75..
[353] Somol and Whiting, 75.
[354] Somol and Whiting, 75-76.
[355] They actually define the shift as index to diagram. I interpret/reformulate the transition as indexical image to flexible diagram.

(the single hand) nor of industrialized mechanization (corporate production)"[356] , it represents a specific process. Although its visual presence is mostly less detailed, it is more generative than the classical image. Somol's re-reading offers relevant insights into the shape/form distinction. He notes that critics such as David Leatherbarrow and Kenneth Frampton have sought to reconstruct architectural discourse by opposing what they see as an overemphasis on image and style in both postmodern historicism and neo-avant-garde approaches. While they critique the former for being overly tied to scenography, they criticize the latter for relying too heavily on external theoretical imports. Their shared aim is to redirect architecture back toward its historical and disciplinary foundations, away from both commercial spectacle and speculative experimentation.[357]

Although his comment on the correspondence between these dualities is precise, Somol contrasts the tectonic vision of architecture with diagrammatic thinking. Here, remembering Fausch's diagram, Somol's point ignores the tectonic flexibility between scenographical and technological; however, that flexibility can also project a diagrammatic practice. In this regard, Somol's formulation of shape architecture can be read inparallel with the distinction between *Gestalt* and *Form*. His approach is closer to the meaning of *Gestalt* and does not emphasize any process-based quality of architectural thinking. He posits "shape" as an opposition of "form." While Doppler architecture promotes a flexible framework, Somol distinguishes more clearly between the imitative and formative aspects of shape and form, as noted by Pier Vittorio Aureli:

> Somol describes shape as easy; that is, its constitution does not result from a conscious generative process but rather springs forth from improvisation and chance. In comparison, form asserts an inherent difficulty, manifesting itself as an expressed index of its generational process. Shape is seen as a low-resolution image, while form is the index of a conscious and explicable

[356] Robert E. Somol. "The Diagrams of Matter," *ANY: Architecture New York 23* (1998): 23.
[357] Somol, 23.

> method imprinted in an object. Therefore, Somol argues, while form must be reasoned, shape is arbitrary.[358]

Aureli summarizes Somol's distinction as a filter that presents contemporary architecture within two categories: "the movers and the shapers". In Aureli's words: "According to Somol, the shapers find their strategies in the instantaneous appearance of formal manifestations, while the movers center their work on the generative process of form, starting from external or algorithmic data."[359] He says that form does not generate but is generated, which includes complex relations of geometric, linguistic, philosophical, technological, economical, biological, and sociological spaces that its constitutional process covers.[360]

In addition to the reflexive definitions of shape and form that define each other self-referentially, Somol's understanding of architectural processes through a Doppler lens offers valuable insights into *Bildung*'s reflexive nature. We observe that the tectonic flexibility between scenographical and the technological, central to the origins of tectonic theory, intersects further in the "Doppler" definition of architecture, understood as an adaptive synthesis of multiple contingencies and leading to diverse interpretations. The theoretical connections center around the notion of shape architecture, highlighting its complexity and its correlation with the epistemological framework as articulated through the concept of *Bildung*. The imitative and formative aspects of *Bildung* distinctly relate to the conceptual duality of shape and form. Furthermore, Doppler architecture, by its nature, is reflexive: continuously evolving and self-referential. This perspective helps to contextualize how shape and form are understood not as isolated concepts, but in relation to the other double articulations within the glossary.

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[358] Pier Vittorio Aureli. "Architecture and Content: Who's Afraid Of the Form-Object?." *Log 3*, (2004): 30.
[359] Aureli, 30.
[360] Aureli, 34.

Form, Form-object, Formal

Aureli's response to Somol's definitions of shape and form can be further understood in his renowned book *The Possibility of an Absolute Architecture*, which "reconsiders architectural form through a unified interpretation of architecture and the city." [361] While his primary focus often centers on the architecture-city relationship, Aureli's notion of "absolute form" offers broader insights into post-millennial understandings of form. He defines the term "absolute" as connoting purity, explaining that "the possibility of an absolute architecture is thus both the possibility of making the city and also the possibility of understanding the city and its opposing force, urbanization, through the very finite nature of architectural form." [362] In this formulation, he links the formal and the political as intertwined concepts that define architecture's essential nature.[363] For Aureli, the political is equated with the formal, and the formal ultimately becomes a mode of limiting architecture's scope and role.[364]

In reexamining the origins of the term "form" to redefine "formal," Aureli observes the following:

> The Latin *forma* stands for two Greek words with quite different meanings: *eidos*, or abstract form, and *morphè*, or visible form. In its very origin, the word form seems to contain the dispute between those who give priority to the visibility of things as a fundamental datum of experience and those who give priority to the inner structure of experience itself as the factor that determines how visible things are.[365]

Aureli acknowledges the risk of oversimplifying these definitions into a binary of form versus content, where form is perceived as a visible container with invisible

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[361] Pier Vittorio Aureli. *The possibility of an absolute architecture*. MIT Press, 2011.ix.
[362] Aureli, xiv.
[363] Aureli, 2.
[364] Aureli, 2.
[365] Aureli, 30.

content. Thus, as he points out, his definition of form goes beyond the duality of abstract and visible. His discussion of form revolves around the concept of the formal.[366] The formal can be understood as the experience of limits, as the relationship between the "inside" and the "outside."[367] He refers to the "acting subject" as the inside and the "state and situation" as the outside.[368]

Aureli expands on his discussion of architectural form in urban space in another article, in which he revisits Robert Somol's concept of shape architecture and form. He cites Somol's work, emphasizing his critique of the "recurring mythologies" used as scientific tools in architecture and urbanism, such as theoretical, sociological, anthropological, technological, geometric, and Utopian approaches, which serve to obscure what is essentially becoming a mere landscape of shapes. These shapes, while spectacular, symbolic, and monumental, are ultimately self-referential.[369] Aureli argues that Somol's position opposes the "false consciousness demonstrated by architectural culture in recent years," which overlooks shape without fully comprehending it. He emphasizes that Somol reinforces his perspective through a careful presentation of a theoretical genealogy, tracing various definitions from "Malevich's Architectonics to Superstudio's Continuous Monument, to John Hejduk's masques, and then to the latest project designs by OMA."[370] In doing so, Aureli emphasizes that Somol's method is not just an aesthetic proposition but a conscious shift in architectural discourse. This approach aims to reclaim shape, not as something preestablished, but rather as a creative input, critically engaging with the legacy of twentieth-century theoretical frameworks.

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[366] Aureli makes this reference in alignment with Schmitt's argument in *The Concept of the Political*.
[367] Aureli, 30.
[368] Aureli, 30.
[369] Aureli, 2004, 30.
[370] Aureli, 30.

Aureli comments on Somol's definition of shape as a low-resolution, light, and easy idea. He underlines that this understanding sustains the naturalization of communication.[371] He says:

> Today the content of the easy contributes to an economy of information that, behind the mythology of accessibility, the ordinary, the spontaneous, and the self-organizing, hides an unconvincing ideological and political opacity. The superficiality of shape is nothing but the solidification of excess content, of metaphors, meanings, and symbols without sense; a solidification for which the architectural shape is often a literal mold.[372]

This perspective enables Aureli to redefine the "content" of contemporary architectural works by prominent architects such as Koolhaas, Herzog and de Meuron, Jean Nouvel, and others as "pure content, or contenthood obliterating the condition of its form-objecthood."[373] He further investigates the distinction between shape and form, posing the following critical question: "How is the idea of shape emancipated and distinguished from form?"[374] Aureli contends that while "form" necessitates "a complex elaboration," shape, characterized by its easiness and immediacy, stands in opposition to form. Rather than embracing the "easy" and ready-made nature of shape, he highlights the diverse potential of form, which, importantly, is limited to neither language nor style.[375] He concludes his discussion by emphasizing the "transparent" potential of form, referencing both internal and external forces. He argues that form is inherently opaque in meaning, yet immediate and transparent in its presence. In an era dominated by a complex communications economy, where the rapid circulation of information often leads to greater opacity, he stresses the need to focus critically on form. For Aureli, it is essential to determine

[371] Aureli, 33.
[372] Aureli, 33.
[373] Aureli, 34.
[374] Aureli, 34.
[375] Aureli, 34.

the specific meaning of form in each case in order to rescue it from becoming exhausted and self-referential, reduced merely to content.[376]

As Aureli underlines, the connotation of architectural form has always been opaque. Its flexible conceptual meaning, which focuses on the process of making, has often been misread with shape or image/scenography-based thinking. However, form in architectural discourse, with its cumulative significance, has a timeless reference to the diversity and plurality of making methods. For Aureli, form is not merely a static object but a phenomenon shaped by its material construction and practical application. It embodies a logic and expressiveness derived from its making. In this sense, form is inherently austere, not as a stylistic gesture, but as a demonstration of precision and responsibility in architectural choices. Form may appear in various styles, be it eclectic, modest, comical, or elegant, and its theoretical significance lies in the integrity of its process rather than its aesthetic appeal or appearance.

In conclusion, Aureli positions form as a crucial tool for engaging with the cultural and material realities of architecture. Rather than merely a visual category, form reflects architectural process. This reconceptualization of form aligns closely with the underlying framework of *Bildung* as articulated in this thesis and how its formative interpretations intricately intersect with the origins of "form" and "formal." Aureli's work is particularly relevant for this glossary as his definition of form is not a fixed entity to be chosen or found but rather a conceptual operation that contributes directly to the evolving epistemology of architectural *Bildung* and its formative interpretation.

[376] Aureli, 36.

The Problem of Shape: An inquiry

Almost a decade after Aureli's article on the rereading of shape and form, architectural designer and artist Hans Tursack (b. 1987), in his 2017 paper titled "The Problem of Shape," expanded the shape and form discussion. He defines "form" as "a diagram of forces, a series of transformations and operations acting on a configuration of geometric units in time" and shape as "a static assemblage of relatively undigested parts."[377] Tursack refers to Somol's formulations on shape architecture in both "12 Reasons to Get Back into Shape" and "Green Dots 101," explaining that Somol outlines a specific set of geometric and graphic operations for producing shape and describes the visual effects these shape-based projects achieve. Key compositional strategies include "sculptural figuration—an anti-abstractionist take inspired by the anthropomorphic elements in John Hejduk's later works," along with "decoration through patterns, printed graphics, and camouflage techniques" and "graphic iconicity, where shapes are perceived as singular, unambiguous gestalts without complex geometric transformations."[378]

Tursack explains that the distinction between shape and form lies in their generative processes. Both approaches work with geometric primitives to achieve strong visual expression using minimal means. As combinatorial exercises drawn from a limited set of elements, shape and form offer alternatives to more system-driven or computation-intensive geometries. While form represents a dynamic diagram of forces, shaped by transformations and operations over time, shape remains a static assembly of largely unrefined parts.[379]

The duality described here is defined as a juxtaposed one within the recent discourse of contemporary architecture; however, contrasting with image-based PoMo, form-

[377] Tursack, 50.
[378] Tursack, 45.
[379] Tursack, 50.

based approaches are rather inclusive in terms of diversities of architectural making. Parallel to that, Tursack's ideas are pertinent here:

> My thesis is blunt: shape's original (ill-conceived) polemic has devolved into a culturally bankrupt aesthetic language. A victim of its own success, shape is an exhausted method that has lost whatever expressive potential it may have originally held. Shape should have already been assigned to the "scrapheap of history," but it continues to operate as a theoretically frictionless image-centric formula that produces a zombie style: a vehicle for disciplinary puns.[380]

Here, the term "shape" can be viewed as an operational equivalent of the static images of historical models in the current context. Rather than simply reflecting imitative thinking, both historical models and contemporary shape architectures point to a scenographical mode of architectural production. Similarly, the term "form" can be viewed as an operational equivalent of the evolving concepts, aligning more closely with structural, conceptual, and technological expressions in architectural discourse. In both cases, whether image or idea, or shape or form, architectural discourse navigates between imitation and generation. The reflexive nature of these definitions fosters an open and productive discussion environment, allowing for the continuous reinterpretation and creative engagement that corresponds precisely with the interpretations of *Bildung* as an epistemological framework for architecture.

Interconnections and Further Explorations

To expand the conceptual field surrounding shape and form beyond the Somol-Aureli axis, it is important to consider how other contemporary theorists extend or reframe similar binaries, particularly through epistemological or operational distinctions. These studies do not engage with *Bildung* directly, yet they contribute

[380] Tursack, 48.

to a wider architectural discourse that similarly navigates between surface and structure, image and concept, or representation and formation. Including these perspectives allows this glossary to map how the shape/form double continues to evolve, both as a design problem and as an ontological framework within tectonic thinking.

While they are not direct rereadings of Somol's "shape and form," some related studies reflect the ongoing projection of tectonic theory within twenty-first-century architectural discourse and offer alternative conceptualizations that echo the reflexive structure of *Bildung*. One of these is Robert Geddes's 2012 manifesto, in which he also discusses the relation/distinction between shape and form. Similar to Bötticherian tectonic dialectics, he projects the distinction onto internal-external relations:

> Form may be understood to be a shape, but the shape is only an *external* aspect—an outer boundary. For example, while a lake has a shape, it has no structure. When a shape also has an *internal* structure, an inner organization, then it has *form*.[381]

Geddes' formulation closely aligns with the structural dualism underpinning the concept of *Bildung*, where true form arises from inner organization rather than external contour. His distinction between surface and structure offers an ontological reading that reactivates the formative dimension of architectural epistemology. Geddes defines the possibilities of "tight fit" and "loose fit" by examining the similarities and contrasts between external and internal relations. This can be regarded as a parallel reading of architectural making between shape and form.

Another relevant study published in 2006, six years before that by Geddes, is *Atlas of Novel Tectonics* by Jesse Reiser and Nanako Umemoto, which includes a number

[381] Robert Geddes, *Fit: An Architect's Manifesto* (Princeton: Princeton University Press, 2013): 71.

of concepts that present interpretations of the changing ways of architectural making. The relevance to this glossary stems from how they redefine form not through typology or composition, but through systemic behavior and relational properties in an approach that aligns with the reflexive, non-static understanding of architectural *Bildung* developed throughout this thesis. Reiser and Umemoto frequently refer to the art-historical double of norm and form that relates to the classical-fixed and new-invented. They define many doubles that follow the image-form, classical-new, fixed-invented, internal-external dialectics, including the "intensive-extensive" properties that are involved in design processes. "Extensive" properties are related to limits, measurements, and scale-bound regulations, which may be interpreted as being fit to the idea of shape, external limits, and norms (Figure 2.33). "Intensive" properties, on the other hand, are non-scale-bound properties that necessitate material information and customized input based on the integrity of the element, referring to a certain form generation without any external limits (Figure 2.33).[382] In this light, their distinction between intensive and extensive properties resonates with the glossary's scenographical and technological doubles, offering a vocabulary through which formation can be understood as both material process and epistemic condition. Such operational binaries map directly onto the broader framework of *Bildung*, where internal logics and external representations co-constitute architectural formations.

[382] Jesse Reiser and Nanako Umemoto, *Atlas of Novel Tectonics* (Princeton: Princeton Architectural Press, 2006): 72.

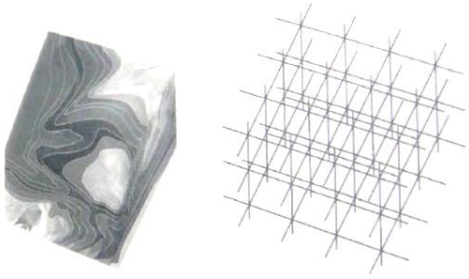


Figure 2.34 Diagrams for intensive vs. extensive qualities. Source: Jesse Reiser and Nanako Umemoto, *Atlas of Novel Tectonics* (Princeton: Princeton Architectural Press, 2006).

Speculations for Architectural *Bildung*

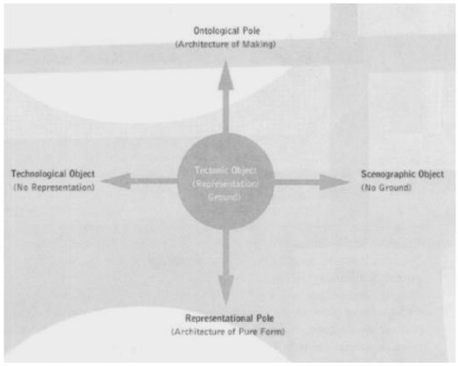
By situating shape and form within broader operative and epistemic frameworks, this section has opened new pathways for understanding how contemporary theory inherits and transforms foundational concepts. The relationship between shape and form in architecture is not merely a matter of opposition but an ongoing dialogue, which is an apparent epistemological parallel for defining architectural *Bildung*. Reflecting on Somol's ideas, Pier Vittorio Aureli criticizes the notion of shape as merely a surface-level phenomenon while simultaneously supporting the idea of form as a condition that is structured, political, and ontological in nature. Similarly, Hans Tursack highlights the unique yet interconnected nature of these concepts. While shape focuses on immediacy, form engages with structural and material aspects. While not directly rereading Somol's ideas, this discourse extends and touches upon contemporary discussions of tectonic theory, as illustrated in the works of Robert Geddes, Jesse Reiser, and Nanako Umemoto, where external limits and internal structures interact. Instead of prioritizing one over the other, architecture benefits from the dynamic reciprocal relationship between shape and form. This section has argued that the potential of architectural making lies not in rigid binaries but in their reflexivity, balancing the immediacy of shape with the complexity of form.

Unlike the earlier sections of the glossary, such as *Kernform/Kunstform* and *Scenographical/Technological*, which are grounded in historically established reflexive doubles, this section does not emerge from an "expected" double already present in the literature. Rather, it reflects the methodological intervention in the research: a speculative construction of a twenty-first-century strand of reflexive doubles. In doing so, it aims to complete the chronological continuity of the glossary and extend the conceptual trajectory of architectural *Bildung* as an expandable framework. This effort is central to the thesis's broader intention of not merely compiling historical definitions but actively defining architectural *Bildung* through its possible reflexive glossary compiled across time.

Diagrammatical Synopsis

Overall, the glossary includes three sets of terms and their interpretations, underlining the critical position necessary for understanding architectural *Bildung*. In this context, Fausch's diagram can be reinterpreted through the lens of the glossary's reflexive structure (Figure 2.34). This synoptic diagram builds upon a reinterpretation of Deborah Fausch's diagrammatic framework, adapted here to outline the reflexive coordinates that define architectural *Bildung*. The ontological pole (top) emphasizes terms such as "formation," "form," "*Kernform*," and "technological." It corresponds to the formative dimension of *Bildung*. The representational pole (bottom) has affinities of imitation, shape, and *Kunstform*. This area of the diagram draws on scenographical logics. This diagram enables a nonlinear reflexive mapping of architectural *Bildung*: each object or pole is not simply a location but a conceptual condition, providing a field of possible terms that expand the glossary. The dashed lines and homogeneous gridded background imply permeable relations within the field rather than fixed hierarchies. The empty edges of the diagram, or the spaces beyond the four primary poles, are intentionally left

ambiguous. As mentioned, this open field allows for potential terms that can expand the glossary.



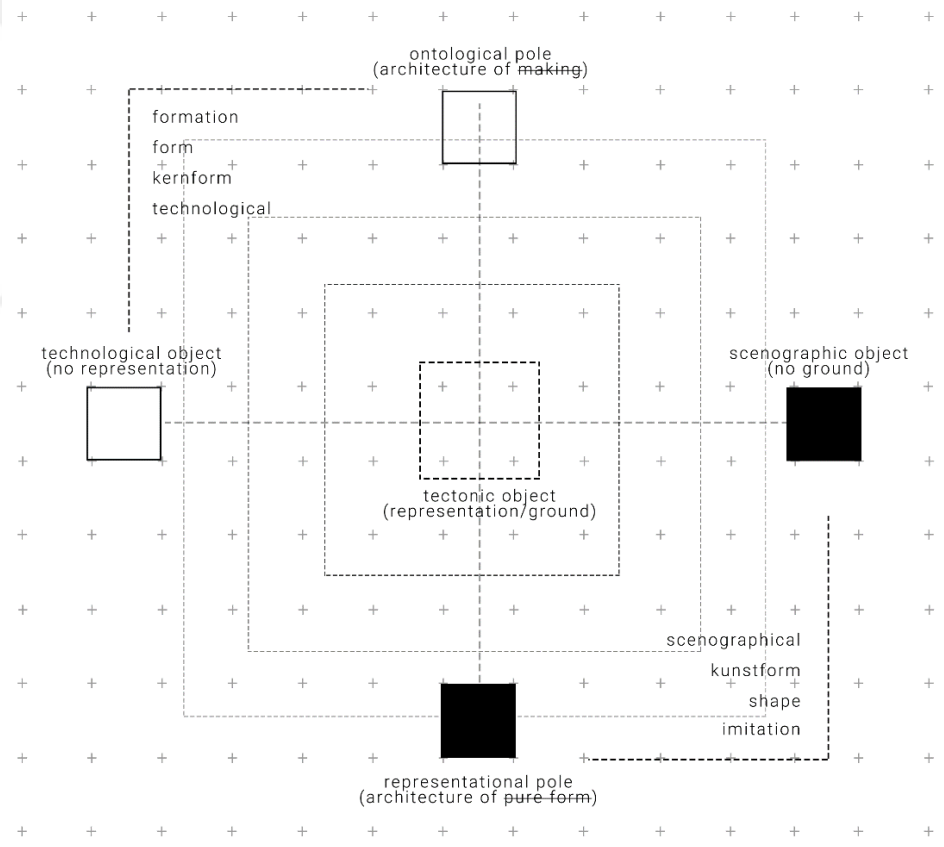


Figure 2.35 Redrawing of Deborah Fausch's diagram, reinterpreted to include the proposed model glossary.

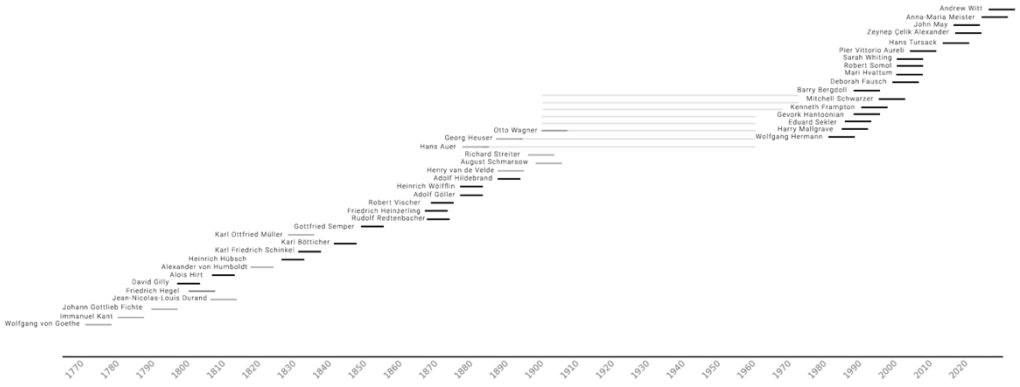


Figure 2.36 Timeline of the "*Tektonik* debate" with foundations, elaborations, and revisits: feeding modernism, but becoming especially sparse in the early twentieth century.

The timeline in Figure 2.35 offers a supplementary synopsis, outlining the chronological sequence of references within this chapter. While not all figures are presented in detail, this timeline includes the authors of core readings, key secondary literature sources, their references and contemporaries, and speculative connections. The most compelling gap emerges where modern architectural theory is elaborated without acknowledging its scenographical roots, overlooking the dual articulations central to nineteenth-century German architectural thought. Similarly, the gap also reflects postmodern architectural theory's tendency of neglecting these dualities, this time omitting the technological dimension.

Framed through the lens of defining architectural *Bildung*, this timeline illustrates how various strands of theory intersect to shape a glossary of architectural *Bildung*. The concluding subtitles of this chapter, each traceable along the timeline, are as follows: "Foundations of Architectural *Bildung* (Artform and Coreform)," "An Evolving Vocabulary for Architectural *Bildung* (Scenographical and Technological)," and "Speculations for Architectural *Bildung* (Shape and Form)."

CHAPTER 3

DISPLAYING ARCHITECTURAL *BILDUNG*: AN OPERATIONAL CURATION



Figure 3.1 Pages from final version of *Mira Calligraphiae Monumenta* featuring both calligraphic texts and illustrative additions.

Returning to the *Mira Calligraphiae Monumenta* as a pretext, this chapter addresses the second argument of the thesis. Underpinned by the model glossary, it explores how the concept of *Bildung* can be interpreted to propose operations of architectural making, and it introduces a creative intervention. Just as Hoefnagel's multilayered illusions were responses to Bocskay's calligraphic model book, creating both temporal and visual layers, this chapter traces overlooked concepts within nineteenth-century architectural theory to articulate methodologies and interpretive frameworks, paralleling Hoefnagel's illustrative contributions. His well-known "back pages" illusion, for example, does not merely enrich the image but draws attention to temporal and visual layers embedded in the model book. The thesis's aim of uncovering latent concepts and revitalizing them through contemporary architectural makings is mirrored by Hoefnagel's method.

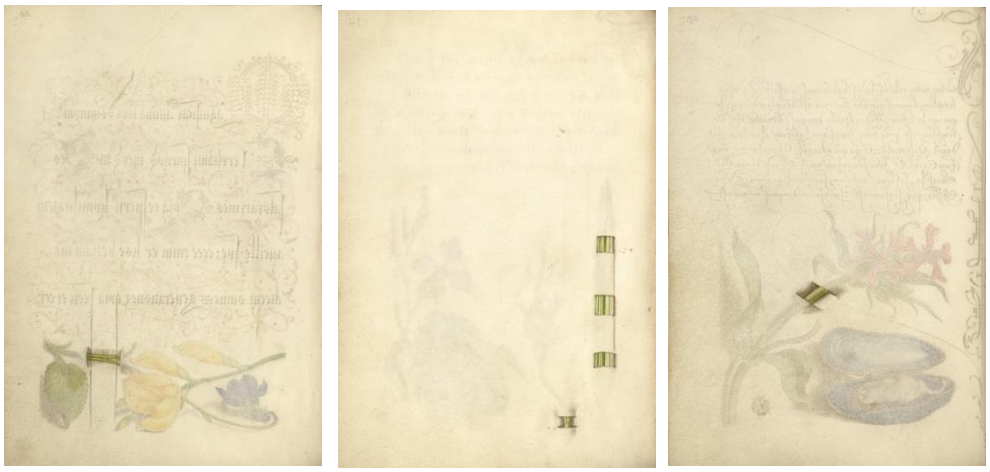


Figure 3.2 Pages with *trompe l'oeil* with traces of illustrations *in Mira Calligraphiae Monumenta*.

Accordingly, this chapter presents **the second argument of the thesis: the complex interplay of the imitative, formative, and reflexive understandings of *Bildung* can offer an operational logic for architecture.** These three categories are illustrated through selected examples of architectural making that merge temporal layers for each operation. Here, *Bildung* is interpreted not only as a cultural or pedagogical ideal but also as a generative principle in architectural practice, embodying both historical learnings and design methodology. Consequently, this chapter utilizes the model glossary and especially rather overlooked concepts from the nineteenth century to define this operational curation, not simply by compiling references but by displaying them through prototypes in the form of curated operational strategies. The use of "displaying" in the title of this chapter is intended to establish a visual and conceptual field that demands to be looked at, and not only showing but also specifically situating architectural works within a discursive environment where operations and interpretations unfold actively.

To ground this operational framework, the second argument draws upon a set of theories presented in the late eighteenth century and flourishing in the nineteenth

century, a period rich in the elaboration of the modern *Bildung*.[383] Modern *Bildung* and its connotations were significant for both humanist philosophy and the natural sciences. While the former field addresses self-formation, centering the subject, the human mind, and human-based learning processes, the latter prioritizes objective processes, natural formation, and natural growth. The concept of *Bildung* necessitates the correlation of both fields, and particularly in the nineteenth century, the coexistence of these contrasting yet contradictory understandings of *Bildung* offered a productive ground for philosophical strands.

The strong relationship between eighteenth- and early nineteenth-century theories, and especially those of Immanuel Kant (1724–1804), Johann Wolfgang von Goethe (1749–1832), Johann Gottfried Herder (1744–1803), and the Humboldt brothers, Wilhelm von Humboldt (1767–1835) and Alexander von Humboldt (1769–1859), and Georg Wilhelm Friedrich Hegel (1770–1831) defined *Bildung* within various

[383] Long before the introduction of the Modern *Bildung*, in the fifteenth century, Angelo Poliziano defined three categories for ways of acquiring knowledge: *Inspiratum*, *Inventum*, and *Mixtum*. These categories represent three distinct modes of knowing: inspiration, invention, and combination. Although not directly connected to *Bildung*, this triadic structure can be interpreted as an intriguing parallel to the conceptions of *Bildung* that emerged in the late eighteenth century and took shape throughout the nineteenth century. Angelo Poliziano's (1454–1494) categories of "knowing/learning" offer a triadic model of intellectual formation, which Werner Oechslin also emphasizes in his "Reflections on the Ground Rules of the Baroque." Here, the reference may seem unrelated to the specific focus on the nineteenth century; however, Poliziano's renowned categorization of *genera doctrinarum*, or possibilities/ways of knowing/learning, in *Panepistemon* is a significant contribution widely referenced for its timeless definition of knowledge and knowing. Poliziano's philosophical views and their influence encompassed a broad framework affecting the separation of the humanities from the natural sciences. His categorization of knowledge reflects an attempt to combine multiple disciplines, ranging from theology to practical arts, within a philosophical framework. He proposed three main categories of knowing: *Inspiratum* ("inspiration"), *Inventum* ("invention"), and *Mixtum* ("combination"). According to him, *Inspiratum* refers to divinely inspired theology; *Inventum* refers to knowledge gained through human reasoning and discovery, particularly in philosophy; and *Mixtum* is a blend of divine inspiration and human insight. This classification reflects Poliziano's attempt to systematically structure ways of knowing in the fifteenth century. These Renaissance categories of knowledge cannot be directly translated. Nonetheless, his effort provides a framework that has been revisited and reinterpreted in philosophical discussions. Likewise, it can be applied to comparable structures proposed in this thesis. Amos Edelheit, "Poliziano and Philosophy: The Birth of the Modern Notion of the Humanities?," *Traditio* 70 (2015): 369-405.

philosophical, scientific, and pedagogical frameworks. Recognizing that each of these frameworks merits a dedicated study in itself, this thesis does not intend to offer a comprehensive analysis of every relevant thinker. The following section does not aim to provide an exhaustive account, nor to position this work as a contribution to philosophical scholarship. Instead, it aims to create a theoretical foundation for tracing the historical origins of *Bildung* as formation and exploring how its imitative, formative, and reflexive aspects have been articulated across these thinkers frameworks. Ultimately, these philosophical strands are brought together in a dialogue to translate the concept of *Bildung* into operations of architectural making with respect to imitative, formative, and reflexive categories, thereby generating new outlines for defining architectural *Bildung* as a dynamic and historically grounded process.

Beginning with Kant, *Bildung* exists within the process of self-formation that centers the subject and human-based learning processes.[384] For Kant, *Bildung* is both an individual process and a collective one that historically develops. Kant's *Bildung* encompasses the cultivation of reason, both individually and collectively. In this context, Kant's idea of *Bildung* implies that once we grasp the image (*Bild*), we can perceive the development of moral capacity as realizing human potential, enabling us to actively work toward its realization.[385]

Building on Kant's foundation, Johann Gottfried Herder further develops *Bildung* by shifting the emphasis toward historical and organic models of formation. In the German historiography of pedagogical thought, Johann Gottfried Herder is seen as the founder of the secular ideal of *Bildung*. According to Herder: "The individual is seen as a process of organic formation and growth and not as an atom of society or

[384] Rebecca Horlacher, "Bildung – a Construction of a Historyof Philosophy of Education," Studies in Philosophy and Education 23, no. 5–6 (September 2004): 409–426, https://doi.org/10.1007/s11217-004-4452-1.
[385] Horlacher.

as an abstract generic, as in the naturalistic theories of the seventeenth and eighteenth centuries."[386] Herder assigns a critical value to the concept and connects it to an educational ideal that would come to significantly influence German thought and society.[387] He defines the historical process itself as the formation of humanity as a whole. Thus, the concept of *Bildung* can be defined as a part of his philosophy of history. Herder's theory is also based on the basic premise of *Bildung* as an aesthetic education through which individuals may develop all their potential talents and learn to know themselves.

Building on the contributions of Kant and Herder, Georg Wilhelm Friedrich Hegel introduces a triadic structure that further develops the concept of *Bildung*. Hegel originally saw *Bildung* as a process of self-formation. Subsequently, he would retain this subjective understanding but expand its significance, situating it between the cultural and historical shifts. According to him, *Bildung* helps us better understand the intricacies of historical change and the influence of second nature in transforming culture.[388] His account of *Bildung* challenges the dualism of nature and culture, and it includes various aspects that integrate both subjective and objective levels. In Hegel's philosophy of history, and indeed throughout his objective spirit, *Bildung* is the primary focus of his discussion of the role and influence of culture on the spirit's development.[389] He distinguishes two different *Bildung*s; one is "like the Greeks", coupling knowledge of spirit and thought; and the other "like the uncultured(*ungebildet*)", coupling knowledge and natural forces.[390] Despite his distinctions, these two, (which we can refer to as external and internal formation processes), exist together. His concept of *Bildung* challenges the dualism of nature

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[386] Alves, 5.
[387] Michael Forster, "Johann Gottfried von Herder" in The Stanford Encyclopedia of Philosophy (Winter 2023), eds. Edward N. Zalta and Uri Nodelman, https://plato.stanford.edu/archives/win2023/entries/herder/
[388] Simon Lumsden, "The Role of Bildung in Hegel's Philosophy of History",ccount *Intellectual History Review* 31, no. 3 (2021): 445-462.
[389] Lumsden, 446.
[390] Lumsden, 446.

and culture, and his account of *Bildung* includes various aspects that integrate both subjective and objective levels.

Andel Odenstedt extends this reading by examining how Hegel's triadic conception of *Bildung* is echoed in his theory of historiography. According to Odenstedt, Hegel differentiates between three modes of writing history: original, *reflective*, and philosophical. Original history is grounded in an immediate affinity between the historian and the historical events, where the same process of *Bildung* shapes both the author and the age being described. Reflective history introduces a separation between the self and other, acknowledging temporal distance, although it often misreads the past by projecting the historian's own spirit onto earlier times. Finaly, philosophical history, finally, recognizes both past and present as evolving stages within the development of the spirit, thus allowing for a reflexive, process-oriented understanding of historical change. This framework reinforces Hegel's view of *Bildung* as a dialectical formation, constituting synthesis of cultural continuity and critical transformation.[391]

While Hegel emphasized *Bildung'*s dialectical and historical dimensions, Johann Wolfgang von Goethe expanded its generative and naturalistic aspects, bridging aesthetic, personal, and architectural development. Goethe's understanding of *Bildung* is multifaceted, encompassing self-formation, education, and cultural development. He sees it as a generative process expanding from the idea of natural growth. From Goethe's perspective, *Bildung* entails not only personal development but also the transmission of culture and history. This double projection, as in the cases of the previous definitions, is significant for this thesis as Goethe also expands this reading to address upon the architectonic processes in architecture. This concept is evident in his architectural writings, where he links building construction to the process of personal identity. Goethe's idea of *Bildung* reflects a dynamic interplay

[391] Anders Odenstedt, "Hegel and Gadamer on *Bildung*," *The Southern Journal of Philosophy* 46, no. 4 (December 2008): 562 https://doi.org/10.1111/j.2041-6962.2008.tb00085.x.

among individual self-development, cultural education, and historical continuity, highlighting the connection between individual and communal growth through significant structures and narratives.[392]

Goethe's naturalistic view of *Bildung* resonates with Alexander von Humboldt's scientific investigations, which further articulate formation as a systemic and integrative process. Humboldt has a particular interest in the notion of natural formation and growth in terms of geological and geographical knowledge. His exploration of nature as an interconnected system reflects the *Bildung* ideal of holistic development, where growth, be it personal or environmental, is understood as a dynamic and integrative process.[393] The idea of formation and growth as a part of the concept of *Bildung* has a clear relationship with naturalistic theories, and especially those that culminated in the nineteenth century.[394]

These Humboldtian ideals, linking natural science with cultural production, also profoundly influenced nineteenth-century architectural thinking, and especially in the work of Schinkel. At the same time, Wilhelm von Humboldt carried the concept of *Bildung* concept into institutional and educational reform. Barry Bergdoll emphasizes the "German integration of aesthetic and natural-historical research and thinking" and states that:

> … Schinkel had been deeply involved not also with the natural historical researches of Alexander von Humboldt, a close friend, but also with the revival of interest in Goethe's natural historical studies, and in particular Goethe's interests in both crystal formation and in plant morphology, both in terms of the word and concept – which, indeed, were to have a powerful resonance throughout nineteenth-century German architectural theory...[395]

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[392] Bernstein.
[393] Nordenbo.
[394] The other Humboldt brother, Alexander von Humboldt, also had a specific interest in the *Bildung* within the scope of natural formation and growth in terms of geological and geographical knowledge.
[395] Barry Bergdoll. "Of crystals, cells, and strata: natural history and debates on the form of a new architecture in the nineteenth century." *Architectural History* 50 (2007): 10.

In addition to its naturalistic interpretations, the concept of *Bildung* continued to develop within educational thought at the beginning of the nineteenth century. Alexander von Humboldt's brother, the philosopher Wilhelm von Humboldt, who co-founded the University of Berlin in 1809, defined the concept within educational frameworks. He developed the idea of *Bildung* into a theoretical framework and created a "university" community, that would serve as a platform for the interplay between individual and collective ideas. "He advocates connecting 'objective knowledge/scholarship (*Wissenschaft*) with subjective cultivation (*Bildung*)'."[396]

These perspectives that are ranging from Kant to the Humboldt brothers, converge together into a triadic understanding of *Bildung*, which informs the framework of the imitative, formative, and reflexive categories developed in this study. Its adaptability across intellectual and historical contexts is grounded in its triadic structure, with interplay among subjective cultivation, collective historical consciousness, and natural generative processes. Though not in the same order, these three dimensions also inform the imitative, formative, and reflexive understandings of *Bildung* that structure this study's interpretive approach. This enduring triad, present in various forms throughout the works of the aforementioned scholars, serves as a conceptual foundation for rethinking architectural formation.

[396] Tomislav Zelić, "*Bildung* and the Historical and Genealogical Critique of Contemporary Culture: Wilhelm von Humboldt's Neo-Humanistic Theory of *Bildung* and Nietzsche's Critique of Neo-Humanistic Ideas in Classical Philology and Education," *Educational Philosophy and Theory* 50, no. 6–7 (September 7, 2017): 663, https://doi.org/10.1080/00131857.2017.1374841.

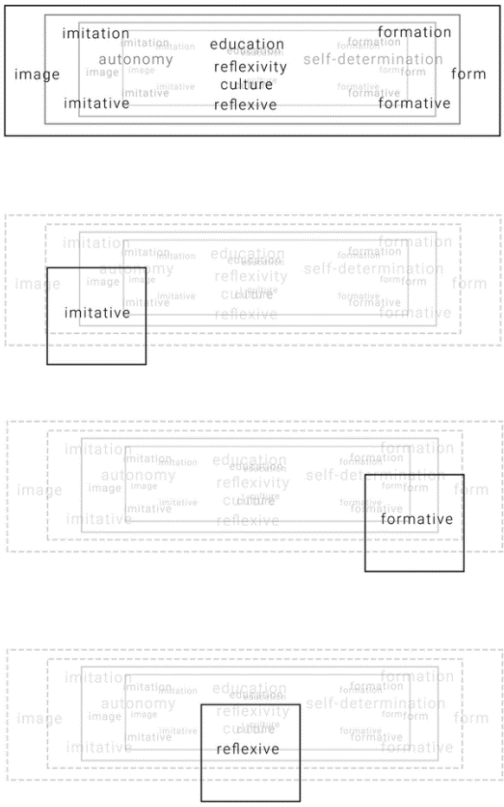


Figure 3.3 Interpretations of *Bildung*, "These categories do not aim to limit the plural interpretations of *Bildung*, but rather underscore specific interpretations already embedded in its historical usage—emphasizing without erasing the richness and layered complexity of the term." Diagram created by the author.

Grounded on the *Bildung*'s late eighteenth-century understandings of *Bildung* that flourished in the nineteenth century, the curation in this section of the thesis is structured around three interpretive categories: **imitative *Bildung***, **formative *Bildung***, and **reflexive *Bildung***. These categories do not aim to limit the plural interpretations of *Bildung*, but rather underscore specific interpretations already embedded in its historical usage, emphasizing them without erasing the richness and layered complexity of the term (Figure 3.3). Imitative *Bildung* encompasses practices of learning and making through references, resonating with the etymological roots of the term *Bildung* in *Bild* and *Nachbildung* (imitation, reproduction). Formative *Bildung*, on the other hand, emphasizes the "formative" interpretation of *Bildung* through *bilden*, referring to modes in which knowledge develops through generative laws and rule-based processes of variation. Bringing

these two approaches together, reflexive *Bildung* is situated within a framework of learning informed by Koselleck's three propoerties of *Bildung*; autonomy, self-determination, and reflexivity, while also emphasizing a self-referential return to itself.

These categories, as a proposed architectural framework, are informed by two historically overlooked architectural concepts from the nineteenth-century: *Vorbilderbewegung* or Modeling Movement, and *Bildungsgesetze* or Laws of Formation. These concepts shed light on how architectural knowledge has been historically reformulated. The proposed framework draws from the books, definitions, articles, buildings, and drawings that emerged around these two concepts, forming the basis for an operational curation. These concepts were intentionally briefly touched upon in the model glossary because they are "overlooked" concepts intertwined among the lost strands of the transition to modern architecture in the twentieth century.[397] While *Vorbilderbewegung* (Modeling Movement) emphasizes learning through exemplary models and visual references, *Bildungsgesetze* (Laws of Formation) proposes the generative logic of form through laws of separation and relation. In the context of this curation, these two frameworks are treated not as isolated traditions but as interwoven theories, revealing their inherently reflexive nature. This mutual reinforcement is key to understanding architectural *Bildung* as a dynamic interplay of imitation, formation, and the synthesis of both rather than as a linear method. Each category corresponds to a particular mode of learning and architectural operation. Imitative *Bildung* engages with the concept of *Vorbilderbewegung* (Modeling Movement), operating through the act of collecting fragments, which is a process of assembling coded lexicons for and of architectures. Formative *Bildung* draws

[397] Material from this section of the thesis was published by the author as "Between *Bild* and *Bildung*: A Sample of Re-reading the Making of Architectural Knowledge" in the Criticall Conference, TUDelft, 2023, and as "Between Image and Form: A Transition from *Vorbilderbewegung* (Modeling Movement) to *Bildungsgesetze* (Formation Laws)" in the Foundations. Positions. Words Conference, Yeditepe University, İstanbul, 2022.

on *Bildungsgesetze* (Laws of Formation), focusing on the generative potential of architectural rules and sequences, activated through varying transitions and iterations. Finally, reflexive *Bildung* synthesizes these two operations of collecting and varying into a combined interpretive and self-referential strategy. This triadic framework provides a thorough understanding of *Bildung* and is further articulated through examples of architectural making that unfold across overlapping historical and contemporary layers of architectural knowledge. This framework, which reflects the philosophical richness of *Bildung*, is the outcome of a hermeneutic reading. The modes of making illustrated through the curated examples have been accordingly reframed in line with these categories. It is important to note that, due to the limitations of the thesis format, an evolving structure with expandable operations is not fully possible here. However, based on its theoretical premise, this study proposes such an expansion. These operations can be multiplied, and the overlaps between examples and temporal layers can be further diversified. What matters most is the method-generating capacity of this new categorization. Additionally, each operation is linked to a specific reference through theoretical elaborations, and I meticulously cited these terms to include them in the curation.

The first category, conveying an **"imitative"** understanding of *Bildung*, is influenced by the *Vorbilderbewegung* (Modeling Movement), and involves historical precedents that generate coded lexicons for and of architectures and defines the operation of collecting. This principle aligns with Poliziano's *Inspiratum* (inspiration) as a way of knowing. The act of collecting and repeating existing fragments defines an imitative *Bildung*, as architectural formation gathers and replicates pre-existing models that are collected as static and largely unchanged shapes. This approach focuses on learning from nineteenth-century coded lexicons within the *Vorbilderbewegung*, including the *Bilderatlas* tradition, pattern books, and teaching collections. By drawing from the *Bilderatlas* tradition, and particularly its visual taxonomies and iconographic compilations, collecting is defined as an architectural imitative operation with a

strongly scenographical dimension. This definition is illustrated by Alison Smithson's The Big Scrapbook, where architectural fragments are organized visually into a subjective atlas. This mode of collecting is also evident in pattern books such as *Vorbilder für Fabrikanten und Handwerker* (Models for Manufacturers and Craftsmen), which provided reproducible models and typological guides. A similar logic is reflected in the work of Denise Scott Brown and Robert Venturi, whose strategies of visual codification transform commercial and cultural symbols into architectural tools. Other examples can be found in teaching collections - such as those at the Karlsruhe SAAI and TU München *Architekturmuseum*, which gathered images, drawings, and models for pedagogical use. This institutional method of collecting is exemplified in Andrew Kovacs' *Archive of Affinities*, where fragments are digitized and rearranged to form new associative interpretations. These historical and contemporary couplings reveal a consistent operational strand of collecting fragments across various media and timeframes within the framework of imitative *Bildung*.

The second category conveys a **"formative"** understanding of *Bildung* that is influenced by the concept of *Bildungsgesetze* (Laws of Formation), exploring how architectural knowledge emerges through generative rules and sequential variations and defines the operation of varying. This principle aligns with Poliziano's *Inventum* as a way of knowing. The act of varying and process-based approaches defines a formative *Bildung*, in which architectural formation is guided by generative rules that understand form not as a fixed outcome but as an ongoing process of becoming. This approach, once again, focuses on learning from the nineteenth-century interest in generative laws, particularly the concept of *Bildungsgesetze* (formation laws) and its overlooked and relatively narrow discourse, including the works of Friedrich Heinzerling (1824–1906) and Rudolf Redtenbacher (1842–1885), which foregrounded the technological dimension of architectural formation in line with the meaning it held within tectonic theory. Learning from the four-partite definition of form—

Nutzform, *Werkform*, *Begriffsform*, and *Sinnform*—as well as the "laws of separation/division and relation/transition" proposed in Friedrich Heinzerling's article *Die Bildungsgesetze der architektonischen Formen* (The Laws of Formation of Architectural Forms), varying emerges as a formative architectural operation. This approach is also evident in Superstudio's spatial diagrams, such as *Istogrammi*, where basic forms undergo systematic transformations. A similar approach is found in the writings of Rudolf Redtenbacher, *Tektonik* and *Die Architektonik der modernen Baukunst*, that discuss concepts such as *Formgebung* (form-giving), *Begrenzungsformen* (limiting-forms), and *Übergangsformen* (transition forms). Varying also informs the procedural design strategies of SHoP Architects, who coined the term "versioning" to describe how forms evolve through parametric iterations. These examples demonstrate how the operation of varying, whether through conceptual typologies or computational transformations, constitutes a consistent strand of Formative *Bildung* across both former and more recent architectural practices.

Finally, the third category conveys a **"reflexive"** understanding of *Bildung*, which is another intrinsic quality of the term. Reflexive *Bildung* centers around the confluence of the principles of imitative and formative *Bildung*, both relating to collecting fragments and varying sequences. Reflexive *Bildung* aligns with Poliziano's *Mixtum* as a way of knowing. This approach does not operate through learning from historical precedents or contemporary examples of making in a linear manner. Instead, it functions as a synthetic process, integrating various methods, including both imitative and formative *Bildung*, without prioritizing one over the other. It creates an open system for knowledge production by integrating various architectural methods, where *Bildung* is not just adapted but actively engages with imitative and formative processes. Reflexive *Bildung* does not merely learn from precedent but instead, it emerges through the confluence of multiple approaches. The operation of "imaging", as a recent term coined by MILLIØNS Architecture and John May, aligns well with the knowledge production proposed in this thesis.

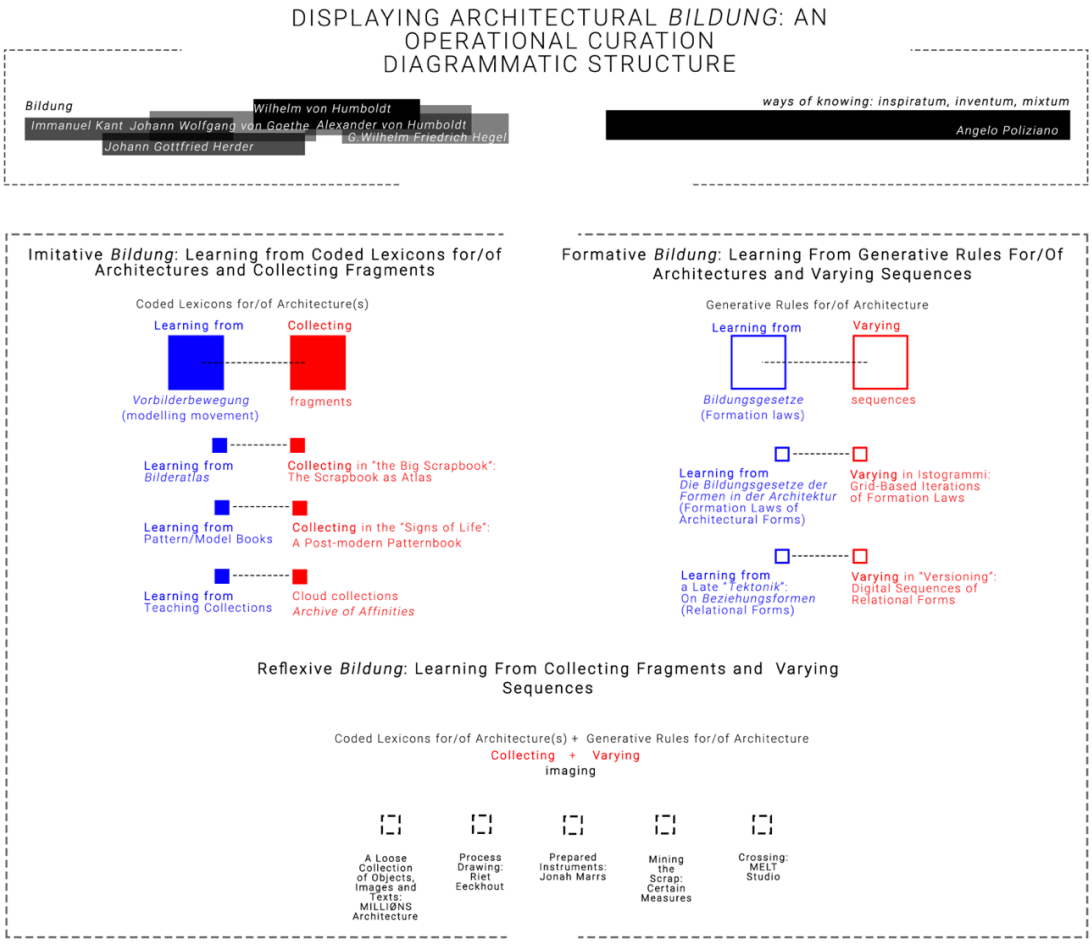
Imaging does not rely on either a fixed set of images or a set of generative rules, making it especially relevant to the framework of reflexive *Bildung* as an evolving mode of architectural making. Imaging, as John May states, has a difference compared to the previous forms of simulation: "that is what imaging simulates is not specific ideas or thoughts but rather thinking itself."[398] Coded lexicons and generative rules integrate collected fragments with transformative sequences, creating new architectural possibilities through imaging. Redefined as an operation of reflexive *Bildung*, imaging enables a new mode of architectural knowledge production, where collected elements are not simply archived but actively reconfigured to create new possibilities. This synthesis is evident in contemporary speculative practices such as MILLIØNS Architecture's imaging of diagrammatic systems, Riet Eeckhout's "process drawing" that unites thinking and making, Jonah Marrs' prepared instruments that mediate between design logic and action, Certain Measure's data-driven minings and reconstructions that conjure existential and symbolic spaces, and MELT's collections of fragments that allow the imagining of new spatial possibilities. Although imaging is presented as a broader operation, each act of making introduces distinct suboperations, such as process drawing and prepared instruments involving plotting, meshing, and rendering, as well as mining through scraps and finding. These works are not mere representations; they are reflexive instruments of inquiry, framing architecture as a form of thinking.

In summary, these interpretive operations are combinations of collecting fragments, varying sequences, and imaging as synthesis that arise from the coupling of overlooked historical concepts and contemporary design approaches. Selective but not reductionist, this chapter defines an expandable framework of methods for architectural making. While the number and emphasis of operations may differ across categories, the aim is not to be exhaustive but rather to show how each can be extended. The curation itself is structured through the conceptual filter of the

[398] John May, "Everything is Already an Image", *Log* 40 (2017): 9-26.

proposed categorization, intentionally combining examples from different timeframes. What is highlighted here is not the examples themselves but their illustrative power in relation to the proposed terminology. The significance of this contribution lies in offering a new definition of architectural *Bildung* through its multiple interpretations. These operations embody the imitative, formative, and reflexive dimensions of *Bildung*, and together, they provide a curatorial method that unfolds across temporal and visual layers, as reflected in the *Mira Calligraphiae Monumenta*.

Diagrammatical Introduction



Imitative *Bildung*: Learning from Coded Lexicons for/of Architectures and Collecting Fragments



The imitative understanding of *Bildung* that is rooted in its philosophical and etymological foundations can be defined in architectural theory through the influence of the *Vorbilderbewegung* (Modeling Movement), which foregrounds the role of historical precedents and scenographical traditions in architectural knowledge. This mode of making aligns with Angelo Poliziano's second way of knowing: *Inspiratum* (Inspiration). At the core of this category lies the act of collecting the already existing and re-imitating it through the collection itself. It is a creative operation that gathers fragments of mostly artforms, images, and references into coded lexicons for and of architecture. These lexicons, historically understood as *Formlehre* (coded lexicons) and *Lehrbücher* (illustrated pattern books), marked a shift away from the canonical treatises and classical interpretations of the *ancien régime*.[399] They infused classical elements with new civic meanings and pedagogical functions, disseminating architectural knowledge in more accessible and often visual formats.

In the century of "*Verstandesarbeit* (labor of understanding)," which exists between "academic art vs. contemporary science" and "tradition and innovation," we can identify another dual distinction regarding understanding and learning from architectural history.[400] In this context, understanding one unique distinction and the

[399] Wolf.
[400] Schwarzer, 1994.

methodological difference between *Architekturgeschichte* (architectural history) and *Bauforschung* (building history or research) can help to better situate the Modeling Movement (*Vorbilderbewegung*) within the century. Since the development of the theories on *Tektonik* also triggered a strong relationship between archaeological methods and architecture, this aforementioned distinction can be seen as an inevitable result:

> …the notion of tectonics is closely tied to the archaeological excavations which with stratigraphic method have enabled to study the ancient architecture decomposed into single elements, reconstructing the original image moving from part to whole; from details to the organism. Karl Bötticher, architect trained at the Bauakademie pupil of Karl Otfried Müller, wrote the book *Tektonik der Hellenen* linking the concept of tectonics to the archaeological discoveries of the time, and to the history of Greek architecture and construction.[401]

Within the century, tools for teaching the architectural forms of historical prototypes expanded to include excavations. During the discussions of *Tektonik* theory, particularly in the mid-twentieth century, former *Bauakademie* students who studied history under Bötticher, Hirt, and Stier became engaged in German excavations at Olympia and Pergamon. Most of the archaeological fragments were converted into models, creating collections that became "classrooms" for *Bauforschung*. These evolving archaeological and tectonic interests directly shaped the pedagogical approaches of architecture schools, where drawing and model-making became central tools for engaging with historical knowledge. Dietrich Neumann notes the following:

> It is not surprising that with its roots in the art academies, the teaching of architecture and its historical forms was centered for a long time on drawing from models and, occasionally, local architecture. The schematic drawings

[401] Dietrich Neumann. "Teaching the History of Architecture in Germany, Austria, and Switzerland: "Architekturgeschichte" vs. "Bauforschung"," *Journal of the Society of Architectural Historians 61*, no. 3 (2002): 371.

> of building types and architectural elements that Jean-Nicolas-Louis Durand and others introduced at the beginning of the nineteenth century in France had a clear influence in Germany as well (on architects such as von Klenze and Friedrich Gartner). In the second half of that century, many architecture schools established teaching collections consisting of publications, original drawings, and plaster casts or cork models of the architecture of antiquity.[402]

Both the drawing courses and the visual notes from excavations included comprehensive prototypes. In this regard, drawing and redrawing served as methods to learn about and comprehend historical elements and relationships. Neumann states that, besides drawing, another essential tool was the model, ranging from plaster casts to scale models of individual parts or the entire architectural organism. In academies and universities, collections are assembled to replicate the classrooms of actual museums. For example, the architecture museum at the Technical University in Munich began as a teaching collection for students in 1868. Similarly, the Technische Universität Berlin Architekturmuseum was originally a teaching collection as well. Within this pedagogical and archaeological context, *Vorbilderbewegung* gained momentum as a structured movement dedicated to modeling and prototyping across the arts and applied design.

[402] Neumann, 376.



Figure 3.4 Teaching collections, TU München and TU Berlin
https://www.ar.tum.de/einrichtungen/architekturmuseum/geschichte/
https://architekturmuseum.ub.tu-berlin.de/index.php?p=16

The specific movement in nineteenth-century German thought was referred to as "*Vorbilderbewegung*," or "Modeling Movement". As a continuation of pattern books that include detailed drawings of historical prototypes in the arts, industry, and architectural ornaments, models of such prototypes were produced, collected, and integrated into the creation processes. Schwarzer describes the *Vorbilderbewegung* as a mid-nineteenth-century tendency, particularly in the 1850s and 1860s, where efforts to unify art and industry primarily looked to artistic traditions for guidance. This reliance on historical models gave rise to a movement focused on prototypes, particularly in newly established applied art museums and institutions (Figure 3.4).[403]

[403] Mitchell Schwarzer. "The Design Prototype as Artistic Boundary: The Debate on History and Industry in Central European Applied Arts Museums 1860-1900", *Design Issues 9*, no. 1 (1992): 30-44.

The physical collection of models and drawings is a projection of processes in the arts, industry, and inevitably, architecture. It can be considered a physical statement that signifies a transitional point from the limitations of historical prototypes to the possibilities of innovation. Schwarzer states:

> The strength of the modeling movement in applied arts museums between the 1860s and 1880s led to a preoccupation with formal, visual qualities, stressing the need to translate the works of classicism into modern artistic languages through imitation and modeling from pattern books.[404]

Here, it is important to note that this movement was inevitably affected by both French studies on typology and the British Arts and Crafts Movement. The strong relationship of modern historiographies and the works of William Morris and the British Arts and Crafts Movement has already been widely studied. Curtis argues that within the broader context of the transition from nineteenth-century architectural styles to the rise of modern architecture, the Arts and Crafts Movement continued into the twentieth century, influencing the development of high-quality individual works. Importantly, the Arts and Crafts ideals played a crucial role by emphasizing simplicity, honesty, and necessity. These principles later became foundational to the Deutscher Werkbund in Germany, which aimed to address more directly the challenges of mechanization.[405]

As stated, the reflection of the Arts and Crafts Movement within the German-speaking context was interpreted and transformed within the German-speaking context. The concept was seen as a "mediator between formal invention and standardization, between personal style and the appropriate form for the *Zeitgeist* (or 'spirit of the times'), between a sense of the contemporary world and reliance on age-old artistic principles."[406] In particular, this study should highlight the "educational

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[404] Schwarzer, 38.
[405] William J.R. Curtis. *Modern Architecture Since 1900* (Phaidon, London, 1996), 97.
[406] Schwarzer, 100.

aspect" of *Vorbilderbewegung* as an early concept should be highlighted. Schwarzer explains the difference between the British Arts and Crafts Movement and *Vorbilderbewegung* further:

> … What both of these movements held in common was their opposition to the rigid historicist and academic attitudes of the second half of the nineteenth century; we are told in each case that new design models emerged because historical artistic models were rejected… Unlike the English Arts and Crafts movement, applied arts museums never rejected industry and took great efforts to create an educational environment for industrialists and art dealers, as well as artists, historians, and the general public.[407]

The Modelling Movement's understandings in the nineteenth century affected architectural making and learning, which can be seen as a generating an ongoing design culture. Accordingly, in contrast to their frozen fragmentary states, collections of historical models guided architects and artists to nourish hermeneutic cycles of creation. It is significant to note that *Vorbilderbewegung* refers to applied arts, primarily encompassing models of industrial design. However, the condition of architectural fragments has also presented a unique scale that is part of teaching collections comprising architectural models and survey drawings. In relation to this movement, new architectural programs, including university museums and Kunstgewerbemuseum, were developed. The educational network that included Bauakademie education as well as teaching collections and the Kunstgewerbemuseum, is significant in further elaborating on the invention of new ways of making. Beyond its historical significance, the *Vorbilderbewegung* offers a framework for understanding collecting as a pedagogical and design operation.

In this regard, the period of *Vorbilderbewegung* was a significant theoretical and practical moment in history, serving as an interaction point for various strands of

[407] Schwarzer, 38.

architectural making. This thesis emphasizes the act of collecting as learned from the Modeling Movement, which is defined as a creative pedagogical operation. Collecting, as a renowned architectural operation, has diverse appearances throughout the archival literature. Rather than focusing on that extensive body of literature, this discussion aims to highlight the act of collecting itself and what it generates in terms of different media. The act of collecting has encompassed a variety of spaces that reflect both personal affinities and collective memories, revealing layers of architectural imaginaries. These spaces range from curiosity cabinets (*Wunderkammern*) and personal archives to scrapbooks, teaching collections, and institutional repositories.[408] Examples such as John Soane's house, Aby Warburg's *Bilderatlas*, Alison Smithson's scrapbook, or the CCA collection and university museums illustrate this anachronistic spatial diversity in collecting practices. In the twenty-first century, the development of digital databases to provide access to digitized versions of drawings, photographs, and other materials has provided another layer of multiplicity for spaces of collecting. This digital integration has not only broken institutional boundaries but has fostered new freedoms in the acts of collecting and architectural thinking, particularly those shaped by personal affinities. Andrew Witt underlines this similarity between contemporary ideas in computational architectural thinking and the "analogous" roots of collecting, uncovering multiple interconnections.[409] He says:

> Architects register cultural affinities in part by furnishing their physical workspaces and social conversations with specific artifacts. Amalgams of artifacts shape the creative horizon of the designer as a repository of ur-forms and desire-objects which inevitably inflect the acts of visualizing and making.[410]

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[408] One of the earliest and most comprehensive studies of architectural collections and institutions was conducted by Ayşen Savaş as Ph.D. research: Ayşen Savaş, *Between Document and Monument: Architectural Artifact in an Age of Specialized Institutions* (Ph.D. diss., Massachusetts Institute of Technology, 1994), https://dspace.mit.edu/handle/1721.1/11641.
[409] Witt, 2022.
[410] Witt, 20.

The "learned from" examples inspired or produced by *Vorbilderbewegung* highlight collecting as a fundamental aspect of architectural *Bildung*. Drawing from sources such as *Bilderatlas* tradition, pattern books like *Vorbilder für Fabrikanten und Handwerker*(Models for Manufacturers and Craftsmen), and institutional teaching collections such as those at the SAAI at Karlsruhe Institute of Technology and the *Architekturmuseum* of TU München, collecting is established as a central epistemic and material operation. Collecting, as an imitative operation, extends into contemporary contexts through various modes, including Alison Smithson's subjective atlas The Big Scrapbook, Denise Scott Brown and Robert Venturi's visual codification of symbols, and Andrew Kovacs' cloud-based Archive of Affinities.

This section explores Imitative *Bildung* through the operation of collecting, understood as both a historical practice of modeling and as a contemporary method of design thinking. Each of the following subsections presents a dialogue between different temporal layers, linking a historical lexicon, book, or institution with a more recent project that echoes or reactivates its scenographical logic. Rather than drawing a strict division between past and present, these pairings demonstrate how acts of collecting, in spite of being temporally distant- can operate within the same imitative framework of architectural *Bildung*.

Learning from the *Bilderatlas* Tradition

The concept of *Bilderatlas* offers an interesting lens through which to explore the relationships of visual collections and creative processes in art and architecture. Two notable examples separated by nearly a century, Johann Georg Heck's *Bilderatlas* (1851) and Aby Warburg's *Bilderatlas Mnemosyne* (1924–1929), serve as significant introductory examples. Although Heck's *Bilderatlas* has been historically more influential, particularly through its impact on the structure of pattern books and teaching collections, Warburg's atlas is acknowledged here for two reasons: first, as a foundational reference in curatorial studies, and second, to present another example of the *Bilderatlas* principle of collecting with different

content. Heck's atlas, rooted in the encyclopedic ambitions of the nineteenth century, sought to systematize human knowledge visually. Warburg's Warburg's *Bilderatlas Mnemosyne*, on the other hand, moved beyond linear narratives to explore how constellations of images generate multiple interpretations. Together, these examples highlight the lasting importance of collecting images and reading them together, particularly in their ability to inspire artists and architects through the synthesis of creative methodologies.

Johann Georg Heck's "*Bilder-Atlas zum Conversations-Lexicon*" while not an architecture book, is an architectural work, which was published between 1859 and 1860 and consists of seven volumes covering mathematics, science, geography, history, ethnography, wars, marine sciences, architectural history, technology, arts, and religion. Although designed to convey encyclopedic knowledge scenographically, the atlas's pages are composed around unified scenes and their fragments. This compositional method highlights relationships between parts and wholes. (Figures 3.5 and 3.6). The atlas privileges scenographical logic, yet each image plate also implies a narrative tied to context, reinforcing the educational function of visual sequences. This relationship may be a significant point to highlight within the nineteenth century, often seen as a period of change and transition. In Figures 3.5 and 3.6, pages from different volumes of the *Bilder-Atlas* present scenes and fragments from various contexts, including marine environments, architectural ruins, fortifications, the human body, military costumes, and machinery. Heck's atlas thus operates not only as an image compilation (*Zusammenstellung*) but also as a visual composition (*Zusammensetzung*), emphasizing both fragments of shapes and artforms and scenographical relationships between elements.



Figure 3.5 A selection of illustrative plates from the *Bilder-Atlas zum Conversations-Lexikon*, representing a nineteenth-century encyclopedic ambition to visualize and classify universal knowledge. The collection spans subjects such as geometry, astronomy, meteorology, and geology; architectural typologies and construction techniques across cultures and periods; natural sciences including botany, zoology, and mineralogy; and medical fields such as anatomy and surgical instruments.
Source: Johann Georg Heck. *Bilder-Atlas zum Conversations-Lexikon: Ikonographische Encyklopädie der Wissenschaften und Künste*. Vol.s 1-7. 1849. David Rumsey Map Collection https://www.davidrumsey.com



Figure 3.6 A selection of illustrative plates from the *Bilder-Atlas zum Conversations-Lexikon*, representing a nineteenth-century encyclopedic ambition of visualizing and classifying universal knowledge. The collection spans subjects such as geometry, astronomy, meteorology, and geology; architectural typologies and construction techniques across cultures and periods; natural sciences including botany, zoology, and mineralogy; and medical fields such as anatomy and surgical instruments. Source: Johann Georg Heck, *Bilder-Atlas zum Conversations-Lexikon: Ikonographische Encyklopädie der Wissenschaften und Künste*, Vols. 1-7, 1849. David Rumsey Map Collection, https://www.davidrumsey.com.

The second example is a more recent *Bilderatlas*, although its conceptual framework remains very similar. Aby Warburg's *Bilderatlas* comprised a series of wooden panels onto which he pinned clusters of images including photographic reproductions, diagrams, sketches, postcards, and various printed materials like advertisements and newspaper clippings. Aby M. Warburg (1866-1929) was a significant figure in the modern study of art and visual culture. Warburg's use of modern techniques of reproduction was intended to develop an "instrument" of knowledge on this basis.[411] The project brochure underlines today's perceptions of the project from today:

> To the present-day viewer, the work may well call to mind an Internet search engine's flood of images, but Warburg's panels are constructed with great deliberation and comprise a repository that condenses memory into complex constellations.[412]

The *Bilderatlas* includes a wide range of media: painting, sculpture, graphic design, illuminated manuscripts, tapestries, wedding chests, playing cards, everyday objects, jewelry, and others (Figure 3.7). These images are compiled in the panels of his *Bilderatlas*, yet they bear little connection to the esteemed "masterpieces" and "values."[413] The *Bilderatlas* project evolved over several stages. The choice of images, the number of panels, and their arrangements were continually changing. The initial set of panels was photographed in May 1928, followed by a second series captured in multiple sessions from late August to mid-September 1928 (Figure 3.7). The final and most widely recognized version, completed after Warburg's death in October 1929, comprises 63 panels and 971 items, marking the last stage of this unfinished project (Figure 3.8).[414]

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[411] Aby Warburg, *Mnemosyne: Bilderatlas—Reconstruction, Commentary, Revision*, exhibition at ZKM | Center for Art and Media Karlsruhe, curated by Roberto Ohrt and Axel Heil in cooperation with the Warburg Institute, London, July 4-November 15, 2020, 5.
[412] Warburg exhibition catalogue, 5.
[413] Warburg exhibition catalogue.
[414] https://warburg.sas.ac.uk/archive/bilderatlas-mnemosyne



Figure 3.7 *Bilderatlas Mnemosyne*, first version, March to May 1928. Aby Warburg assembled approximately 40 panels constituting the initial draft of his atlas.
Source: https://warburg.sas.ac.uk/archive/bilderatlas-mnemosyne



Figure 3.8 *Bilderatlas Mnemosyne*, final version, October 1929. In the final stage of the project, Aby Warburg assembled a new version of the atlas, refining the arrangement of images across 63 panels.
Source: https://warburg.sas.ac.uk/archive/bilderatlas-mnemosyne

Christof Wood (b. 1969, art historian and cultural theorist) summarizes the creative force that could be learned from Warburg's *Bilderatlas*:

> By pinning them to panels, Warburg declined to submit the images to the hierarchies of grammar or argument, but rather allowed them to pulse in all directions at once, connecting laterally with one another. The panels of the picture-atlas were like the façade of a Romanesque church, studded with monstrous, apotropaic symbols, forming incomprehensible motifs. The *Bilderatlas* treated images like accumulations of energy circulating through history, never settling into units of discrete meaning.[415]

Learning from the *Bilderatlas*, collecting refers to positioning and converting fragments into dynamic scenographical relationships instead of static compositions. By highlighting lateral connections, collecting offers a method of making that allows images, drawings, and artforms and shape fragments to define new dialogues and create frameworks of knowledge. The proposed framework of imitative *Bildung* includes numerous examples of this mode of making, such as model books, pattern books, *Bilderatlases*, and twentieth century references to "norm-making"[416], most notably Ernst Neufert's *Bauentwurfslehre* (1936), which compiles data for architectural design, encompassing various scales, materials, and parts. However, rather than offering an exhaustive survey, this thesis highlights selected overlaps between these examples and their corresponding temporal layers.

The legacy of scenographical relationships in the *Bilderatlas* tradition reappears in the subjective and open-ended collecting practice of Alison Smithson's The Big Scrapbook, where fragments are reassembled into a personal architectural lexicon.

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[415] Christopher S. Wood, "Aby Warburg, *Homo victor*," *Journal of Art Historiography*, no. 11 (December 2014).
[416] Meister, 4.

Collecting in *The Big Scrapbook*: The Scrapbook as Atlas

Scrapbooks illustrate subjective collecting and its potential in architectural making. By the mid-twentieth century, scrapbooks had become essential media for architects, creating dynamic relationships between fragments through collecting and scenographical exploration. *The Big Scrapbook*, as a personal collection, exemplifies this shift.

Alison Smithson's big scrapbook, recently digitized, may be the most significant and comprehensive example of this operation. It contains various fragments, including drawings, photographs, and text. The base of the scrapbook is Charles Knight's *Old England: A Pictorial Museum* (1854). Knight's book portrayed England's architectural and cultural heritage, providing Smithson with pages on which to create her work. She transformed the book into a layered composition by gathering and composing the original illustrations alongside photographs, images from magazines, packaging, brochures, books, and postcards. Its visual content ranges from British landscapes and ruins to infrastructural fragments and classical forms, along with seemingly unrelated images that, when pinned together, suggest new modes of architectural imagination. It is a scenographical catalogue of Alison Smithson's theoretical thinking, and includes a personal collection of shapes, fragments which she used to build new arguments and relations from the 1940s until her death in 1993. The arrangement of images from various contexts encourages the creation of new creative processes and relationships. More than a collection, the scrapbook functions as a design instrument, emblematic of the Smithsons' broader approach to architecture.

Selected spreads from *The Big Scrapbook* are presented below. These pages provide visual and conceptual proof of the scrapbook's role as a model of imitative *Bildung*, mediating between historical sources and forms of architectural imagination. Through this reading, the scrapbook is defined as more than merely an archival

object; it is an active methodological tool, demonstrating the creative potential of collecting within architectural making. This section highlights three selected from among nearly 845, each believed to exemplify the operative logic of collecting. They demonstrate how the act of collecting generates encounters that constitute an expanded archive of ideas.



Figure 3.9 The base of the scrapbook, from spread 14, pages from the book *Old England: A Pictorial Museum.* Source: www.archive.org

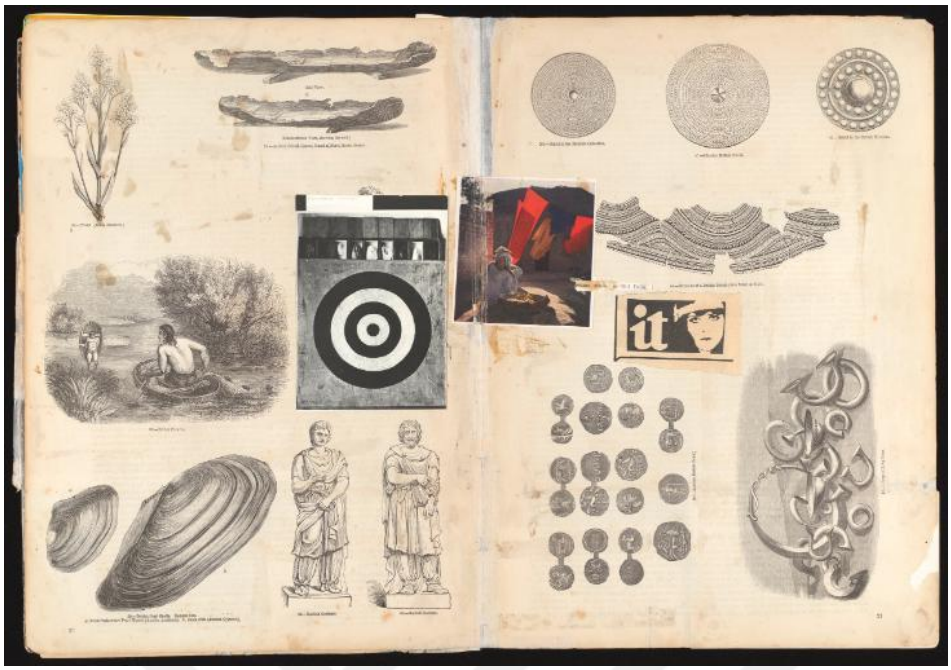


Figure 3.10 Spread 14 from Alison Smithson's *The Big Scrapbook*, from the Tate digitization project "Alison Smithson's Mind: An Architectural Scrapbook, 1950-1990."
Source:
https://www.tate.org.uk/art/archive/tga-20245/alison-smithsons-scrapbook.

This spread (Spread 14, Figure 3.10) from Alison Smithson's *The Big Scrapbook* vividly demonstrates the gathering of diverse fragments and their scenographical arrangement to create open-ended, interpretive relationships. It illustrates how the encyclopedic order is disrupted by subjective juxtapositions, which is an act that exemplifies imitative *Bildung*. The base of the book *Old England: A Pictorial Museum* is particularly apparent in this spread of classical sculptures, ancient coins, marine fossils, and natural illustrations such as shells and trees (Figure 3.9).[417] These fragments already evoked a pedagogical and encyclopedic intention, and Smithson added pieces from more recent media, such as a black-and-white bullseye target, and a photograph of a peanut vendor, juxtaposed with abstract red shapes. (Figure 3.10).[418] The juxtaposition of scientific illustration with consumer shape-based

[417] https://www.tate.org.uk/art/archive/tga-20245/alison-smithsons-scrapbook.
[418] https://www.tate.org.uk/art/archive/tga-20245/alison-smithsons-scrapbook.

imagery challenges the taxonomic function of the original atlas, prompting a shift toward visual ambiguity.

Instead of presenting a linear narrative, Spread 14 serves as a field of visual associations. The temporal and scenographical layering of these layers, though less pronounced than those of other spreads, embodies the scrapbook's function as a visual field for intellectual formation. This act of collecting transforms a didactic shape based compilation into a site of open-ended interpretation.

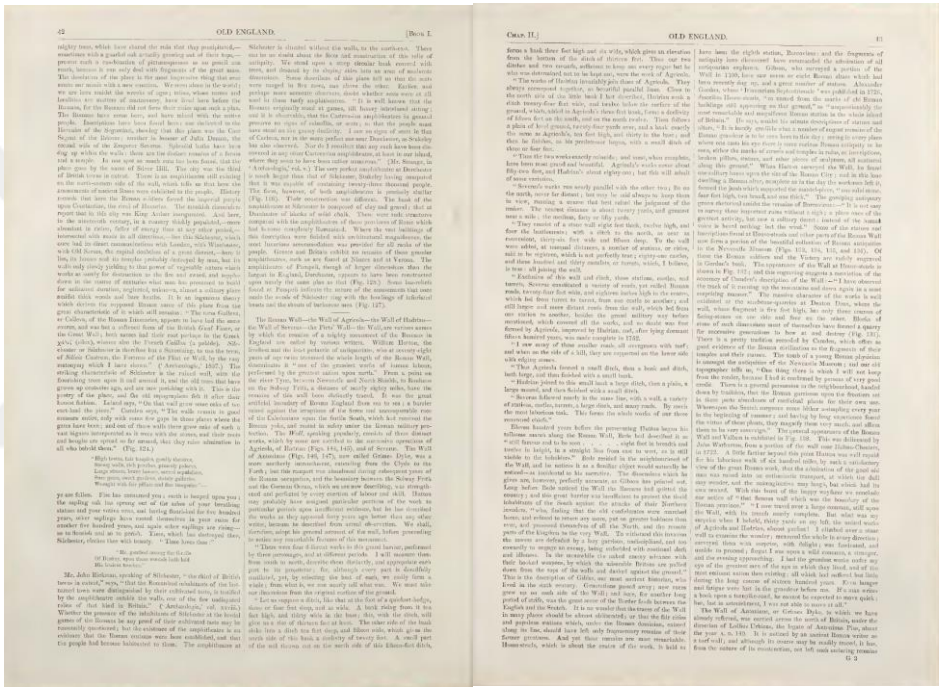


Figure 3.11 The base of the scrapbook from Spread 27, pages from the book *Old England: A Pictorial Museum.* Source: www.archive.org



Figure 3.12 Spread 27 from Alison Smithson's *The Big Scrapbook*, from the Tate digitization project "Alison Smithson's Mind: An Architectural Scrapbook, 1950-1990."
Source:
https://www.tate.org.uk/art/archive/tga-20245/alison-smithsons-scrapbook.

In the scrapbook, Spread 27 enriches the visual narrative with more additional layers. The base pages feature a continuous text this time (Figure 3.11), overlaid with cutout shapes showcasing various elements such as people in traditional dress, Benin bronzes, a waterfront view, two members of the Bakuma Tribe, hot air balloons, a Chinese street scene, a reproduction of a painting, a figurine, and a group of farm workers, with an image appearing to be pasted behind them (Figure 3.12). Additionally, there are cuttings showing people with instruments, a sheet of tiger decals, and tiger balm stickers printed in both Chinese and English. These elements further enrich the scrapbook's formation with temporal and scenographical layers that are composed on one page. The visual density

reflects the complexity of cultural memory, where disparate visual languages - colonial, artisanal, commercial- interact without hierarchy.[419]

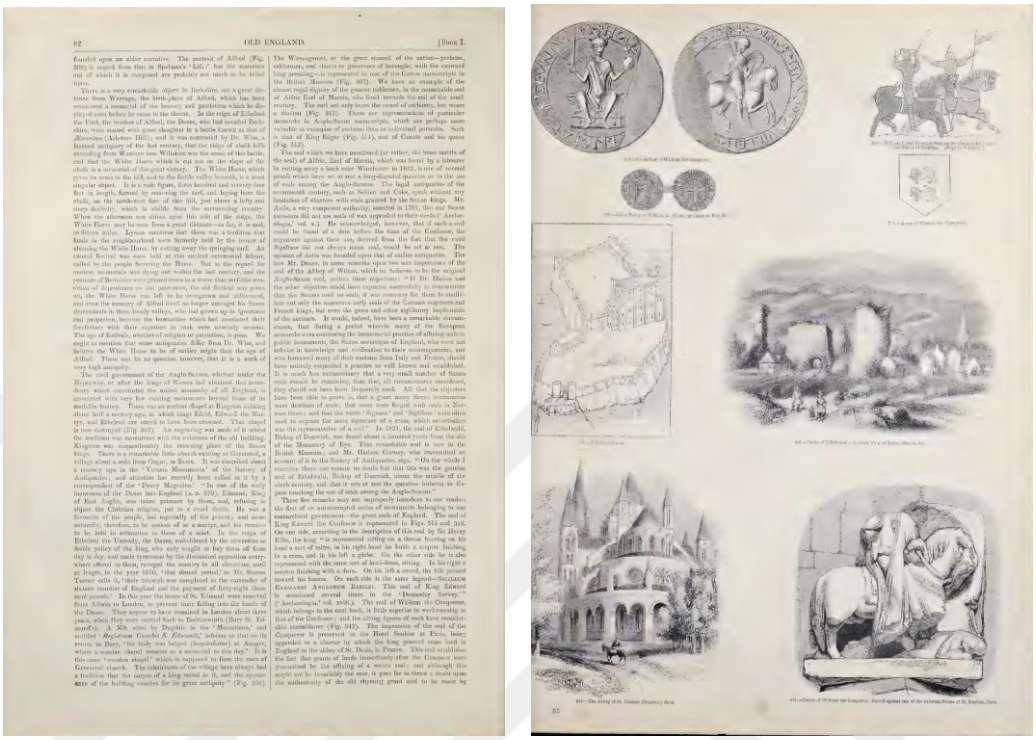


Figure 3.13 The base of the scrapbook,from Spread 41, pages from the book *Old England: A Pictorial Museum.* Source: www.archive.org

[419] https://www.tate.org.uk/art/archive/tga-20245/alison-smithsons-scrapbook.



Figure 3.14 Spread 41 from Alison Smithson's *The Big Scrapbook*, from the Tate digitization project "Alison Smithson's Mind: An Architectural Scrapbook, 1950-1990."
Source:
https://www.tate.org.uk/art/archive/tga-20245/alison-smithsons-scrapbook.

In the Spread 41 the base pages from *Old England: A Pictorial Museum*, pages 82 and 85, are partly obscured. One appears to be densely text-based, while the other has depictions of medieval architecture, including castle ruins, coins, heraldry, and axonometric plans and perspective views of castles (Figure 3.13).

Smithson overlays this base with sepia-toned photographs and postcard fragments: a vaulted Gothic colonnade, harbors at Whitby and Lyme Regis, and a figure on a wall marked with a drawing (Figure 3.14). These additions, while not necessarily contextual in content, resonate formally as temporal layers with the underlying shape based imagery of vaults, arches, and harbors, creating associations grounded in

spatial analogy. They suggest different potentials of limits, open to varied interpretations by different viewers.[420]

As an operation defined within the category of imitative *Bildung*, collecting is displayed through Alison Smithson's newly digitized scrapbook, which reflects a method of collecting learned from the *Bilderatlas* tradition, combining fragments from multiple scenographical and temporal layers. The act of collecting here becomes both analytical and affective, creating, once again, open-ended inspiration. It represents a dynamic process of thinking through shape based imagiries, where meaning emerges through juxtaposition rather than fixed narratives.

Learning from Pattern/Model Books

The Modeling Movement (*Vorbilderbewegung*), as articulated by various model books and collection inventories of the nineteenth century, reveals how collecting became both an educational and a creative operation in architecture and the applied arts.[421] These books did not merely reproduce historical artforms; they organized visual knowledge into transferable, modular systems.

To better understand the conceptual and institutional foundations of *Vorbilder für Fabrikanten und Handwerker*, it is helpful to examine two earlier examples that shaped the logic and visual language of the *Vorbilderbewegung*. These examples illustrate how model books evolved into systematic instruments for documenting, transmitting, and reinterpreting historical forms. The first example is provided by the drawings from *Vorbilder für Bautischler-Arbeiten: Sammlung ausgewählter Bautischler-Arbeiten der Renaissance in Italien* by Rudolf Redtenbacher from 1875. This book features a wide array of detailed drawings focusing on carpentry works

[420] https://www.tate.org.uk/art/archive/tga-20245/alison-smithsons-scrapbook.
[421] A related work was published by the author based on this part of the thesis research: "Re-/Non-reading Fragments: Inventories for Architectural Thinking," paper presented at Learnings/Unlearnings Conference, Stockholm, 2024.

from Renaissance Italy. The book's plates showcase drawings of doors, furniture, and wall ornaments from various styles of Italian architecture. The overall structure of the book is based on these plates (*Tafeln*), together with textual explanations that provide information about the specific properties of the drawings and their historical context. Each plate provides contextual information about the architectural monument that it represents. The primary source is an inventory of existing artforms, capturing changes in the sections, surface qualities, and dimensions of each detail (Figure 3.15). To illustrate the representational methods of this collection, three plates are presented in the following text. *Tafel* 22 features sectional drawings of surface details and wall ornaments from Siena Cathedral, showing the precise articulation of elements such as capitals, bases, and pilasters. *Tafel* 30 focuses on ceiling compositions from Roman churches, demonstrating variations in structural and symbolical division. *Tafel* 31 features a detailed section of a door from Siena, emphasizing the interplay between surface treatment and spatial articulation. (Figure 3.15). The overall documentation includes a diverse range of samples from various architectural contexts, serving as a scenographical collection of artforms for study, imitation, or application.[422] This example demonstrates how surveyed architectural elements were systematically documented and categorized for reference and application.

[422] Rudolf Redtenbacher, *Vorbilder für Bautischler-Arbeiten: Sammlung ausgewählter Bautischler-Arbeiten der Renaissance in Italien* (Karlsruhe: 1873).

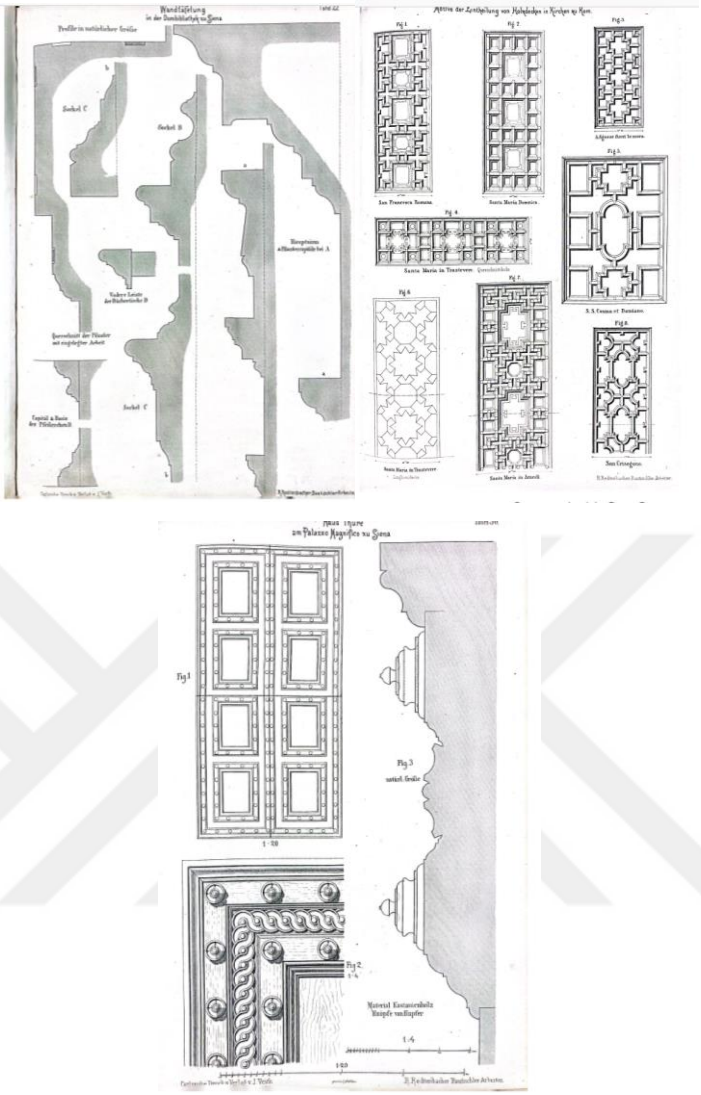


Figure 3.15 *Tafel* 22, *Tafel* 30, and *Tafel* 31. Source: Rudolf Redtenbacher, *Vorbilder für Bautischler-Arbeiten: Sammlung ausgewählter Bautischler-Arbeiten der Renaissance in Italien* (Karlsruhe: 1873). Kunsthalle Karlsruhe Library.

The second example is a museum inventory, *Vorbilder-Hefte aus dem Kgl. Kunstgewerbemuseum: Königliche Museen zu Berlin*, created by Julius Lessing. The museum released a series of *Vorbilder-Hefte*, or "pattern booklets," featuring intricate illustrations of historical art and design prototypes and serving as valuable educational resources for artists, craftspeople, and designers (Figure 3.16). The series includes visual studies of artform typologies such as wrought-iron grilles (*Gitter aus Schmiedeeisen*), Oriental carpets (*Orientalische Teppiche*), ceramic tiles, stained glass, and jewelry. Each of the booklets focuses on a specific material or

decorative category, emphasizing both stylistic variation and technical execution. The plates often combine elevations, profiles, and ornamental details, fostering a systematic and scenographical understanding of historical design vocabularies.

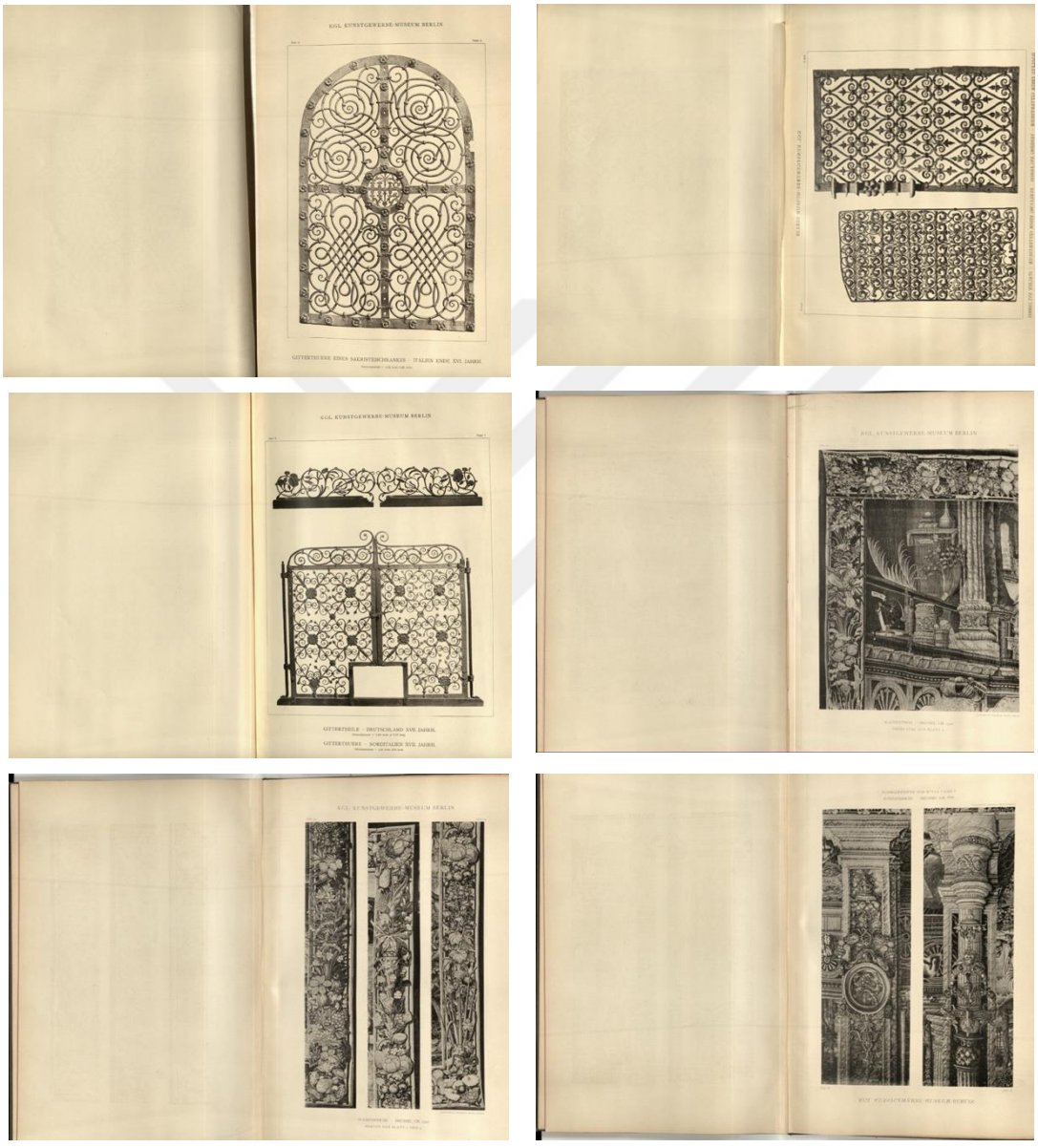


Figure 3.16 *Orientalische Teppiche* [*Oriental Carpets*], and *Gitter aus Schmiedeeisen* [*Grilles of Wrought Iron*], Source: Julius Lessing, *Vorbilder-Hefte aus dem Kgl. Kunstgewerbemuseum: Königliche Museen zu Berlin* (Berlin: Verlag Ernst Wasmuth, late nineteenth century), Zentralinstitut für Kunstgeschichte, Munich.

These examples set the stage for one of the most comprehensive efforts to arise from the Modeling Movement: a collaborative model book by Peter Wilhelm Beuth and Karl Friedrich Schinkel, which synthesized architectural, industrial, and pedagogical aims. Following the two examples discussed here, *Vorbilder für Fabrikanten und Handwerker* ("Models for Craftsmen"), a pattern book by Beuth and Schinkel, offers a particularly precise portrayal of the concept of *Vorbilderbewegung*. It features detailed drawings of existing models of doors, ornaments, furniture, patterns, and architectural components. It constitutes one of the most significant examples of *Vorbilderbewegung* in the early nineteenth century, offering a detailed survey of specific historical prototypes, including transitional architectural elements such as cornices and capitals, as part of a catalog of artforms that also includes vessels, chairs, and textile patterns (Figures 3.17-3.20).

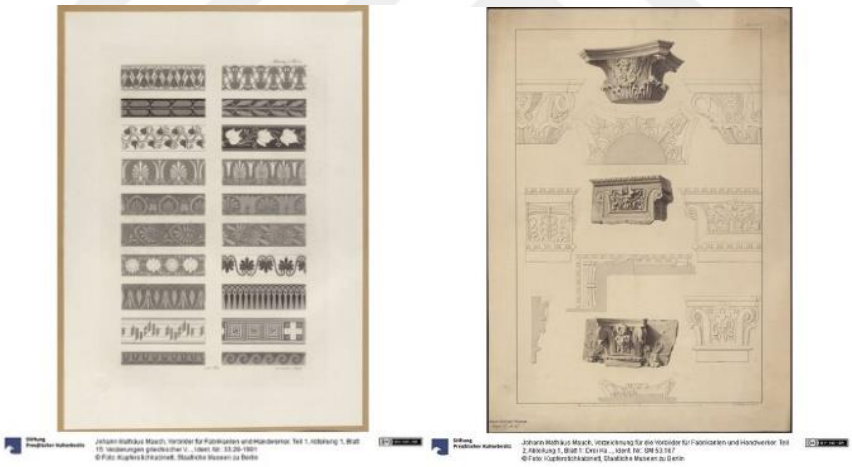


Figure 3.17 Left to Right: Teil I Abteilung I, Blatt 1; Teil 1 Abteilung 1, Blatt 15; Teil 2 Abteilung 1, Blatt 1. Source: Karl Friedrich Schinkel and Peter Wilhelm Beuth, *Vorbilder für Fabrikanten und Handwerker*, 1821. https://smb.museum-digital.de/objects, Museum-Digital: Staatliche Museen zu Berlin, Kupferstichkabinett. Creative Commons Lizenz 3.0, by-nc-sa. Also retrieved from KIT Library - Archive, Karlsruhe.



Figure 3.18 Left to Right: Teil I Abteilung 2, Blatt 1; Teil 1 Abteilung 2, Blatt 27; Teil 2 Abteilung 2, Blatt 7. Source: Karl Friedrich Schinkel and Peter Wilhelm Beuth, *Vorbilder für Fabrikanten und Handwerker*, 1821. https://smb.museum-digital.de/objects, Museum-Digital: Staatliche Museen zu Berlin , Kupferstichkabinett. Creative Commons Lizenz 3.0, by-nc-sa. Also retrieved from KIT Library - Archive, Karlsruhe.



Figure 3.19 Left to Right: Teil I Abteilung 3, Blatt 5; Teil 1 Abteilung 3, Blatt 9; Teil 2 Abteilung 3, Blatt 23. Source: Karl Friedrich Schinkel and Peter Wilhelm Beuth, *Vorbilder für Fabrikanten und Handwerker*, 1821. https://smb.museum-digital.de/objects, Museum-Digital: Staatliche Museen zu Berlin Kupferstichkabinett. Creative Commons Lizenz 3.0, by-nc-sa. Also retrieved from KIT Library - Archive, Karlsruhe.



Figure 3.20 Teil 2 Abteilung 2, Blatt 22. Source: Karl Friedrich Schinkel and Peter Wilhelm Beuth, *Vorbilder für Fabrikanten und Handwerker*, 1821. https://smb.museum-digital.de/objects, Museum-Digital: Staatliche Museen zu Berlin Kupferstichkabinett. Creative Commons Lizenz 3.0, by-nc-sa. Also retrieved from KIT Library - Archive, Karlsruhe.

Prior to compiling *Vorbilder für Fabrikanten und Handwerker*, Schinkel and Beuth undertook extensive research trips across Europe, visiting factories, workshops, bridges, machinery halls, and ironworks. These travels informed both the content of Schinkel's *Lehrbuch* and their shared vision for industrial education.[423] Schinkel documented these buildings and other details, which would become part of the contents of his *Lehrbuch* (textbook). With the founding of the Institute for Industrial Arts and Trade in 1821, Beuth and Schinkel aimed to provide new textbooks for architectural education. Together, they produced three volumes of *Vorbilder für Fabrikanten und Handwerker*, with illustrations contributed in part by Karl Bötticher. The first volume appeared in 1821, introducing engraved model designs across media such as ceramics, silver, wood, and cast iron. The print shop of the Gewerbe-Institut, where many plates were printed, played a central institutional role

[423] Harry Francis Mallgrave. "Rise of German Theory" in Modern architectural theory: A historical survey, 1673–1968. Cambridge University Press, (2009): 99.

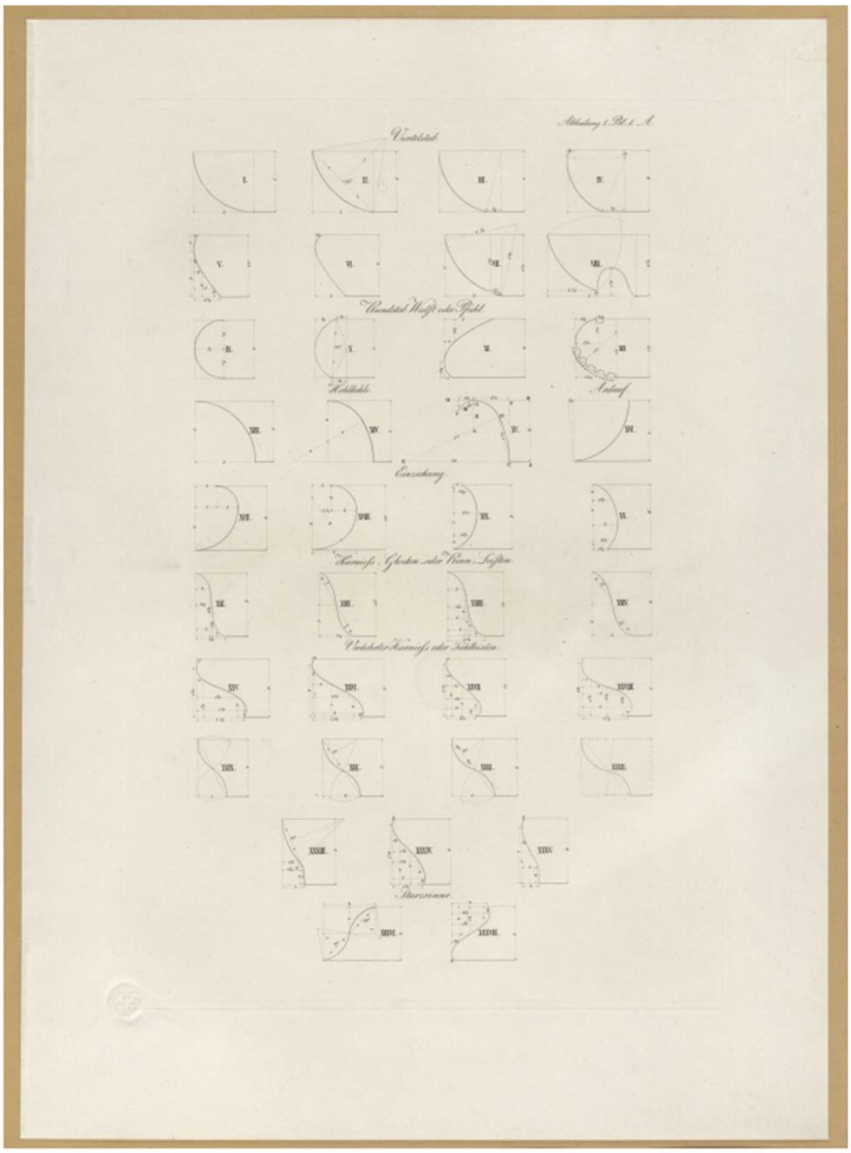
in this effort.[424] Items were organized according to their materials and functions, suggesting that the evolution of form emerged from an interplay between material properties and functional needs. While some designs were inspired by antique sources, most were either created by Schinkel or based on his ongoing projects in Berlin. The volumes of this book can be regarded as catalogues of patterns that present static taxonomies and merge architectural and industrial scales. Additionally, Beuth highlighted the educational aims of their work in the preface.

The first volume of the book was created between 1821 and 1830, and the second volume was produced in 1837. It consists of a variety of plates and texts in three sections. The first section offers a textual explanation of plates addressing *Architectonische und andere Verzierungen* ("Architectural and Other Ornaments"). The second section provides a textual explanation of plates presenting *Geräthe, Gefäße und kleinere Monumente* ("Devices, Vessels, and Monuments"). The third section consists of textual explanation of plates on *Vorbilder für die Verzierung von Zeugen und für die Würkerei (Wirkerei) insbesondere* ("Models for the Ornamentation and for the *Würkerei* (Knitting) in Particular"). The first two sections include artforms of antiquity: capitals, friezes, and ceramic vessels (Figures 3.17-3.20).

[424] Mallgrave, 99.

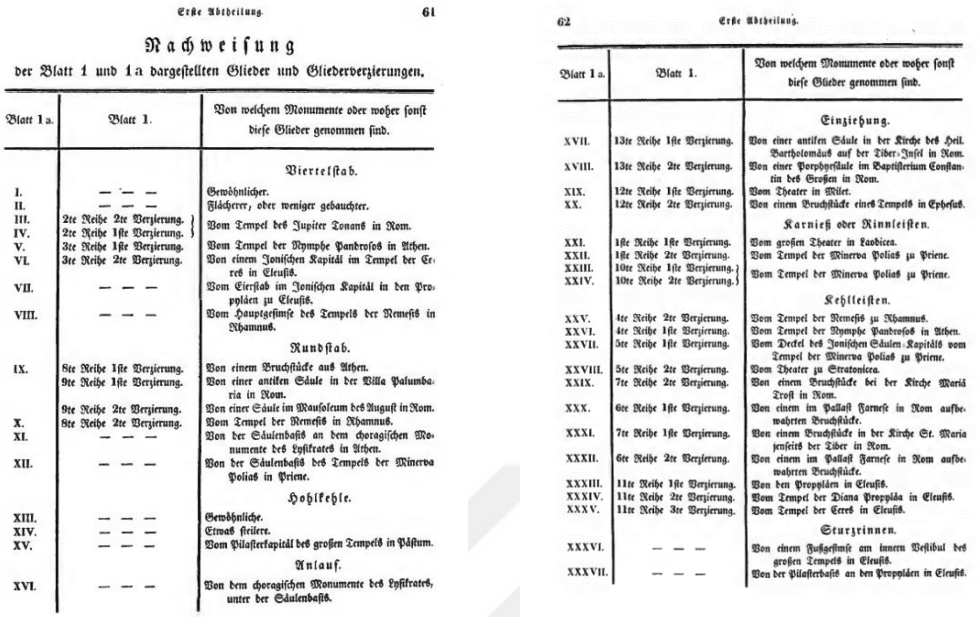


Figure 3.21 Teil I Abteilung I, Blatt 1. Source: Karl Friedrich Schinkel and Peter Wilhelm Beuth, *Vorbilder für Fabrikanten und Handwerker*, 1821. https://smb.museum-digital.de/objects, Museum-Digital: Staatliche Museen zu Berlin, Kupferstichkabinett. Creative Commons Lizenz 3.0, by-nc-sa. Also retrieved from KIT Library - Archive, Karlsruhe.



Stiftung Preußischer Kulturbesitz
Technische Deputation für Gewerbe, Vorbilder für Fabrikanten und Handwerker. Teil 1, Abteilung 1, Blatt 1a: Konstruktionsdetails der Be..., Ident. Nr.: 33.04-1991
© Foto: Kupferstichkabinett, Staatliche Museen zu Berlin
(cc) BY-NC-SA

Figure 3.22 Teil I Abteilung I, Blatt 1a. Source: Kupferstichkabinett. Creative Commons Lizenz 3.0, by-nc-sa. Karl Friedrich Schinkel and Peter Wilhelm Beuth, *Vorbilder für Fabrikanten und Handwerker*, 1821. https://smb.museum-digital.de/objects, Museum-Digital: Staatliche Museen zu Berlin, Kupferstichkabinett. Creative Commons Lizenz 3.0, by-nc-sa. Also retrieved from KIT Library - Archive, Karlsruhe.



Erſte Abtheilung. 61

Nachweiſung

der Blatt 1 und 1a dargeſtellten Glieder und Gliederverzierungen.

Blatt 1a.	Blatt 1.	Von welchem Monumente oder woher ſonſt dieſe Glieder genommen ſind.
		Viertelſtab.
I.	— — —	Gewöhnlicher.
II.	— — —	Flächerer, oder weniger gebauchter.
III.	2te Reihe 2te Verzierung.	Vom Tempel des Jupiter Tonans in Rom.
IV.	2te Reihe 1ſte Verzierung.	
V.	3te Reihe 1ſte Verzierung.	Vom Tempel der Nymphe Pandroſos in Athen.
VI.	3te Reihe 2te Verzierung.	Von einem Joniſchen Kapitäl im Tempel der Ceres in Eleuſis.
VII.	— — —	Vom Eierſtab im Joniſchen Kapitäl in den Propyläen zu Eleuſis.
VIII.	— — —	Vom Hauptgeſimſe des Tempels der Nemeſis in Rhamnus.
		Rundſtab.
IX.	8te Reihe 1ſte Verzierung.	Von einem Bruchſtücke aus Athen.
	9te Reihe 1ſte Verzierung.	Von einer antiken Säule in der Villa Palumbaria in Rom.
	9te Reihe 2te Verzierung.	Von einer Säule im Mauſoleum des Auguſt in Rom.
X.	8te Reihe 2te Verzierung.	Vom Tempel der Nemeſis in Rhamnus.
XI.	— — —	Von der Säulenbaſis an dem choragiſchen Monumente des Lyſikrates in Athen.
XII.	— — —	Von der Säulenbaſis des Tempels der Minerva Polias in Priene.
		Hohlkehle.
XIII.	— — —	Gewöhnliche.
XIV.	— — —	Etwas freiere.
XV.	— — —	Vom Pilaſterkapitäl des großen Tempels in Päſtum.
		Anlauf.
XVI.	— — —	Von dem choragiſchen Monumente des Lyſikrates, unter der Säulenbaſis.

62 Erſte Abtheilung.

Blatt 1a.	Blatt 1.	Von welchem Monumente oder woher ſonſt dieſe Glieder genommen ſind.
		Einziehung.
XVII.	13te Reihe 1ſte Verzierung.	Von einer antiken Säule in der Kirche des Heil. Bartholomäus auf der Tiber-Inſel in Rom.
XVIII.	13te Reihe 2te Verzierung.	Von einer Porphyrſäule im Baptiſterium Conſtantin des Großen in Rom.
XIX.	12te Reihe 1ſte Verzierung.	Vom Theater in Milet.
XX.	12te Reihe 2te Verzierung.	Von einem Bruchſtücke eines Tempels in Epheſus.
		Karnieß oder Rinnleiſten.
XXI.	1ſte Reihe 1ſte Verzierung.	Vom großen Theater in Laodicea.
XXII.	1ſte Reihe 2te Verzierung.	Vom Tempel der Minerva Polias zu Priene.
XXIII.	10te Reihe 1ſte Verzierung.	Vom Tempel der Minerva Polias zu Priene.
XXIV.	10te Reihe 2te Verzierung.	
		Kehlleiſten.
XXV.	4te Reihe 2te Verzierung.	Vom Tempel der Nemeſis zu Rhamnus.
XXVI.	4te Reihe 1ſte Verzierung.	Vom Tempel der Nymphe Pandroſos in Athen.
XXVII.	5te Reihe 1ſte Verzierung.	Vom Deckel des Joniſchen Säulen-Kapitäls vom Tempel der Minerva Polias zu Priene.
XXVIII.	5te Reihe 2te Verzierung.	Vom Theater zu Stratonicea.
XXIX.	7te Reihe 2te Verzierung.	Von einem Bruchſtücke bei der Kirche Maria Troſt in Rom.
XXX.	6te Reihe 1ſte Verzierung.	Von einem im Pallaſt Farneſe in Rom aufbewahrten Bruchſtücke.
XXXI.	7te Reihe 1ſte Verzierung.	Von einem Bruchſtücke in der Kirche St. Maria jenſeits der Tiber in Rom.
XXXII.	6te Reihe 2te Verzierung.	Von einem im Pallaſt Farneſe in Rom aufbewahrten Bruchſtücke.
XXXIII.	11te Reihe 1ſte Verzierung.	Von den Propyläen in Eleuſis.
XXXIV.	11te Reihe 2te Verzierung.	Vom Tempel der Diana Propyläa in Eleuſis.
XXXV.	11te Reihe 3te Verzierung.	Vom Tempel der Ceres in Eleuſis.
		Sturzrinnen.
XXXVI.	— — —	Von einem Fußgeſimſe am innern Veſtibul des großen Tempels in Eleuſis.
XXXVII.	— — —	Von der Pilaſterbaſis an den Propyläen in Eleuſis.

Figure 3.23 Table for Blatt 1-1a. Source: Karl Friedrich Schinkel and Peter Wilhelm Beuth, *Vorbilder für Fabrikanten und Handwerker*, 1821. https://smb.museum-digital.de/objects, Museum-Digital: Staatliche Museen zu Berlin and KIT Library - Archive, Karlsruhe; Harvard University Collection, *Vorbilder für Fabrikanten und Handwerker*, Karl Friedrich Schinkel and Peter Wilhelm Beuth, 1821. Public Domain Mark 1.0. https://archive.org/details/bub_gb_cWIXAAAAYAAJ.

Both the textual and the visual structure of the book present architectural transitional elements as "stacked" shapes of frozen fragmentary models that align with vessels, frames, and knitting patterns. Figure 3.21 presents an intriguing representation with a stacked collection of cornices, emphasizing their definition as *Kunstform*: linear, ahistorical elements that both crown and cover structural bodies while reflecting the bodily relations of the *Kernform*. Although the overall composition appears to be almost contextless, some fragments exhibit seamless transitions that combine two examples into a seemingly fictional scenographical composition. While the stacked composition in Blatt 1 presents various detailed elevation drawings, Blatt 1a complements it with mathematical diagrams that depict apses and coordinates corresponding to each element, essentially illustrating how to craft them (Figure 3.22). These drawings demonstrate an advanced level of precision, documenting every geometrical reference necessary for the reproduction of the elements. These

mathematical drawings link each visual fragment to a specific historical monument, as indicated in the accompanying table (Figure 3.23).[425] In Figure 3.23, there is a matrix listing the "*Verzierungen*" (ornaments) alongside the monuments or sources from which these elements were taken, thereby providing contextual references for each fragment.

These "*Vorbilder*", translated directly to pre-images in English, reveal the limits of historical prototypes. In contrast to their static, fragmentary existence, collections of artforms and survey drawings guided architects and artists in cultivating hermeneutic cycles of creation. This contrasting relationship created various textual and visual representations of architectural transitional elements, which became apparent toward the end of the century. As previously described, there are specific theoretical categorizations of historical prototypes considering their direct and indirect transformations, which formed diverse concepts in architectural and industrial design during the nineteenth century. A revisitation of Bergdoll's ideas on the contrasts between Alois Hirt's and Heinrich Hübsch's theories of "archaeology" and "history" reveals enduring distinctions between static taxonomies and productive transformations.

In contrast to the interpretative and loosely arranged practice of collection learned from the *Bilderatlas* tradition, the collecting process inspired by pattern books follows a more organized and systematic approach. Fragments are meticulously documented and categorized, such as capitals from various temples or doorways from Renaissance Siena, reflecting consistency in type, context, or period. Even if the fragments diverge formally, their selection is influenced by a common geographical or stylistic framework. The focus is on preserving and sharing architectural knowledge through precise typological references rather than through suggestive juxtapositions or open-ended interpretive relationships.

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[425] Peter Wilhelm Beuth and Karl F. Schinkel, *Vorbilder für Fabrikanten und Handwerker*, Vols. 1 and 2 (Getsch, 1821, 1837).

The scenographical logic of nineteenth-century pattern books is echoed in *Signs of Life*, where collecting becomes a performative and affective operation shaped by postmodern sensibilities.

Collecting in the *Signs of Life*: A Post-modern Pattern Book

Before examining the *Signs of Life* project, it is important to note a broader shift in the logic of collecting, from an epistemological practice rooted in typology and historical continuity to an affective operation based on scenographical performance. While traditional pattern books aim to transmit architectural knowledge through orderly classification, emphasizing the consistency of type, context, or period, the example offered here challenges and reframes that logic.

Among many exhibitions grounded in collecting practices, *Signs of Life* stands out for its translation of the pattern book tradition into a postmodern scenographical logic. Its curatorial method operates at the intersection of typological classification and affective, performative display, making it an ideal example for examining the shifting logics of collecting in architectural discourse.

In this context, the *Signs Of Life: Symbols in the American City* (February 26 through September 30, 1976) exhibition served as a link between modes of collecting and making, simultaneously operating as a method for assembling and classifying vernacular forms and as a performative demonstration of architectural thinking. We can understand this exhibition as existing in between the didactic and typological logic of the pattern book tradition and what Robert Somol later refers to as the postcritical or postmodern logic of "graphic expediency," reflecting a transition from epistemological cataloging to affective visual operations. The exhibition was a presentation of the twentieth-century world of suburb, strip, and sprawl landscapes, displaying an iconic American scenography often

overlooked by architects, planners, and cultural critics even though it constitutes an undeniable urban truth of the nation.[426]

The exhibition was organized into three main thematic sections: The Home, The Strip, and The Street.[427] Each section employed a different display strategy based on collections of large-format photography and diverse media tactics. The overall *Signs of Life* exhibition aimed to blend architectural research with popular visual culture using materials collected over the course of nearly a decade. Following their initial studies in Las Vegas and Levittown in the late 1960s and early 1970s, Venturi, Scott Brown, Izenour, and others gathered thousands of photographs depicting suburban and commercial areas, along with shape based advertisements, postcards, and interviews with billboard companies. For every image displayed, many more examples were stored in their archives.[428]

The first section, "The Strip," employed backlit images and neon signs, mimicking the overwhelming visual culture of American roadside environments. The centerpiece was a double-sided, luminous, billboard-like structure filled with photographic material, deliberately echoing elements of real billboards. Here, Venturi and Scott Brown drew inspiration from two models: the distracted visual logic of the billboard and the dense format of the newspaper. This section of the exhibit introduced a kind of media overload, reflecting a dense scenographical collection of real city elements (Figures 3.24 and 3.25).[429]

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[426] *Signs Of Life:Symbols In The American City* Exhibition catalogue.
[427] The author did not see the exhibition in person. The descriptions are based on published reviews and the exhibition catalogue. Also the author contected the Architectural Archives of the Weitzman School of Design, University of Pennsylvania, to access visuals of the exhibition from the Venturi-Scott Brown Collection.
[428] Deborah Fausch, *The Context of Meaning is Everyday Life: Venturi and Scott Brown's Theories of Architecture and Urbanism* (PhD diss., Princeton University, 1999).
[429] Olivier Lugon, "Before the Tableau Form," *Études Photographiques*, no. 25 (2010):5. https://journals.openedition.org/etudesphotographiques/3230.



Figure 3.24 Scenes from the *Signs of Life* exhibition, curated by Robert Venturi and Denise Scott Brown, presented at the Smithsonian Institution in 1976. Source: *Castro.15.1-scan.013* and *The Strip 08 (Tom Bernard)-detail*, Venturi-Scott Brown Collection, Architectural Archives of the Weitzman School of Design, University of Pennsylvania.

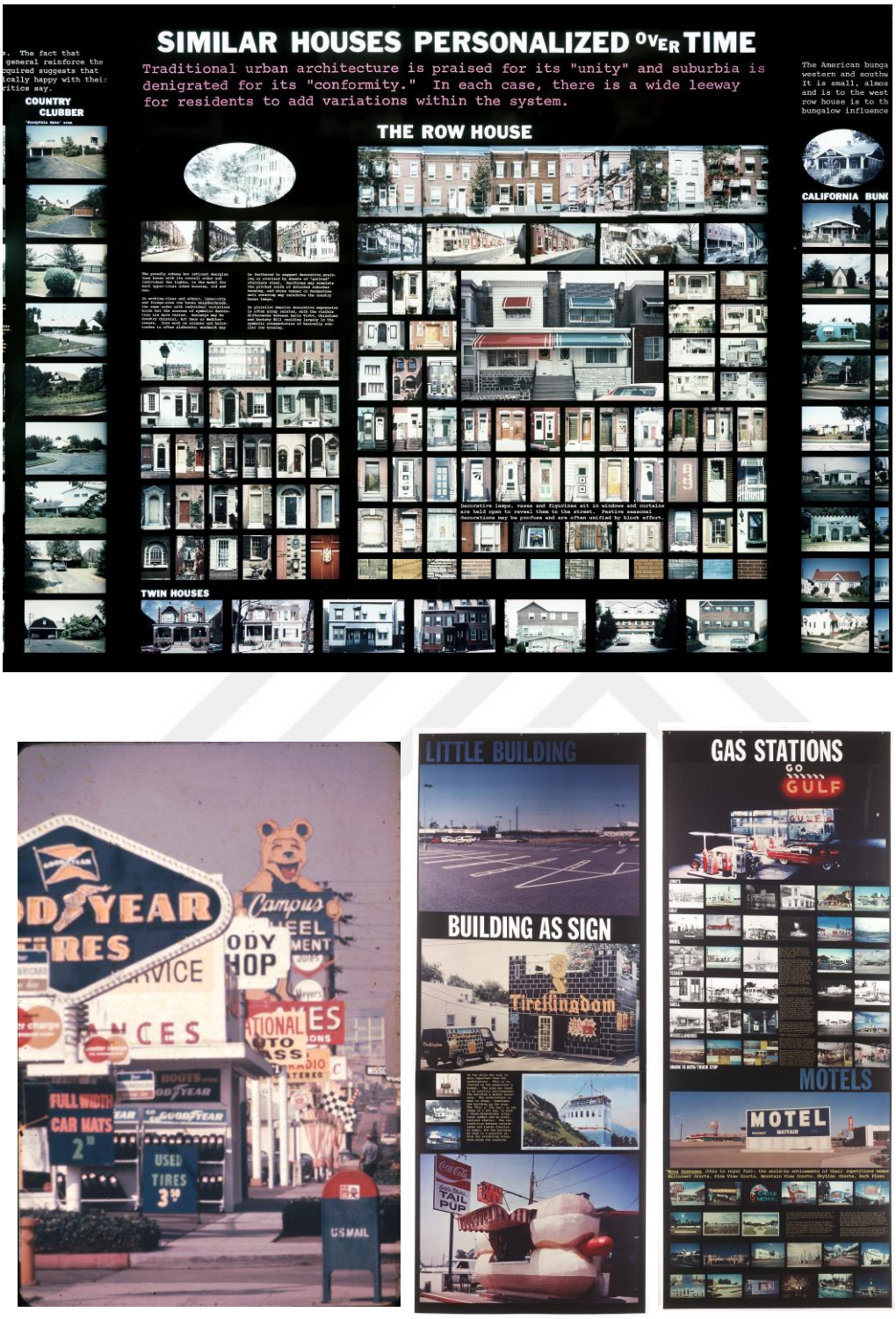


Figure 3.25 Photographs and boards from the *Signs of Life* exhibition, curated by Robert Venturi and Denise Scott Brown, presented at the Smithsonian Institution in 1976. Source: *Castro.15.1-scan.009, dsb_lv190045, Building as a sign*, and *Gas Stations-Motels flat*, Venturi-Scott Brown Collection, Architectural Archives of the Weitzman School of Design, University of Pennsylvania.

In the second section, "The Home," the curators recreated three fully furnished living rooms, each representing a different social class: a working-class row house, a suburban middle-class home, and an upper-class residence. These domestic interiors, featuring functioning televisions and speech-bubble "images" from comics that indicated the selected shapes of the decor, were arranged like painted dioramas (Figure 3.26). The gap between the museum exhibit and daily life was intentionally eliminated. Adjacent booths showcased large-format photographs by Stephen Shore, illustrating house façades on suburban streets (Figure 3.27). These were presented like *trompe-l'œil* dioramas, shifting between illusionistic spaces and photographic images.[430]



Figure 3.26 Scenes from the *Signs of Life* exhibition curated by Robert Venturi and Denise Scott Brown, presented at the Smithsonian Institution in 1976. Source: Exhibition brochure, available at http://venturiscottbrown.org/pdfs/SmithsonianInstitutionSignsofLife01.pdf.

"The Street," the exhibition's final section, displayed large-format photographs. Architectural paintings were arranged as independent artworks and one of Stephen

[430] Lugon.

Shore's enlargements was hung like a historical painting, dominating the wall (Figure 3.27).[431]



Figure 3.27 Scenes from the Signs of Life exhibition, curated by Robert Venturi and Denise Scott Brown, presented at the Smithsonian Institution in 1976. Source: Exhibition brochure available at: http://venturiscottbrown.org/pdfs/SmithsonianInstitutionSignsofLife01.pdf.

Here we see extended collections of signs and symbols from the changing scales of streets, homes, and the city itself. The large-scale installations and the on-board collections can be interpreted together as a pattern book of the American city, expanded into the space of the museum.

It is helpful to recall the concept of "logo" here. By Somol's formulation, a logo is not merely a striking image; it is a flattened, non-referential graphic act that functions performatively. Pattern books represent, but logos act, and they feed the making process. In this sense, the *Signs of Life* exhibition can be read not as abandoning the logic of collecting but as transforming it, offering a postmodern reinterpretation of the pattern book tradition by shifting from typological cataloging to affective scenographical operations.

[431] Lugon, 8.

Learning from Teaching Collections

A continuous strand can be traced from the teaching collections of the nineteenth century to the scenographical methods of architectural making in the second half of the twentieth century and into the present. This shows how historical collecting practices continue to inform and inspire new approaches to architectural creativity and knowledge production. These collections combine numerous models, shapes, fragments, and spaces into a larger space that merges research and making.

This section does not aim to provide a comprehensive history of the two selected examples of collections. Rather, it aims to understand how these collections and their associated spaces functioned as institutional frameworks of architectural pedagogy and production. Both examples are university-based collections, but they evolved differently within the context of the *Vorbilderbewegung* concept.[432] As part of my thesis research, I conducted on-site visits to both institutions and their spaces, collecting material and oral histories that shed light on their curatorial logic and spatial organization. These two examples were selected deliberately; the focus of this research on the German theoretical context made these examples particularly relevant, and they also represent two distinct archival structures.

SAAI at Karlsruhe Institute of Technology - Archive for Architecture and Engineering (*Südwestdeutsches Archiv für Architektur und Ingenieurbau)*[433]

This section provides an overview of the relationship between archives and universities in Germany, focusing on the SAAI's role within this network and how

[432]Teaching collections are among the oldest pedagogical tools and can be considered the initiators of museums. From the centuries-old University of Bologna to Harvard University, many institutions maintain teaching collections that continue to function both as instruments of learning and as archival resources for museums. In this context, two examples from Germany were selected for this thesis, as they reflect conceptual and historical focuses relevant to the discussions in this work.

[433] The following text was composed following research conducted at the SAAI, after documenting the relevant oral history and conversations with Anna-Maria Meister and Martin Kunz.

its collection evolved from a teaching collection into a more extensive architectural archive.

The archives in Frankfurt, Stuttgart, Karlsruhe, and Munich form a network that incorporates shifting contributions from different universities and various regions of Germany. The most well-established institutions, such as the Architekturmuseum at TU München and that at TU Berlin, are more independent and better resourced, with large collections, stable funding, and generous exhibition space. The Deutsches Architekturmuseum in Frankfurt emphasizes the representational visibility of architectural projects. In contrast, the less well-known Südwestdeutsches Archiv für Architektur und Ingenieurbau (SAAI) at the Karlsruhe Institute of Technology (KIT) houses a wide range of materials, including letters, documents, previously unpublished sketchbooks, and drawings, all centered around research (Figure 3.28-29). The collaboration between these universities and their collections is becoming more evident, which is a current goal for both the SAAI and KIT Architecture.



Figure 3.28 Sketchbooks of Hermann Billing (1867–1946, was a significant German architect known for his work in the Jugendstil-Art Nouveau movement), SAAI, Karlsruhe. Photographed by the author.

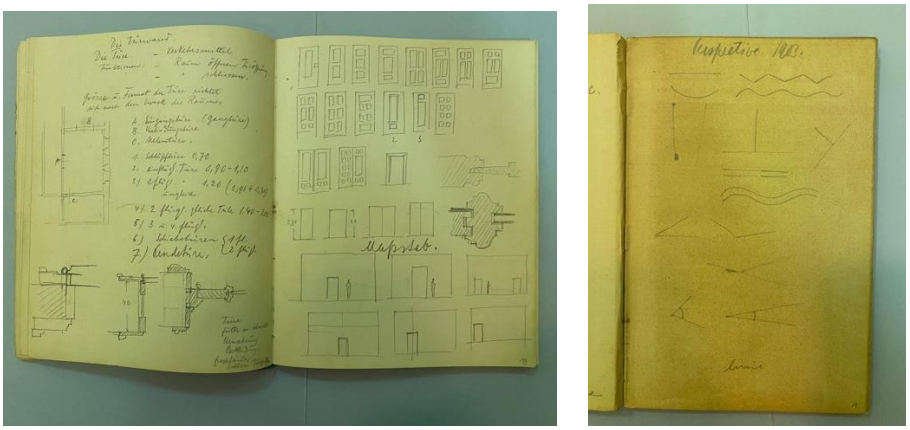


Figure 3.29(continued). Sketchbooks of Hermann Billing (1867–1946, was a significant German architect known for his work in the Jugendstil-Art Nouveau movement), SAAI, Karlsruhe. Photographed by the author.

In the city of Karlsruhe, the main archives are those of Kunsthalle Karlsruhe, Stadtarchiv Karlsruhe, the SAAI, and Landesarchiv Baden-Württemberg. These collections contain different works by the same architects, reflecting various projects and periods. Thus, the relationships among these institutions are crucial for both architectural visibility and academic research. The Kunsthalle collection emphasizes art and architectural representation, with a focus on paintings and drawings. While past exhibitions incorporated materials from other collections, a recent shift in management has narrowed the focus to showcasing only the Kunsthalle's own holdings.[434] In contrast, Landesarchiv Baden-Württemberg focuses on conservation, specializing in documents related to preservation processes and projects. The broader Stadtarchiv complements this with a diverse collection. In the conversations with him, Kunz noted that "archives with concepts" tend to operate more effectively, reflecting an institution's pursuit of clear conceptual frameworks.

[434] The Kunsthalle was chiefly designed by Heinrich Hübsch, with extensions made by various architects. Four different architects created the four wings of the museum/archive.

The SAAI, under the co-direction of Anna-Maria Meister and Joaquín Medina Warmburg, focuses on the intersections of architecture, engineering, and design, approached through a critical lens. Its collection is especially rich in technical drawings, notebooks, and sketchbooks. The archive maintains strong links to academic research, emphasizing the correspondences between written documents and architectural drawings. Kunz explained that the letters and records help in decoding different drawing sets, revealing the variations among them and clarifying their interrelations.

Professors and students at the Polytechnic School in Karlsruhe played key roles in the foundation of the SAAI. The first collection contains student materials from the classes of Friedrich Weinbrenner (1766–1826, a pivotal figure in early nineteenth-century German architecture, particularly known for his works of Neoclassicism in Germany and his significant influence in shaping architectural education), covering the years 1800 to 1867 (Figure 3.30). This collection, titled "Weinbrenner School," primarily features re-drawings by Weinbrenner's students, who studied and replicated his own drawings. Among them were Heinrich Hübsch, recognized as one of Weinbrenner's most talented students (Figure 3.31).



Figure 3.30 Drawers, Friedrich Weinbrenner, SAAI, Karlsruhe. Photographed by the author.

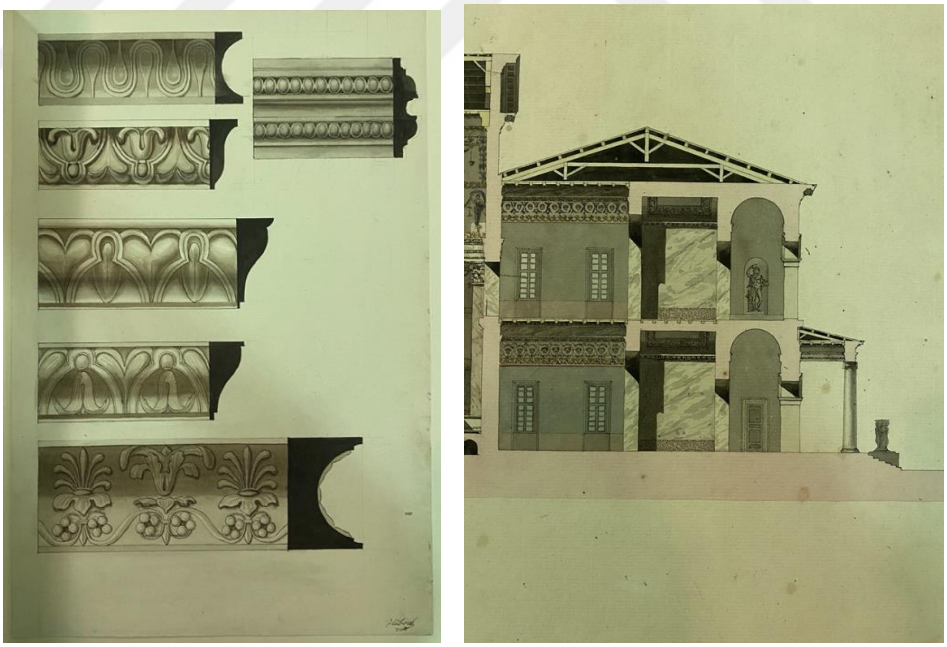


Figure 3.31 Hübsch's drawing from the teaching collections. Source: Weinbrenner School collection, SAAI, Karlsruhe.

Like many nineteenth-century collections, the SAAI archive began as a teaching collection. Its early holdings largely comprised models and architectural fragments, and they were affiliated with the Institute für Baugeschichte. Debates between Jugendstil proponents, who sought a break from tradition, and Historicists, who emphasized continuity with historical models, shaped the intellectual climate of the time. Some of the models were damaged during that period, and Weinbrenner's materials, which form a core part of the early collection, are now preserved in a fragmentary condition.

The contents of the SAAI collection also reflect the foundations of the KIT as a polytechnic school. Between 1807 and 1825, Gottfried Tulla, a water planning engineer, and Friedrich Weinbrenner, an architect, worked together in attempts to establish a polytechnic school. The collaboration between architecture and engineering on every scale is also reflected in the collection's contents (Figure 3.32). The collection includes numerous engineering documents, drawings, and other paperwork. Until the 1970s, the archive was used solely for teaching purposes. After the 1970s, major donations by contemporary architects enriched the collection; the government was also involved, and the archive began working with the state in the 1980s.[435] Today, the SAAI possesses an extensive collection in Germany, including more than 500,000 plans, drawings, and sketches; 600,000 photographs, slides, and negatives; audio and video recordings; 1100 meters of shelving dedicated to files and records; approximately 900 models; 50 furniture pieces; and a variety of monographs and periodicals that span 400 meters.[436] The largest SAAI collection is the Günther Behnisch collection, which consists of 1 km of drawings. The second largest collection is the Egon Eiermann collection, the first to be digitized. The third largest collection houses Frei Otto's works.

[435] Martin Kunz, in our interview at the SAAI, Karlsruhe, October 2023.
[436] https://www.saai.kit.edu

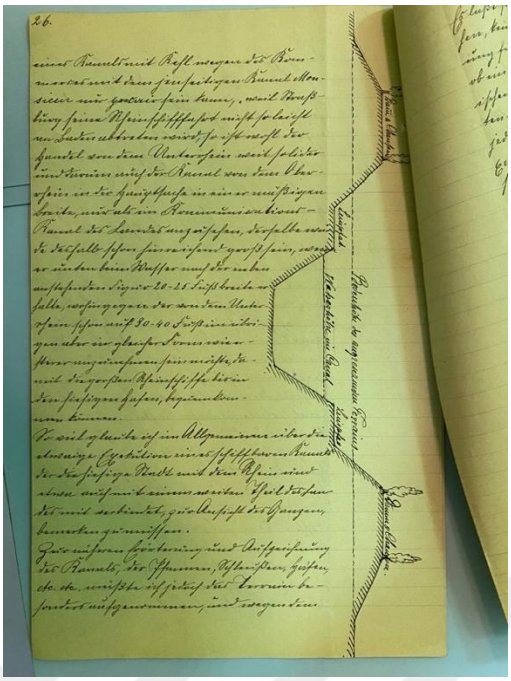


Figure 3.32 Weinbrenner's notes on water planning, with a side section. Source: SAAI, Karlsruhe.

The space at the SAAI designated for collections is especially significant, particularly for architectural archives. The SAAI is fortunate regarding its available space, as it has archival spaces both on the university campus and at Stadt Münze in Karlsruhe. Stadt Münze, originally a coin factory, was designed by Friedrich Weinbrenner (Figure 3.33). The initial collections of the archive include works by Weinbrenner and the Weinbrenner School, establishing an intriguing connection. Another noteworthy aspect is the repurposing of the Stadt Münze as an architectural archive. Since the building was originally designed for coin production and storage, it features fascinating underground and aboveground interactions, together with high security and climate control, which are vital for archival spaces (Figure 3.34-35). Coin production primarily takes place below ground due to the specific fabrication methods used; thus, the space can now easily support functions such as archiving and storage. Additionally, the original reliefs on the building's cornices are part of the archive collections (Figure 3.36).





Figure 3.33 Stadt Münze, SAAI, Karlsruhe. Photographs by the author.




Figure 3.34 Stadt Münze, archive spaces and drawings and model room, SAAI, Karlsruhe. Photographs by the author.



Figure 3.35 (continued). Stadt Münze, archive spaces and drawings and model room, SAAI, Karlsruhe. Photographs by the author.



Figure 3.36 Stadt Münze reliefs, stored in Stadt Münze. SAAI, Karlsruhe. Photograph by the author.

Interestingly, since some collections are quite fragmented, the SAAI maintains a mapping of other parts of collections belonging to the same architects or projects. In this way, it resembles an "archive of archives." One section of the archive building on campus serves this purpose. The drawers there form an archival map of materials and their locations (Figure 3.37). The Friedrich Weinbrenner exhibition organized in 2015 benefited from this mapping. Collections from Kunsthalle, the SAAI, and other archives were brought together. The SAAI also rented some of the Weinbrenner materials from the University of Pennsylvania archive to enhance the collection for this exhibition.

Today, the SAAI at the KIT continues to grow under the leadership of Anna-Maria Meister and Joaquín Medina Warmburg. The archive actively engages with architectural research and innovative projects, supporting research that bridges historical study and contemporary practice. A recent initiative, the International Archive of Architecture and Science (IAAS), explores the intersections of architecture with scientific and technological advancements. This project underscores the archive's dedication to expanding architectural historiography by highlighting interdisciplinary connections. Digitization efforts to improve access to the SAAI's extensive collections are also ongoing. These collections include works by prominent architects and engineers from southwestern Germany, such as Egon Eiermann, Fritz Leonhardt, and Günter Behnisch.



Figure 3.37 KIT Architecture Faculty, drawing storage and drawers of drawers. SAAI, Karlsruhe. Photographs by the author.

TU München Architekturmuseum Archive[437]

The Architekturmuseum der Technischen Universität München (TUM) houses a larger collection than SAAI; it is recognized as one of Germany's premier

[437] This section of the text was composed following research conducted at TU München, the documentation of oral history, conversations with Andres Lepik and Irene Meissner, and assistance from the book *Show & Tell*, which focuses on the collection and development of the TUM Architekturmuseum.

architectural collections, originating from the teaching collection created for the Königliche Bayerische Akademie in 1868. The initial collection was developed alongside the establishment of the architectural program at TUM, aiming to enhance architectural education by offering students and researchers a diverse range of architectural drawings, models, and associated materials.

In her comprehensive work titled "Collecting, Researching, Exhibiting" from the book *Show & Tell*, Irene Meissner outlines a detailed chronology of the collection and the museum's history, highlighting the changes and relationships within the museum. Meissner states that the Architekturmuseum der Technischen Universität owes its current form to the beginnings of academic architectural education in Bavaria at the Königliche Akademie der Bildenden Künste, which Maximilian I Joseph founded in 1808.[438] Like many art and architecture schools of the nineteenth century, this institution also housed a teaching collection, as drawing was mainly learned by replicating existing works and sketching plaster casts (Figure 3.38). The drawings produced or collected in this context form the foundation of the Architekturmuseum's current collection of architectural plans.[439]

This pedagogical legacy was further developed by Gottfried von Neureuther, who made major contributions to the *Hochbausammlung* (Collection for Architectural Construction Studies), which played an essential role in the architectural program at the institution. His influence was instrumental in securing resources such as architectural models, technical drawings, and casts that were crucial for teaching architectural principles. Duplicating and recreating these architectural fragments through drawings and plaster casts played a crucial role in education at that time. These collections reflected the nineteenth century German philosophy of

[438] Irene Meissner, "Sammeln, Forschen, Zeigen / Collecting, Researching, Exhibiting," in *Show & Tell: Architektur sammeln / Collecting Architecture*, ed. Andres Lepik (Ostfildern: Hatje Cantz, 2014), 35.
[439] Meissner, 35.

architectural education, prioritizing historical research and the union of art with architecture.



Figure 3.38 View of the entrance to "Zeichnungssaal für Architecten" (Drawing Room for Architects) Zeichnungen saal Hochschulen und Institute, Architekturmuseum TUM, Digital Collection, Licensed under Creative Commons. https://mediatum.ub.tum.de/941836

Offering an early example for teaching collections, Neureuther's legacy affected the formative years of TUM's architectural collection. In 1912, the collection settled permanently at Gabelsbergerstraße. Friedrich von Thiersch redesigned the second floor of the building to integrate several existing collections. Meissner describes the large numbers of items in these collections:

> The collection of architectural drawings, as of 1873-74 named the Sammlung für architectonische Constructionslehre (the collection of architectural construction), was headed by Rudolph Gottgetreu and included approximately 100 wall panels and sample drawings as well as books and numerous photographs. Established in 1881-82, the collection of decoration and perspective was administered by Joseph Bühlmann and encompassed photographs of buildings and interiors with decorations and furnishings; the

> collection of modeling and sculpting, for which Konrad Knoll was responsible, included over 600 plaster casts.[440]

This contents of the collection were documented with photographs and drawings showing the arrangement of the plaster casts in the collection rooms, which are also significant objects in the current collection. Paul Pfann's sketch drawings of the exhibition of architectural casts in his studio highlight the collection's commitment to historical artifacts and educational practices (Figure 3.39). These arrangements were educationally significant, both for students who drew and redrew the casts and for the expansion of the collection.

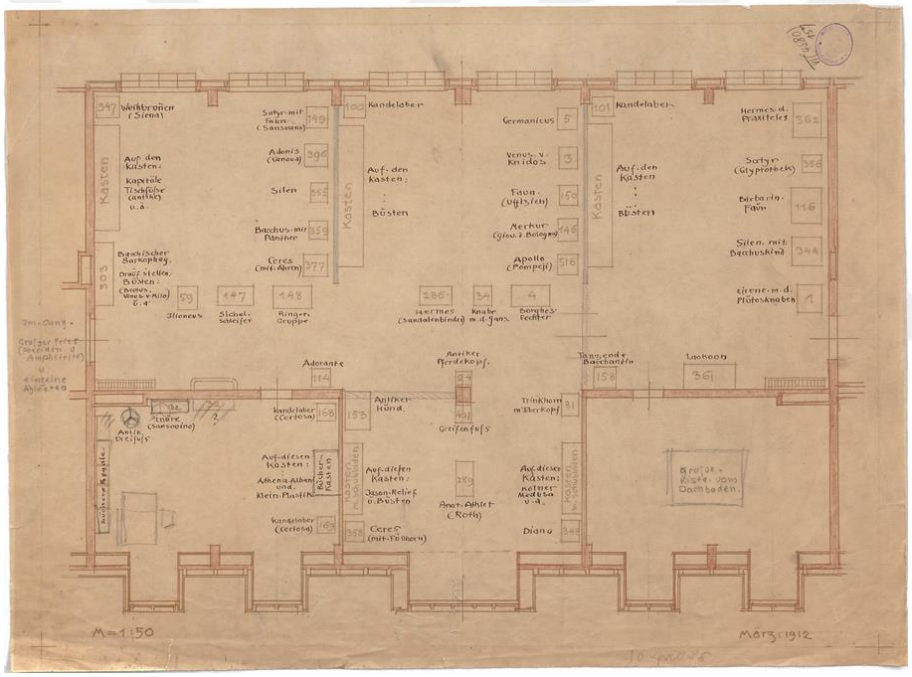


Figure 3.39 Technische Hochschule (TH), Erweiterungsbau, Paul Pfann's drawings of the exhibition of architectural casts. Architekturmuseum TUM, Digital Collection, Licensed under Creative Commons. https://mediatum.ub.tum.de/941836

[440] Meissner, 37.

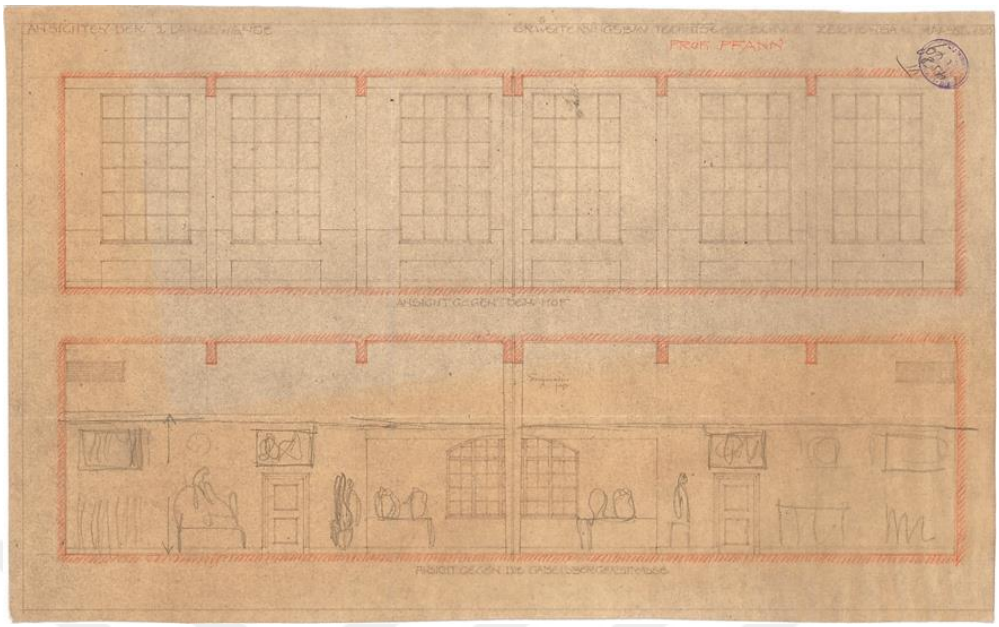


Figure 3.40(continued). Technische Hochschule (TH), Erweiterungsbau, Paul Pfann's drawings of the exhibition of architectural casts. Architekturmuseum TUM, Digital Collection, Licensed under Creative Commons. https://mediatum.ub.tum.de/941836

The spaces were filled with a variety of cast models, various fragments of architectural elements at different scales, and drawings and paintings. Models of varying scales on tables or walls served as three-dimensional teaching tools. These spaces were designed to disseminate architectural knowledge through direct visual and spatial experiences (Figures 3.41-42-43).



Figure 3.41 Technische Hochschule (TH), Erweiterung Hörsaal für Architekten 545, Übungssaal für Freihandzeichnen, Sammlung für Baustoffkunde Bibliothek der Architektursammlung, Friedrich von Thiersch, 1910-16, Architekturmuseum TUM, Digital Collection, Licensed under Creative Commons. https://mediatum.ub.tum.de/941836



Figure 3.42. Technische Hochschule (TH), Erweiterung Hauptsaal der Architektursammlung 1910-16, Architekturmuseum TUM, Digital Collection, Licensed under Creative Commons. https://mediatum.ub.tum.de/941836.



Figure 3.43 Technische Hochschule (TH), Hauptsaal der Architektursammlung Friedrich von Thiersch, 1910-16, Architekturmuseum TUM, Digital Collection, Licensed under Creative Commons. https://mediatum.ub.tum.de/941836

The collection experienced changes and challenges in the early twentieth century. In response to the movement against ornamentation, certain items were transferred to the Deutsches Museum. Later, World War II impacted the collection; it was reduced to ruins by 1945. Postwar efforts focused on refurbishment, especially those led by Winfried Nerdinger, who oversaw critical restoration tasks in the mid-1970s and established a foundation for a comprehensive architectural archive.[441]

In 1997, the collection was consolidated on the ground floor of the Thiersch building, centralizing resources for both academic and public engagement.[442] A significant moment occurred in 2002 with the opening of the *Pinakothek der Moderne*. Under

[441] Meissner, 67.
[442] Meissner, 83.

Wolfgang Hermann's leadership, this advanced facility enabled the Architekturmuseum to connect with various art and design collections, facilitating interdisciplinary conversations.

As the museum's institutional visibility grew, so did the recognition of its extensive holdings. Its inventories encompass not only cast models and scaled architectural models but also a wide array of drawings, sketches, and notes. However, as Meissner explained in our conversations, “inventory registers of the former collections have only been preserved in a fragmentary state. In 2008, an exhibition at the TUM Architekturmuseum displayed some of those historical inventories (Figure 3.44). Some of these inventories remain preserved within the current collection, offering valuable insights into the historical scope and organization of the archive (Figure 3.45).



Figure 3.44 Inventories at the exhibition in 2008 at Architekturmuseum TUM. Photograph courtesy of Architekturmuseum TUM, provided by Irene Meissner.

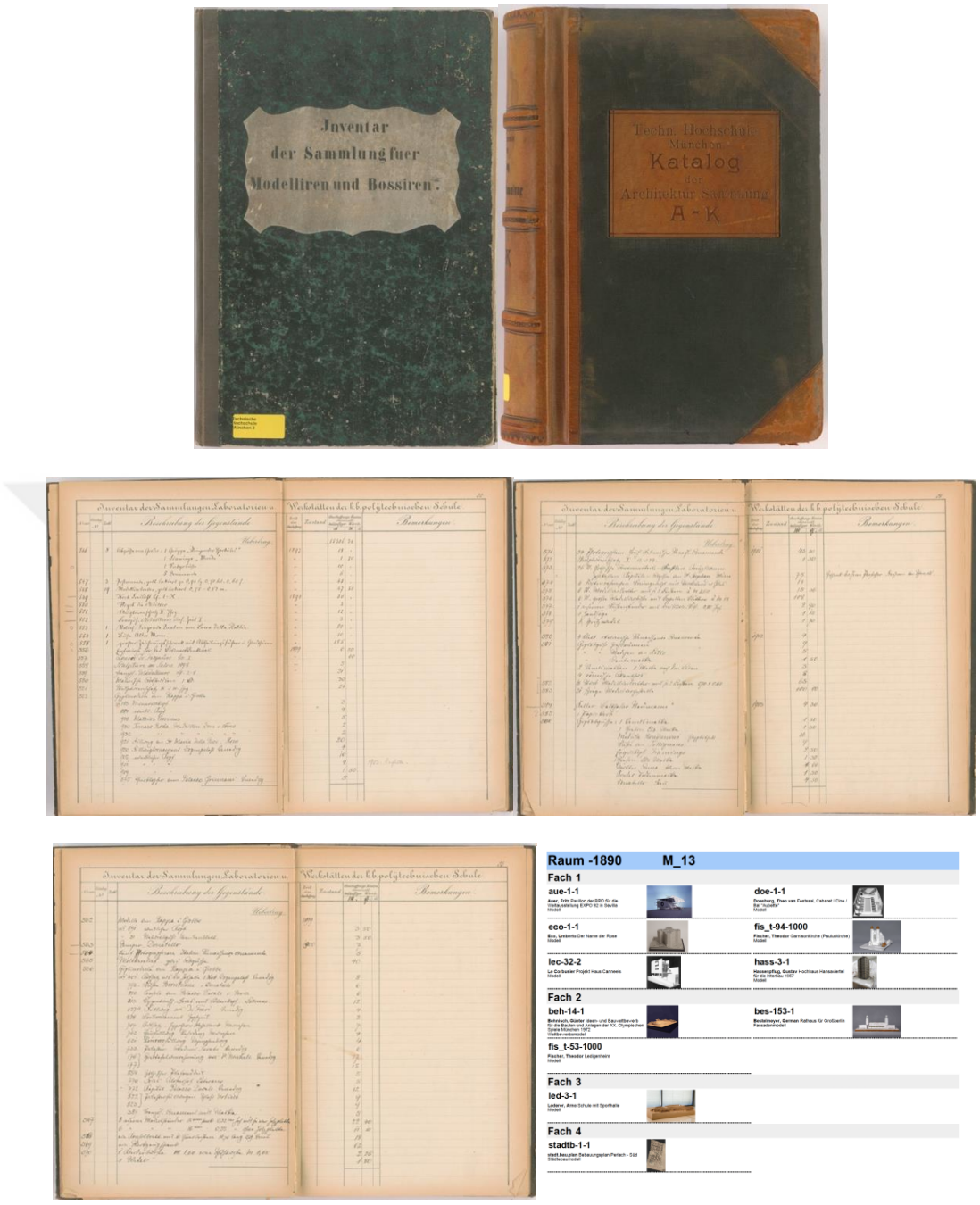


Figure 3.45 Examples of inventories at Architekturmuseum TUM. Images courtesy of Architekturmuseum TUM, provided by Irene Meissner.

Today, under the leadership of Andres Lepik, the museum explores questions about the role of architecture in museums, focusing on its dual nature as both an object of study and an experiential entity. With its historical roots in *Vorbilder* teaching collections and its evolution into a public institution, the TUM Architekturmuseum connects academic, artistic, and public realms, continually redefining architecture's roles in education and culture. Each year, a different research topic is selected for an exhibition at the Architekturmuseum. The collection is still located on Gabelsberger Street and it features a fascinating togetherness of models and building fragments (Figures 3.46-47-48).

Overall, these examples are significant for this thesis not only due to the richness of their collections but also for the spatial and institutional frameworks through which they operate. Their accumulated spaces exemplify how collecting functions as a sustained pedagogical act. Tracing these histories reveals how the logic of collecting has shaped—and continues to shape—architectural knowledge. In this context, the operation of *collecting* extends beyond the simple gathering of objects, engaging with the layering of time as an evolving architectural method.





Figure 3.46 Archive spaces at Architekturmuseum TUM, Munich. Photographs by the author.







Figure 3.47 Archive spaces at Architekturmuseum TUM, Munich. Photographs by the author.



Figure 3.48 Archive spaces at Architekturmuseum TUM, Munich. The model room features fragments: an ornament cast attributed to Brunelleschi and a detail model of the Pompidou Center, placed side by side on the same rack. Photographs by the author.

Collecting in the *Archive of Affinities*: A Cloud-Collection

Building on the pedagogical and spatial frameworks of teaching collections, this section turns to a contemporary reinterpretation of collecting practices. Andrew Kovacs's Archive of Affinities constitutes a digital, cloud-based counterpart to nineteenth-century institutional collections.[443] While the former aimed at disciplinary education through physical fragments and drawings, the latter engages with the generative potential of accumulation and personal imagination in the digital realm. Together, they demonstrate how collecting functions as both a preservative and a speculative operation of imitative *Bildung*.

[443] A short article related to the material presented in this section will be published by the author, titled "Collecting on Cloud/s: Architectural Imaginaries and the 'Archive of Affinities,'" in *Exposed Praxis*, edited by Fabrizia Berlingieri (forthcoming, 2025).

The *Archive of Affinities* by Andrew Kovacs is a contemporary project that connects the nineteenth-century traditions of collecting and copying with his expanding digital archive of architectural fragments consisting a variety of shapes and artforms. This section of the thesis focuses on the specific case of *Archive of Affinities* to understand the creative architectural potential of collecting while exploring how the act of accumulating and organizing objects provides generative input for revealing architectural knowledge across various media.

Andrew Kovacs highlights the fact that the practice of collecting images and objects has long been integral to architectural production. He references notable image collections, including Sol Lewitt's *Autobiography*, Gerhard Richter's *Atlas*, and Alison Smithson's scrapbooks.[444] Kovacs asks how we go about collecting things and emphasizes that the answer varies across different physical and digital spaces. In digital collecting, the absence of scale introduces a new dimension to categorizing collections, allowing for the creation of expanding folders and subfolders.[445] Within this context, scanning becomes crucial in creating an archive space that not only stores but also transforms architectural information.[446] It is within this expanded and

[444] Andrew Kovacs's *Archive of Affinities*, a presentation within the scope of the "Inspirational Talks" in the METU Graduate Program in Architecture, December 2023, organized by the WAWUT Collective initiated by the author.

[445] Andrew Kovacs's *Archive of Affinities*, a presentation within the scope of the "Inspirational Talks" in the METU Graduate Program in Architecture, December 2023, organized by the WAWUT Collective initiated by the author.

[446] Scanning, as an operation, is also widely adopted and explored in contemporary architectural works. In the chapter on scanning in *Design Technics: Archaeologies of Architectural Practice*, Zeynep Çelik Alexander explores the evolution of scanning as a technical operation entailing a technological process and conceptual framework in architectural practice. She explores how the act of scanning, whether conducted by machines or humans, has affected perceptions of form since the nineteenth century, emphasizing its significance in architectural knowledge and design methodologies. Similarly, a recent project, *Drawing Codes*, and its associated book are highly relevant to the aim of this study in terms of methodology and visual inputs. In the section on "Scanning, Storing, Checking: Architecture and the (Machine-Readable) Image," Amelyn Ng defines scanning as "drawing as a capture of reality." Ng cites the Cambridge Dictionary for two definitions of "scan." The first definition is to "look carefully or quickly," which applies to both visual observation and machine operation for collecting information. The second definition describes the process of "creating a picture" with machinery, whether by digitizing a document or capturing the interior of an object. These definitions emphasize the dual nature of scanning as both a visual and central process. Starting with these meanings, and also referencing Çelik Alexander, Ng elaborates

dynamic digital framework that Kovacs describes his project Archive of Affinities as "a constantly updated collection of architectural images that exploit the dual meaning of affinity: personal predilection and the resonant relationship between images."[447] The archive constitutes an expanding inventory encompassing various scales of architectural parts, elements, and compositions (Figure 3.49). This ongoing project serves as an intriguing example of hybrid spaces of collecting that combine cloud and physical space. Kovacs defines his collection as an image bank with additional qualities:

> Archive of Affinities is similar to, but different from, an image bank. An architect's image bank is a way of gathering inspiration and measuring their output with that of the past. At a certain volume of images, the bank inevitably begins to chart lineages between architects and architecture.[448]

on scanning and two additional acts: storing and checking, through tools and additional systems. See Ng in *Drawing Codes: Experimental Protocols of Architectural Representation*, edited by Andrew Kudless and Adam Marcus (New York: Applied Research & Design, 2024).
Starting with these meanings, and also referencing Çelik Alexander, Ng elaborates on scanning and two additional acts: storing and checking, through tools and additional systems.

[447] Andrew Kovacs, "Archive of Affinities Making Architecture from Architecture," *Architectural Design* 89, no. 4 (July 2019): 54–61, https://doi.org/10.1002/ad.2457, 56.

[448] Kovacs, 61.



Figure 3.49 Archive of Affinities (collection and partial objects)
Source: https://o-k-o-k.net/ARCHIVE-OF-AFFINITIES

The collection includes a variety of fragments, scanned or copied, and described by Kovacs as "a pile of architectural trash." Some examples from the collection are architectural plans, photographs of models, dice, a badminton ball, a pipe joint, and an ionic column. He outlines three phases in the process of collecting and creating this inventory: "search, selection, scanning."[449] In the first step of searching, elements, forms, and notations are browsed in the form of old media and collected without predefined criteria such as specific movements or theories, creating an open-ended inventory within the limitless space of the *Archive of Affinities*.[450] The second step is selection, which oscillates between collection and production processes. The content of the inventory is defined as selected fragments, removed from their original context and reassembled in the archive, where they gain new potential meanings.[451] The last step is scanning, in which "the original context is fully erased." Thus, the form, element, or composition is decontextualized to allow the objects to be fully ready for new relationships, combinations, and design explorations. To mobilize and define new relations between the objects of the collection, *Archive of Affinities* suggests a production methodology of "Making Architecture from Architecture":

> Archive of Affinities operates on two levels. The first employs procedures of browsing, searching, tracking, gathering, grouping, organising, comparing, collecting and selecting. The second is the constant production of new images and objects through procedures of flattening, copying, scaling, assembling, combining, compacting, mixing, reorganising, altering, recasting and proposing. What is produced might simply be architectural thought experiments, playful provocations or speculative proposals.[452]

[449] Kovacs, 57.
[450] Kovacs, 57.
[451] Kovacs, 57.
[452] Kovacs, 61.

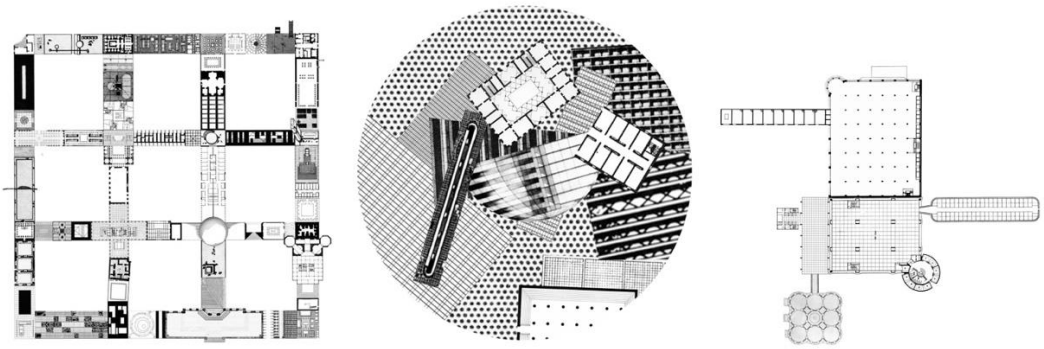


Figure 3.50 Archive of Affinities, Floor Plans project.
Source: https://o-k-o-k.net/ARCHIVE-OF-AFFINITIES

The paragraphs above have detailed Kovacs's methodology in the *Archive of Affinities*, entailing searching, selection, and scanning, and how these processes enable the creation of new architectural ideas. The "Floor Plans" project exemplifies how these collected fragments, or plans, are reassembled into fictional spaces. The plans are crafted using the existing plan collection within the archive, and various combinations suggest fictional spaces proposed by the collaging of these plan elements (Figure 3.50).

Overall, *Archive of Affinities* exemplifies how the operation of collecting, which is central to imitative *Bildung*, can shift in form while retaining its conceptual core. What was once a pedagogical act of gathering and replicating fragments in teaching collections now becomes a digital, scenographical and speculative practice of assembling and reinterpreting fragments. By linking past and present examples of collecting, Kovacs's project demonstrates how imitation is not static repetition but a generative strategy that adapts across media and methods. As such, the archive space transforms from a site of preservation into an active, evolving platform for architectural thinking.

Formative *Bildung*: Learning from Generative Rules For/Of Architectures and Varying Sequences



The formative understanding of *Bildung* addresses the ways in which architectural knowledge develops through generative rules and sequential variations, and it defines the operation of varying. Formative *Bildung* can be defined in architectural theory through the concept of *Bildungsgesetze* (Formation Laws), which are the narrative rules enabling complex processes of making. This mode of making aligns with Poliziano's *Inventum* as a way of knowing. The formative understanding of *Bildung* involves the development of architectural knowledge through rule-based generative technological processes. Central to formative *Bildung* is the operation of varying, viewed as both a conceptual and formal strategy. Conceptually, it emphasizes variation within formative steps; formally, this process is expressed through the act of form-making as a sequence of variations. This thesis traces the intellectual lineage of varying through the juxtaposition of historical and recent temporal layers, emphasizing its role in shaping architectural thinking and making. In doing so, it draws on sources related to *Bildungsgesetze*, including a unique article titled "Die *Bildungsgesetze* der Architektural Formen" and the articulation of *Nutzform* (functional form), *Werkform* (work form), *Begriffsform* (conceptual form), and *Sinnform* (symbolic form) by Friedrich Heinzerling (1873–1949, German architect and architectural theorist), which reveals a layered understanding of form as a process.[453] Furthermore, Heinzerling's "laws," specifically the law of

[453] Friedrich Heinzerling, "Die Bildungsgesetze in der Architektural Formen," *Allgemeine Bauzeitung*, 1869, translated by the author with corrections from German dictionaries, accessed via the Bayerische Staatsbibliothek Digital Archive, https://opacplus.bsb-muenchen.de.

separation/division and the law of relation/transition, are not merely classificatory but generative, guiding the ways in which architectural forms evolve through variation. These generative processes underline the technological advancement to define coreforms. Other commonly overlooked sources utilized here include two books by Rudolf Redtenbacher: *Tektonik* and *Die Architektonik der modernen Baukunst*. In Redtenbacher's works, distinctions among the concepts of *Formgebung* (form-giving), *Begrenzungformen* (limiting forms), and *Übergangsformen* (transition forms) provide a theoretical underpinning for varying as an operation that allows for transformation within boundaries, aligning closely with formative *Bildung*.[454]

The operation of varying, when grounded in the laws of separation and relation, functions across distinct temporal layers. In the nineteenth century, Heinzerling's *Bildungsgesetze* outlined rule-based processes for generating architectural core-forms through systematic variation. The same technologicaş logic appears to be reactivated in Superstudio's *Istogrammi*, where iterative diagrammatic experiments utilize rule-based variations to propose spatial sequences that resist fixed outcomes. These iterative experiments produce spatial sequences that resist finality and emphasize generative procedures over fixed outcomes. Similarly, SHoP Architects' concept of versioning extends this tradition; by serially producing formal alternatives, versioning transforms rules into tools for creativity, aligning with Redtenbacher's conceptions of form. Both of these examples foreground narrative technological progression and procedural thinking, showing how varying continues to structure formative *Bildung* across different temporal registers.

Each of the following subsections presents a dialogue between different temporal layers linking historical theories of form generation and rule-based and form-based

---

[454] Rudolf Redtenbacher, *Tektonik: Principien der künstlerischen Gestaltung der Gebilde und Gefüge von Menschenhand welche den Gebieten der Architektur der Ingenieurfächer und der Kunst-Industrie angehören* (Vienna: Waldheim, 1881), translated by the author with corrections from German dictionaries, accessed via ETH-Bibliothek Zürich.

design, such as those proposed by Redtenbacher and Heinzerling, with case studies including Superstudio's *Istogrammi* and SHoP Architects' versioning. Rather than emphasizing a rupture between temporal layers, these pairings foreground shared modes of formal variation and procedural making. They reveal how formative operations are defined through separation, iteration, and serial transformation, enabling architectural form to emerge through structured yet open-ended systems.

Learning from "*Die Bildungsgesetze der Formen in der Architektur*" (Formation Laws of Architectural Forms)

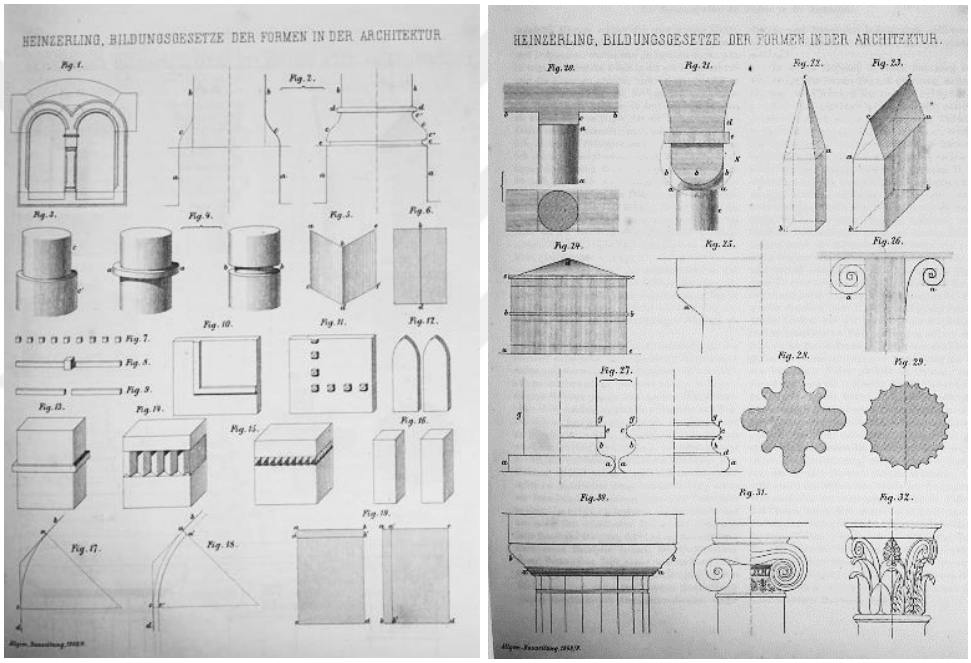


Figure 3.51 Heinzerling's drawings: *Vermittlungsglied* and *Trennungsglied*.
(Bayerische Stadtbibliothek. Die Bildungsgesetze der Formen in der Architektur, Allgemeine Bauzeitung, Friedrich Heinzerling, 1869. CC0 1.0 Universal (CC0 1.0) Public Domain Dedication https://www.digitale-sammlungen.de/view/bsb10479254?page=1)

Friedrich Heinzerling, the author of the relatively less-known article discussed here, was an architect-engineer. He began his studies at the Bauakademie in 1842 and later continued at Justus Liebig University in Gießen; he also served as the rector of the Technical University of Aachen. His research focused on structural principles and construction techniques, particularly in relation to iron bridges, reflecting a deep integration of architectural and engineering knowledge. "*Die Bildungsgesetze der*

Formen in der Architektur" is described here as unique because it is his only work addressing the design methodology transitions published in *Allgemeine Bauzeitung* in 1869.[455] Although he remains a relatively obscure figure of nineteenth-century architectural theory, his theoretical expansion on Bötticher's subforms is considered directly relevant to contemporary theories.

The full title of his work may be translated as "The Laws of Formation/Generative Laws of Architectural Forms: A Contribution to the Knowledge of the Development of Architectural Art Forms." He expands on the Bötticherian dual definition of form and proposes a detailed conceptualization to better define "formation laws." According to Heinzerling (and similarly to his contemporaries), architectural form is developed on the basis of practical experience.[456] This experience is understood as an intellectual process, which he defines as "research" (*Durchforschung*): "…thus, the past centuries in numerous buildings provided the researcher with material for intellectual exploration."[457] In addition to "research," Heinzerling underlines "imagination" as a significant creative force in this exploration. According to him, imagination is a dialectical mental activity that is twofold: "artistic imagination and strict thinking are partly dependent on those church-national conditions beyond our power struggle, but, on the other hand, are largely determined by the nourishment that we feed to that imagination."[458] Although our thinking is influenced by the limits of context, imagination can learn from these boundaries and also expand them through the nourishment of imagination. He says:

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[455] In 1893, Heinzerling gave a speech on "*Die Vermittellungs-Gesetz*" ("The Laws of Mediation/Transition"), as the rector, in the Aula der Kgl. Technischen Hochschule zu Aachen on the occasion of the king's birthday. Excluding the "national" and kingdom-related contents, this speech was based on his 1869 article on *Bildungsgesetze*. Digitalarchiv-Aachen: Publikationsserver der RWTH Aachen University.

[456] Friedrich Heinzerling, "Die Bildungsgesetze der Formen in der Architektur," *Allgemeine Bauzeitung*, 1869: 290. This and the following quotations were translated by the author with corrections from German dictionaries.

[457] Heinzerling, 290.

[458] Heinzerling, 289.

> The nourishment of the imagination lies in the knowledge and understanding of historical architectural styles and the study of natural structures. If the latter provides us with endless material for artistic redesign, then the study of architectural monuments should not only serve as a treasure trove for the direct application of forms created in the past but also guide us in processing those natural structures. The inherited structural form does not merely refer to an imitation that reduces it to a lifeless scheme; instead, it transforms into ever-new and vibrant structural forms through independent intellectual work.[459]

This twofold nourishment of the imagination is further elaborated through various approaches to theorizing knowledge. Heinzerling states that knowledge that is explored theoretically stimulates "the reasons for the emergence, development, and deterioration of the architectural style, as well as the built forms."[460] According to him, it has connections extending in many directions: the first is the historical (or social-historical); the second is the philological-archaeological, based on the study of old buildings and writers; the third is the philosophical-aesthetic, starting from the concept of the beautiful; the fourth is the practical and aesthetic, proceeding from the elements of architecture, their symbols, and the technical demands of handicrafts; and the fifth is the artistic, starting from a predominantly artistic point of view.[461] The overall reading of Heinzerling reflects a certain architectural philosophy that underlines the formative processes of thinking and making, resulting in a variety of new terms.

Nutzform (functional-form), *Werkform* (structural-form), *Begriffsform* (conceptual-form), *Sinnform* (perceptual-form)

Heinzerling understood the development of tectonics within the scope of four acts that works through form-based operations: disposition, construction, composition,

[459] Heinzerling, 289.
[460] Heinzerling, 290.
[461] Heinzerling, 290.

and artistic symbolism. Corresponding to these four concepts, he proposed four subforms: *Nutzform* (functional form), *Werkform* (structural form), *Begriffsform* (conceptual form), and *Sinnform* (perceptual form).[462] These forms can appear independently, but only in their mutual amalgamation do they reveal an architecturally perfect form.[463] The first of these subforms (*Nutzform*) pertains to function and space definition. The second (*Werkform*) relates to structure, aiming to achieve maximum stability and resistance. The third (*Begriffsform*) focuses on the individual parts and their transitional relationships. Finally, the fourth (*Sinnform*) involves the formation of these distinct parts through essentially symbolic elements.[464] Schwarzer explains Heinzerling's elaboration on Bötticher's *Kunstform* as follows:

> Finally, the culmination of architectural design, the *Sinnform* (perceptual form), corresponds exclusively to Bötticher's *Kunstform*. Here, the parts of the *Begriffsform* are transformed into artistic forms. Indeed, the *Sinnform* completes the architectural *Kunstform* by sculpting the symbols of functional members into geometric, vegetative, or animalistic character.[465]

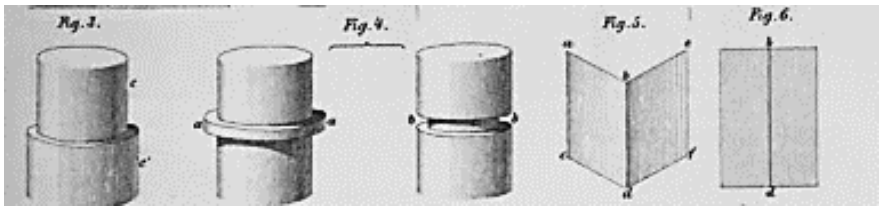
In terms of tectonics, Heinzerling not only presents a conceptual framework but also illustrates the physical development in scale of the architectural line. Following the definition of the spatial necessities and structural composition, *Begriffsform* correlates with a twofold tectonic process: first, "the division of the building's whole into its main parts, or the dissolution of the overall structural concept into its partial structural concepts," and second, "the mediation of those building parts into a building's whole, or the combination of those building parts to form the overall building structure."[466] This twofold process results in the main laws proposed by

[462] Heinzerling, 292.
[463] Heinzerling, 292.
[464] Heinzerling, 292.
[465] Schwarzer, 1994, 187.
[466] Heinzerling, 292.

Heinzerling: the law of separation/division (*Das Gesetz der Scheidung/Trennung*) and the law of relation/transition (*Das Gesetz der Beziehung/Vermittlung*).

The law of separation/division (*Das Gesetz der Scheidung/Trennung*) and the law of relation/transition (*Das Gesetz der Beziehung/Vermittlung*)

Heinzerling's twofold theory presents a formative design methodology for architectural transitions. He defines "the law of separation/division (*Das Gesetz der Scheidung/Trennung*)" and "the law of relation/transition (*Das Gesetz der Beziehung/Vermittlung*)" as a tectonic transition between two parts, which are based on the same principles. Heinzerling explains these laws as follows: "The separation or division of any two adjacent structural form elements occurs either by creating a difference between them at the point of contact or, if they are identical at this point, by inserting a third form element that differs from them."[467] He illustrates this as follows (detail below taken from Figure 3.51):

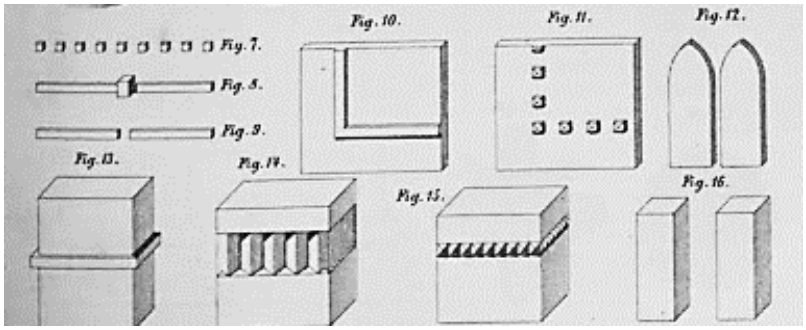


> The separation of two cylinders (Fig. 3) can already be achieved through the difference in their diameters, but if their diameters are equal (Fig. 4), it requires the insertion of a body that differs from them, such as a forward- or backward-stepping plate similar to a or b. The separation of two flat surfaces abed and ddef (Fig. 5) can already be affected by a different position of the same by the formation of an edge dd, but with the same position of the same by the inclusion of a line bd. (Fig. 6.)[468]

[467] Heinzerling, 292.
[468] Heinzerling, 293.

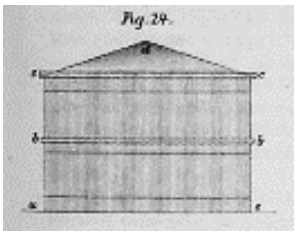
According to Heinzerling, separation and division can be either perfect (total), which is complete, or imperfect (partial), which occurs when it incompletely separates two adjacent form elements. He provides the example of a partition between two neighboring rooms creating a perfect separation, while the row of columns between them represents an imperfect or partial separation. In his article, he expresses this as follows (refer again to Figure 3.51):

> According to this law, the means for obtaining a separation can easily result in:
> a) the free space serving to separate point-shaped bodies (Fig. 7),
> b) the point-shaped body and the free space serving as a means of separating solid bodies (Figs. 8 and 9),
> c) the line-shaped body, the point-shaped body, and the free space serving as means to separate plate-shaped bodies (Figs. 10, 11, and 12), and
> d) the surface-shaped (plate), line-shaped, and point-shaped body, as well as the free space, serving as a means of separating bodies (Figs. 13, 14, 15, and 16).[469]



[469] Heinzerling, 294.

Heinzerling explains the law of relation/transition (*Das Gesetz der Beziehung/Vermittlung*) as the mediation of two different architectural elements that take place through a partial similarity of their form.[470] He illustrates and explains this "similarity" as follows (Figure 3.51):



> If we take as an example a façade divided by separation into two stories and a roof, the mediation of the base line ac (Fig. 24) with the surface of the façade wall is carried out by the base, as a linear surface; the mediation of the lower story wall with the dividing line b between the two stories, as well as the entire façade wall with its dividing line e from the roof, again occurs through a linear surface; and the mediation of the roof with the immaterial space occurs through a termination in a point or line d. The mediations that occur can now be those of a) points with points, b) lines with lines, c) surfaces with surfaces, d) bodies with bodies, or combined mediations: 1) lines with surfaces, 2) surfaces with bodies, and finally 3) the elements (bodies, surfaces, points) with free space.[471]

He concludes with the following formulation:

> The means for establishing these mediations easily result from the above:
> a) Points, as an intermediary for points with points
> b) Lines, as an intermediary of lines with lines,
> c) Bodies, as a mediator of bodies with bodies,
> d) Line-shaped bodies, as mediators of lines and surfaces,
> e) Surface-shaped bodies (plates), as mediators of surfaces and bodies,

[470] Heinzerling, 293.
[471] Heinzerling, 293.

f) Lines and points, as mediators of bodies and bodies with empty space.[472]

Overall, Heinzerling's text presents a methodology for defining and establishing the technologcial relationship between various architectural components. He illustrates this methodology using simple geometric terms represented in abstract diagrammatic layouts. He defines the transition and separation laws as entailing three-dimensional "bodies" in relation to points, lines, and surfaces. In Heinzerling's reading, separations and relations between architectural parts become sites of experimentation of forms, generating new rule-based form expressions through repetition. The law of separation and the law of relation provide a framework for the iterative formation of architectural form in response to specific compositional challenges.

[472] Heinzerling, 294.

Varying in *Istogrammi*: Grid-Based Iterations of Formation Laws

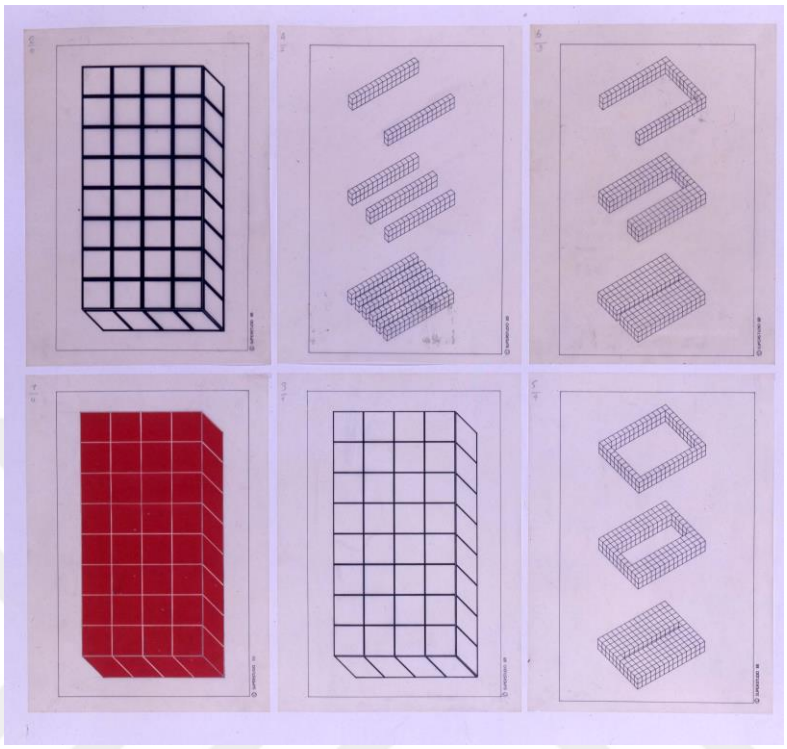


Figure 3.52 Adolfo Natalini (1941), 1969
Superstudio, 1969, *Istogrammi d'Architettura, Entwurf: Isometrie, Formstudie aus Rasterelementen. (*Histograms of Architecture, design: isometric projection, form study composed of grid elements.), Deutsches Architekturmuseum, Frankfurt am Main; © heirs of Adolfo Natalini.

Heinzerling's nineteenth-century *Bildungsgesetze* finds a counterpart in Superstudio's *Istogrammi*, where the systematic use of repetition, iteration, and formal variation critically engages with the conceptual frameworks of architectural production. Superstudio is a radical Italian architecture collective founded in 1966 by Adolfo Natalini and Cristiano Toraldo di Francia. They gained broad recognition for their provocative drawings, critical projects, and theoretical contributions to architecture. By redefining the traditional limits of architectural practice, Superstudio shifted the emphasis from physical structures to conceptual and graphic investigations. Their creations frequently engaged with the sociopolitical landscape

of the late 1960s and 1970s, leveraging architecture as a tool for critique.[473] This approach emphasizes form as a process and highlights technological advancement.

In this thesis, their project titled *Istogrammi d'Architettura* ("Histograms of Architecture") is specifically highlighted because it provides a clear example of the operation of varying within a generative system (Figure 3.52). Superstudio's *Istogrammi d'Architettura* series began in the summer of 1968, developing alongside sketches for the *Catalogo di Ville* (Figure 3.53).[474] As part of a broader critique of architectural practice, *Istogrammi* rejected conventional notions of function and authorship. Conceived of as a "catalogue of architectural histograms with reference to a transportable grid in different areas or scales for constructing a serene and immobile nature in which to finally recognize oneself," the project proposed a radical rethinking of architectural form as a diagrammatic iterative process rather than a fixed object.[475]

[473] For more: Peter Lang and William Menking, *Superstudio: Life Without Objects* (Milan: Skira, 2003).
[474] Lang and Menking.
[475] Ross Kenneth Elfline, *Superstudio and the Staging of Architecture's Disappearance* (PhD diss., University of California, Los Angeles, 2010): 91.

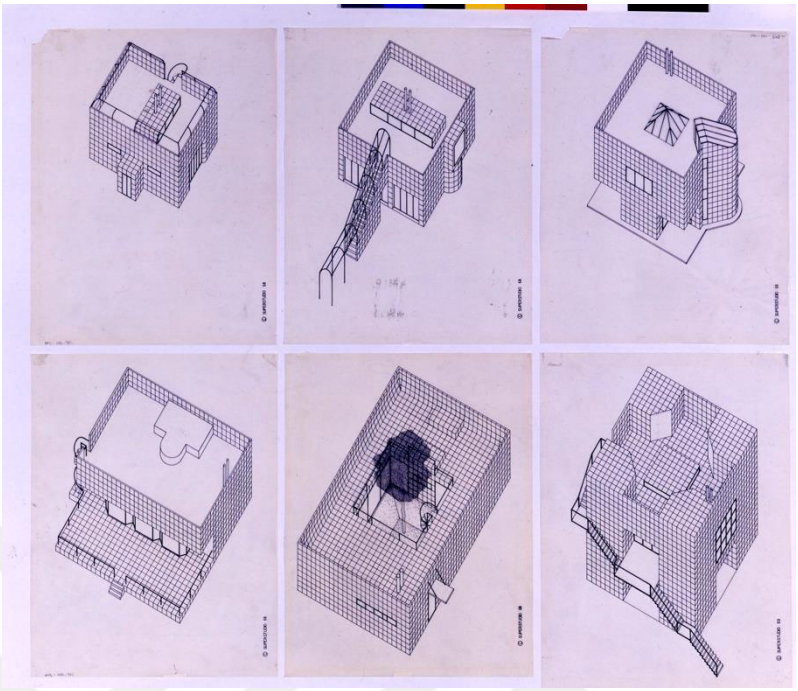


Figure 3.53 Adolfo Natalini (*1941*), 1968.
Superstudio, 1968, *Un Catalogo di Ville*, Serie A: *Villa Suburbana*, Entwurf: Villa; Isometrie (Catalogue of Villas, Series A: Suburban Villa, design: villa; isometric projection). Deutsches Architekturmuseum, Frankfurt am Main; © heirs of Adolfo Natalini.

These three-dimensional forms, described as noncontinuous diagrams and sometimes referred to as the "tombs of the architects," are composed of a homogeneous, isotropic grid transposed to various scales (Figures 3.54 and 3.55).[476] Initially developed alongside the Misura furniture line and later realized in the Quaderna series produced by Zanotta, *Istogrammi* remains conceptually distinct in its resistance to a fixed program. The series consists of thirty diagrams that serve as modular frameworks for generating objects, furniture, interiors, and architectural spaces. Superstudio's consistent use of a 3×3 cm grid established a formal discipline based on iteration and variation, producing an architecture conceived of as an ongoing act of recombination. This approach reflects an understanding of iteration not as redundancy but as a method of exploration. As the group described, the

[476] Peter Lang, "Superstudio: Inhabited Space," *DASH: Delft Architectural Studies on Housing* 11 (2015): 56.

diagrams illustrated "different iterations of a basic form," foregrounding the generative potential of modular design and serial variation (Figures 3.54 and 3.55).[477]



Figure 3.54 Adolfo Natalini (*1941*), 1969.
Superstudio, 1969, *Istogrammi d'Architettura*, Entwurf: Isometrie, Formstudie aus Rasterelementen (Histograms of Architecture, design: isometric projection, form study composed of grid elements). Deutsches Architekturmuseum, Frankfurt am Main; © heirs of Adolfo Natalini.

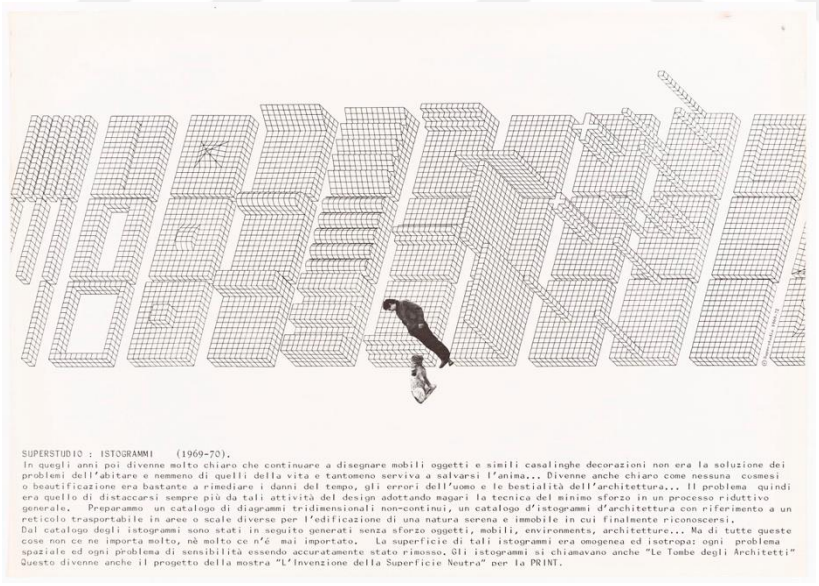


Figure 3.55 *Istogrammi d'Architettura*, 1969. Black and white poster, 498 × 700 mm. (Histograms of Architecture), DMC 2934, Drawing Matter Collection.

[477] Elfline, 106.

The methodological parallel between Superstudio's *Istogrammi* and Friedrich Heinzerling's *Bildungsgesetze der Formen in der Architektur* is particularly clear from their shared emphasis on systematic formation.[478] Heinzerling's *Bildungsgesetze* describes the sequence of relationships and separations that present various rule-based possibilities of form-making. Similarly, Superstudio's grid-based diagrams serve as relational matrices, where each transformation stems from internal logics. In this sense, *Istogrammi* and Heinzerling's formation laws, along with his diagrams, are two temporal layers that engage in dialogue. Both serve as diagrammatic samples where separation and relation create new configurations of form and variation acts as a tool for both discovery and critique.

Learning from a Late "*Tektonik*": On *Beziehungsformen* (Relational Forms)

Rudolf Redtenbacher, the author of a relatively less well-known book on *Tektonik*, was born in Zurich. In 1862, he attended the Berlin Academy of Architecture, where he took courses from Bötticher and Adler. Afterward, he traveled to Dresden to develop his knowledge of Renaissance art. Following that, he traveled to Vienna to study Gothic architecture under Friedrich Schmidt. He later worked as an architect in Karlsruhe, viewing his theoretical contributions as the realization of Semper's incomplete vision for architectural tectonics. Three books that he published should particularly be emphasized here: *Tektonik: Principien der künstlerischen Gestaltung der Gebilde und Gefüge von Menschenhand welche den Gebieten der Architektur der Ingenieurfächer und der Kunst-Industrie Angehören* ("Tectonics: Principles of Artistic Formation"), in 1881; *Architektonik der modernen Baukunst* ("Architectonics of Modern Building-Art"), in 1883; and *Äesthetik der modernen Architektur* ("Aesthetics of Modern Architecture"), in 1883. The approach traced in

[478] The well-known discourse on "shape grammar" also presents a comparable formulation; however, it does not originate within architectural theory. My approach is therefore critical toward it, and it is not included in this discussion. Instead, I find the nineteenth-century discourse on form generation through *Bildungsgesetze* more compelling.

Redtenbacher's books is significant for understanding the early developments leading toward modern architecture. His works present a range of foundational ideas and, notably, the use of the term "modern" can be seen as early as 1883 in his *Die Architektonik der modernen Baukunst*.[479]

Redtenbacher's *Tektonik*, the primary focus of this section, may be considered a late contribution to tectonic theory, but it possesses a unique structure, as each theoretical proposition is accompanied by interlinear diagrams. The book comprises ten sections, each exploring different aspects of tectonics and form-based processes, which the author describes as the artistic design of human constructions and makings.[480] The chapters of Redtenbacher's *Tektonik* constitute a comprehensive framework that includes *Aesthetische Principien* ("Aesthetic Principles"), *Das geometrische Element in der Tektonik* ("The Geometric Element in Tectonics"), *Die Formgebung* ("Form-Giving"), *Die Grössenverhältnisse, Proportionen* ("Dimensions and Proportions"), *Die Farbengebung* ("Color Application"), *Die Aufgaben der Architektur* ("The Tasks of Architecture"), *Die Aufgaben des Ingenieurfaches* ("The Tasks of Engineering"), *Die Aufgaben des Maschinenbaues* ("The Tasks of Mechanical Engineering"), *Die Aufgaben des Schiffbaues* ("The Tasks of Naval Engineering"), and *Die Aufgaben der Kunstindustrie* ("The Tasks of the Decorative or Applied Arts Industry"). It covers a wide range of topics related to tectonics, beginning with abstract aesthetic principles and progressing to considerations of form, material, and design methodologies. It emphasizes the importance of unified connections, purposes, and clear expressions. The book also considers the importance of geometry, proportion, and color, and it seeks to provide practical guidelines.

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[479] Mary McLeod, "Modernism," in *Forty Ways to Think About Architecture: Architectural History and Theory Today*, ed. Iain Borden and Murray Fraser (London: Wiley, 2015), 185-192.
[480] Rudolf Redtenbacher, *Tektonik: Principien der künstlerischen Gestaltung der Gebilde und Gefüge von Menschenhand welche den Gebieten der Architektur der Ingenieurfächer und der Kunst-Industrie angehören* (Vienna: Waldheim, 1881).

Here, the emphasis is primarily on the first three chapters addressing *Aesthetische Principien* ("Aesthetic Principles"), *Das geometrische Element in der Tektonik* ("The Geometric Element in Tectonics"), and *Die Formgebung* ("Form-Giving"). The theoretical contents of all chapters will not be elaborated in detail; however, Redtenbacher's in-between-the-lines diagrams will be used to exemplify certain key concepts.

The opening chapter, *Aesthetische Principien* ("Aesthetic Principles"), lays out the key concepts of aesthetics explored in the text. It argues that every aesthetic evaluation conveys either pleasure (*Lust*) or displeasure (*Unlust*). In this chapter, Redtenbacher visually analyzes specific aesthetic properties of form. As an example, Figure 3.56 depicts a series of squares arranged in various positions to illustrate different relationships among identical geometries.

Redtenbacher states that the aesthetic value of the larger square is not simply four times that of the smaller one, nor are the combinations of squares in Figs. 2, 3, 4, and 5 aesthetically equivalent. Each composition creates a distinct relational effect. The squares possess entirely different relationships with one another and can affect the viewer in diverse ways. Their aesthetic value depends precisely on those relationships. Just as the number of individual aesthetic elements does not determine the overall aesthetic pleasure, their absolute size is also not directly proportional to the total effect. Thus, Redtenbacher emphasizes the aesthetic significance of relational possibilities.[481]

[481] Redtenbacher, 1881.

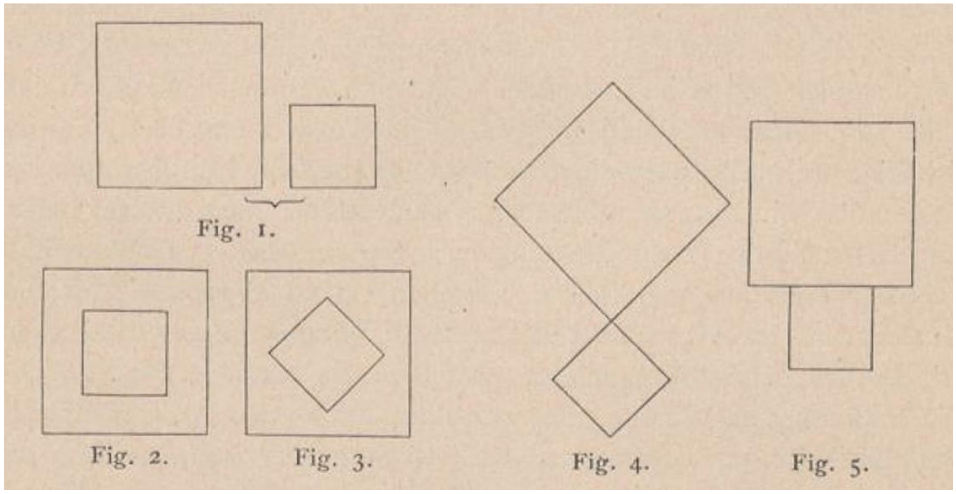


Figure 3.56 Diagram from the chapter on *Aesthetische Principien* ("Aesthetic Principles"). Source: ETH-Bibliothek Zürich, A 5009 Public Domain Mark, https://doi.org/10.3931/e-rara-11789, Rudolf Redtenbacher, *Tektonik: Principien der künstlerischen Gestaltung der Gebilde und Gefüge von Menschenhand welche den Gebieten der Architektur der Ingenieurfächer und der Kunst-Industrie angehören* (Vienna: Waldheim, 1881).

The second chapter on *Das geometrische Element in der Tektonik* ("The Geometric Element in Tectonics") begins with a brief discussion of the history of mathematics. It then focuses on fundamental geometric concepts such as the point, two points as a pair, and three points defining a line. These descriptive geometries are connected to human activities like gathering around a point, gathering in pairs, or lining up in a row. The chapter then further examines linear surface divisions forming patterns. A diagram is provided to display geometric steps and references for the linear division of a surface (Figure 3.57). The drawings are abstract, consisting of repeated basic lines that showcase different form configurations of the same linear references.

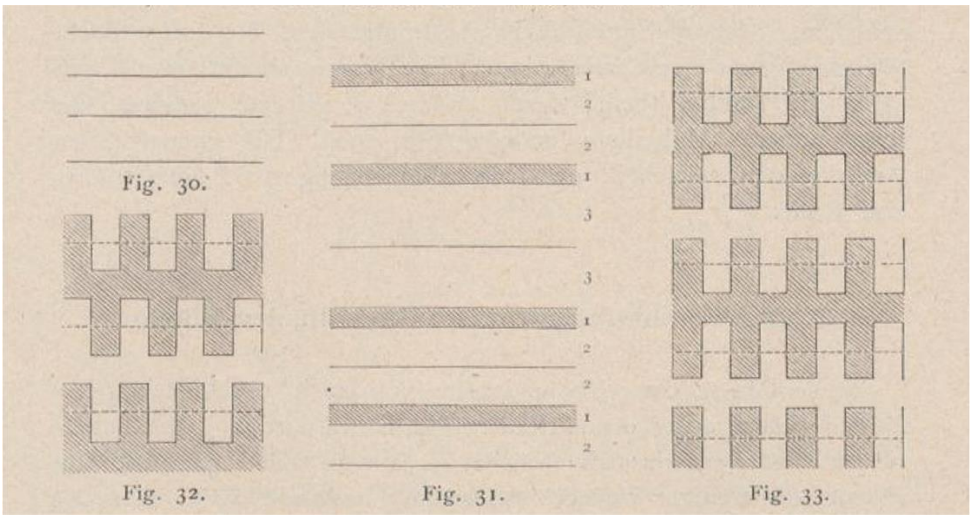


Figure 3.57 Diagram from the chapter on *Das geometrische Element in der Tektonik* ("The Geometric Element in Tectonics"). Source: ETH-Bibliothek Zürich, A 5009 Public Domain Mark, https://doi.org/10.3931/e-rara-11789, Rudolf Redtenbacher, *Tektonik: Principien der künstlerischen Gestaltung der Gebilde und Gefüge von Menschenhand welche den Gebieten der Architektur der Ingenieurfächer und der Kunst-Industrie angehören* (Wien: Waldheim, 1881).

These diagrams, while seemingly minimal, encapsulate more than just visual patterning. They can be read in relation to Redtenbacher's broader perspective, which was based "both on the study of the influences and causal relationships between all buildings in history, and on the interrelationships between buildings and other cultural and artistic phenomena."[482] Redtenbacher proposes a thorough, form-based and technological history that details the evolution and interconnectedness of architectural production methods and their resulting forms.[483]

The third and most extensive chapter, on *Formgebung* ("Form-Giving"), introduces key concepts such as *Begrenzungsformen* (limiting forms) and *Übergangsformen* (transition forms). These ideas closely parallel Heinzerling's formation laws, and particularly his principles of separation and relation.

[482] Schwarzer, 1994, 107.
[483] Schwarzer, 107.

Formgebung (Form-giving)

Before exploring the contents of this third chapter, the contemporary use of the term *form-giving*, as popularized by Bjarke Ingels,[484] should be noted. This term plays a central role in current architectural discourse, especially as a counterpart to form-finding. Long before Ingels, nineteenth-century figures such as Rudolf Redtenbacher and Friedrich Heinzerling used related ideas in their discussions of *Formgebung* and *Bildungsgesetze*, emphasizing generative processes that inform architectural form.

Accordingly, the chapter titled "*Die Formgebung*" is especially noteworthy within the framework of Redtenbacher's approach to defining form. This chapter comprises four main parts:

Accordingly, the chapter *"Die Formgebung*" is especially noteworthy for Redtenbacher's approach to define form. This chapter is composed of four parts:
A. *Die Form an sich* (The form itself)
B. *Ueber das Verhältniss von Form und Zweck* (On the relationship of form and purpose)
C. *Ueber das Verhältniss von Stoff und Form* (On the relationship of form and material)
D. *Symbolische Formen* (Symbolic forms).

Each of these parts conveys knowledge about form and related concepts through organized categories governed by rules and codes. The chapter thus presents both theoretical and technological insights into architectural form, defined through the dualities of artform and coreform, encompassing both representational and structural aspects but prioritizing coreform. Redtenbacher uses the term "*Bildungsgesetze*" as well and presents related rules and codes on "form-giving."

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[484] Bjarke Ingels, *Formgiving: An Architectural Future History* (Cologne: Taschen, 2019).

This chapter of Redtenbacher's book, divided into four interconnected parts, fundamentally argues that the formation of tectonic elements is mainly driven by geometric principles, purposes, and material properties. It begins with a discussion of *die Form an sich*, or form in itself, focusing on forms as pure geometries detached from material applications. These idealized forms are described as bounded by surfaces and organized through compositional references such as axes and centerlines, emphasizing their structural autonomy. This is followed by a detailed examination of the relationship between form and purpose (*Ueber das Verhältniss von Form und Zweck*), where Redtenbacher investigates the extent to which form is directly dependent on function. He argues that a particular basic form may best correspond to a given purpose in a specific material and with a suitable combination of form and material. The analysis extends to the influence of secondary circumstances, be they environmental, technical, or contextual, on this formal determination. The third section addresses the relationship between material and form (*Ueber das Verhältniss von Stoff und Form*), grounding the discussion in the technical and physical properties of materials. Here, form-giving (*Formgebung*) is treated as being dependent on materials, technical processes, and constructions.

The final section, on symbolic forms (*Symbolische Formen*), introduces forms that do not directly serve a functional purpose but instead convey meaning through visual associations. They are divided into the categories of *Beziehungsformen*, or relational forms, and *Schmuckformen*, or ornamental forms, representing either structural relationships or conceptual expression.

Begrenzungformen (limiting forms) and *Übergangsformen* (transition forms)

Relational forms are divided into the categories of *Begrenzungsformen*, or forms of limitation, and *Übergangsformen*, or forms of transition, articulating structural parts by marking boundaries and mediating connections.[485] They reflect an inner formal

[485] Redtenbacher, 192.

logic that suggests where an element begins or ends, or how two parts relate. Ornaments, meanwhile, express the "soul" or conceptual idea of objects through visual associations. Ornamental forms (*Schmuckformen*) aim to evoke appropriate meanings aligned with the relevant purpose while remaining true to both internal and external relations.

Much like Heinzerling's emphasis on separation and relation in his formation laws, Redtenbacher foregrounds inter-part relationships. His drawings reflect a process of understanding and stages of geometric formation rather than directly documenting the existing details or components. Instead of the direct documentation of existing architectural components, we observe guiding lines and geometric references that define multiple solutions despite their "symbolic" purpose. Redtenbacher starts with basic geometries and displays sequential diagrams to illustrate their development into complex mediating elements.

Within the section on *Begrenzungsformen*, or limiting forms, the subheading "Beginning and End, Core and Frame" introduces a discussion supported by two abstract diagrams (Figure 3.58). The first of these abstract diagrams presents the limits for extension or contraction (Figure 3.58). According to Redtenbacher, all linearly extended bodies can either end freely in two opposite directions or connect with other elements in ways that suggest either tension or compression. In the horizontal direction, such linear elements would end identically on both sides, as indicated by *c e* in his Fig. 199. In contrast, vertical elements require differentiated ends, such as *o u*, with an upper and a lower end, appropriate to their directional orientation.[486]

[486] Redtenbacher, 195.

Redtenbacher further explains that forms in ends can transition to specific in-between forms before ending (see his Fig. 200).[487] These can vary in their geometries, but each geometry conveys the limit and the limiting process.

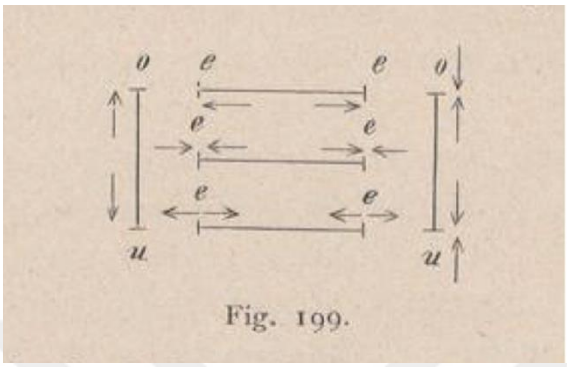


Fig. 199.

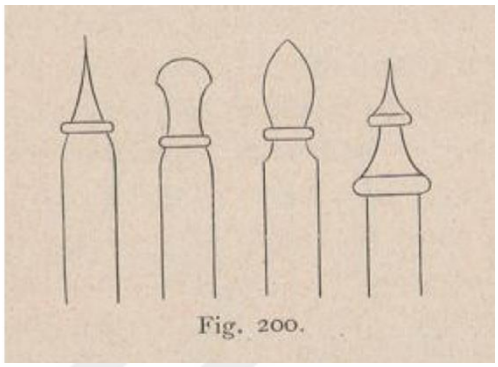

Fig. 200.

Figure 3.58 Diagram from "*Begrenzungsformen* (forms of limitation) " part. Source: ETH-Bibliothek Zürich, A 5009 Public Domain Mark https://doi.org/10.3931/e-rara-11789 / Rudolf Redtenbacher, *Tektonik: Principien der künstlerischen Gestaltung der Gebilde und Gefüge von Menschenhand welche den Gebieten der Architektur der Ingenieurfächer und der Kunst-Industrie angehören*, (Wien: Waldheim, 1881).

In the section on transition forms (*Übergangsformen*), a subsection titled "Mediation, Connection, Articulation" highlights Redtenbacher's use of abstract formative diagrams to visualize the generative processes he describes (Figure 3.59). According to him, in all formations, the masses and cross-sections of the individual components will vary. Guiding one form into another and mediating transitions, as already seen in the case of endings, is not merely a visual necessity but also a conceptual necessity. The forms into which another form transitions require a degree of preparation, allowing for numerous variations depending on the respective geometries of the elements being connected. He explains transition forms using diagrams:

> The most common transitions are those from square to round (Fig. 201) or to octagonal forms, then from a smaller cross-section into a larger one, or vice versa. The most general forms of such transitions are those in which the

[487] Redtenbacher, 196.

smaller cross-section is led into the larger through concave moldings (Fig. 202), or where the material of the larger body overflows the smaller in a convex curve (Fig. 203), or finally, where conical or pyramidal intermediate elements compensate for the difference in cross-sections (Figs. 204, 205, 206). All other occurring forms are more or less variations on the same theme.[488]

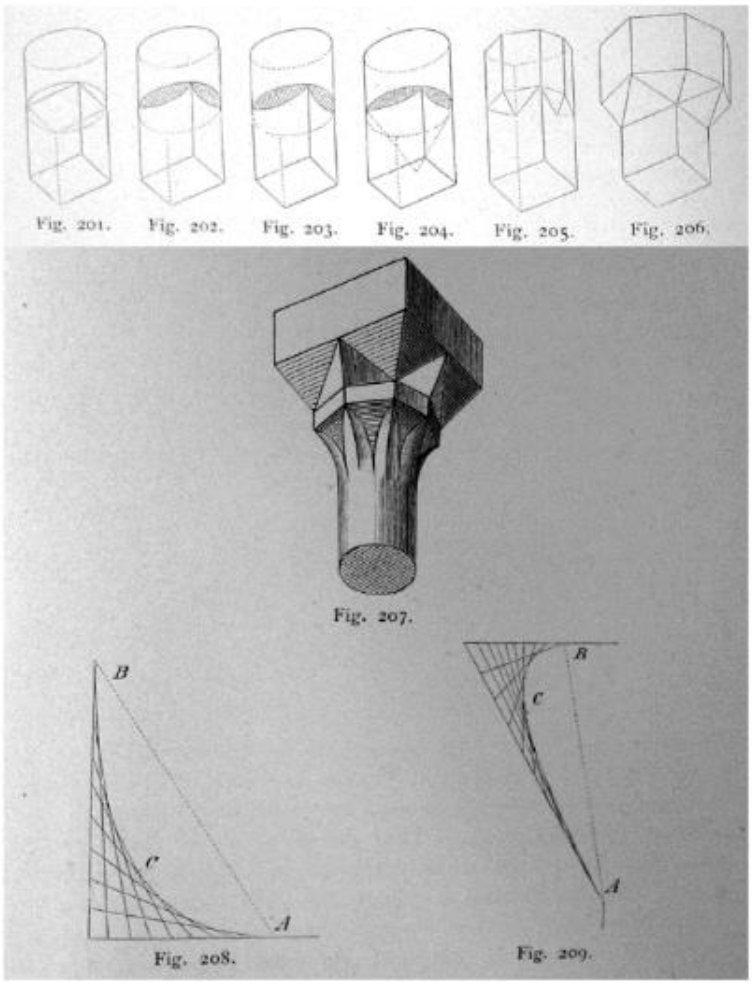


Figure 3.59 Diagram from the section on *Übergangsformen*, or transition forms. Source: ETH-Bibliothek Zürich, A 5009 Public Domain Mark, https://doi.org/10.3931/e-rara-11789, Rudolf Redtenbacher, *Tektonik: Principien der künstlerischen Gestaltung der Gebilde und Gefüge von Menschenhand welche den Gebieten der Architektur der Ingenieurfächer und der Kunst-Industrie angehören* (Wien: Waldheim, 1881).

[488] Redtenbacher, 200.

The final section, on ornamental forms (*Schmuckformen*), will not be discussed in detail here. However, it bears noting that *Schmuckformen*, understood as a continuation of *Kunstform*, illustrate ornamental surface logic. Rather than showing decorative motifs in full detail, Redtenbacher offers abstract diagrams that lay out directional geometries and the underlying structures of patterns (Fig. 3.60).



Figure 3.60 Diagram from the section on *Schmuckformen*, or ornamental forms. Source: ETH-Bibliothek Zürich, A 5009 Public Domain Mark, https://doi.org/10.3931/e-rara-11789, Rudolf Redtenbacher, *Tektonik: Principien der künstlerischen Gestaltung der Gebilde und Gefüge von Menschenhand welche den Gebieten der Architektur der Ingenieurfächer und der Kunst-Industrie angehören* (Wien: Waldheim, 1881).

Redtenbacher's other works, while deserving of separate discussion, share a methodological consistency. Like Heinzerling, Redtenbacher uses abstract diagrams to visualize mathematical and generative variations of architectural elements. For example, in a different publication, he diagrams the geometrical relations between vaults and corners, showing how different diagonals and orthogonal cuts shape transitions (Figure 3.61). These shifting geometries are further elaborated in relation to material properties and spatial requirements.

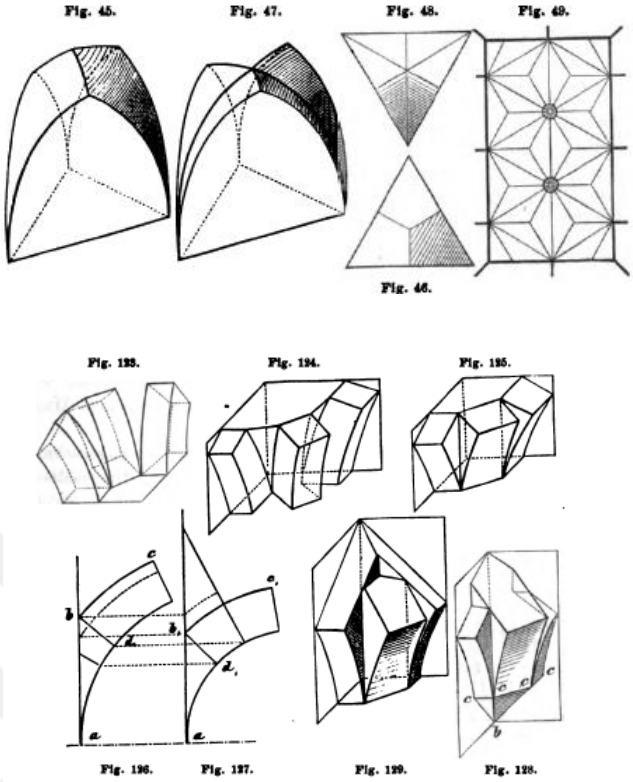


Figure 3.61 Diagrams from the book: Rudolf Redtenbacher, *Leitfaden zum Studium der mittelalterlichen Baukunst; Formenlehre der deutschen und französischen Baukunst des romanischen und gothischen Stiles auf Grundlage ihrer historischen Entwickelung*, Leipzig, T.O. Weigel1881, Public Domain Mark 1.0 Harvard University Collection, https://archive.org/details/leitfadenzumstu00redtgoog

With these points in mind, Redtenbacher's work provides a methodical approach to architectural form, highlighting the interplay of aesthetic principles, material logic, and structural relationships. The concepts of *Formgebung*, *Begrenzungformen*, and *Übergangsformen* reflect the underlying rules of tectonic knowledge. Through abstract diagrams and iterative geometric studies, his work creates a framework for understanding the variation of architectural elements, developing beyond historical references to a systematic theory of form. Redtenbacher's work unifies historical styles and presents a form-based processes, establishing essential principles that resonate with current architectural discussions. What Redtenbacher theorizes as limiting forms are the structured beginnings and endings of architectural elements. The transition forms, on the other hand, are the mediating articulations

between varying parts. The two types of forms together propose a logic of formation grounded in continuous modulation. This logic parallels the twenty-first-century concept of versioning, where iterative variation serves as a method of architectural production.

Varying in "Versioning": Digital Sequences of Relational Forms

Drawing from Redtenbacher's reflections on limiting and transition forms, versioning offers a compelling technological contemporary parallel. The operation of versioning extends his formative thinking into the realm of digital design, where boundaries and connections are treated no longer as fixed points but rather as generative thresholds. This example is chosen because it is one of the first initiatives to combine form-making methodologies with design elements.

Mario Carpo highlights a specific issue of the *AD* magazine in his book titled *The Digital Turn in Architecture 1992–2012.* This 2002 issue of interest is "Versioning: Evolutionary Techniques in Architecture," guest-edited by SHoP Architects (Sharples, Holden, and Pasquarelli). The focus of this issue of the magazine is the definition of "versioning" and qualities of practices that prioritize versioning in a variety of architectural works. According to the issue's editors, versioning reveals "a new relationship between thinking and doing in architecture… thinking becomes doing and doing becomes thinking…"[489] Versioning, in this sense, is a significant concept to be incorporated within a formation-based understanding that prioritizes processes. Originally a term from computer science, versioning entered architectural discourse through this *AD* issue. Although it was first popularized over twenty years ago, it remains a contemporary concept due to its continued influence on design processes. SHoP defines the term in the introduction of the *AD* issue:

> Versioning is an operative term meant to describe a recent, significant shift in the way architects and designers are using technology to expand, in time

[489] SHoP Architects, "Versioning: Evolutionary Techniques in Architecture," *Architectural Design*, no. 159 (2002): 5-96, 6.

> as well as in territory, the potential effects of design on our world. A 'second generation' of digital architects and theorists are emerging who have placed an emphasis on open models of practice where the application of technology promotes technique rather than image. The content within this issue of *AD* is meant to be direct and straightforward, although versioning is an open, gestural idea and the range of contributions should signal the pluralistic nature of the concept. Versioning can be seen as an attitude rather than an ideology. It allows architects to think or practice across multiple disciplines, freely borrowing tactics from film, food, finance, fashion, economics and politics for use in design, or reversing the model and using architectural theory to participate in other problem-solving fields. Versioning is important to architects because it attempts to remove architecture from a stylistically driven cycle of consumption.[490]

This process-driven logic on form recalls the nineteenth-century emphasis on formation, particularly in the *Bildungsgesetze* as discussed by Heinzerling and Redtenbacher. Versioning reclaims this emphasis by framing architecture as a becoming, defined not by fixed forms but by iterative processes. As noted in the *AD* issue, design emerges through difference and citation, evolving internally without a predetermined essence or a final form.[491] The process of the difference/citation emergence constitutes a significant part of the "becoming." The process of becoming inevitably reveals the act of versioning, which works with various possibilities of forms. The process has "its internal dynamic, without fixed end, final essence or final form."[492] Versioning also includes the changing relations of the same lines of idea, represented in iterated drawings and models. The techniques and processes of versioning may be reflected as either collections of variations to be catalogued or accumulations of variations to be worked together as a design methodology.

The first piece in this *AD* issue, "A Non-Alphabetical Glossary of the Cellular-Core Translucent Panel," is an interesting example of material scale (Figure 3.62).[493] Panelite is applied using the same geometric principles with varying relations and

[490] Pasquarelli, 7.
[491] Pasquarelli, 11.
[492] Pasquarelli, 17.
[493] Pasquarelli, 34.

key properties to create honeycomb panels, which also differ in transparency, strength, and thickness. Here, versioning as a method helps to realize variations of form and results in a collection of micro-scale forms.



Figure 3.62 Diagrams and catalogue from Panelite works, pages from the *AD* issue. Source: SHoP Architects, "Versioning: Evolutionary Techniques in Architecture," *Architectural Design*, no. 159 (2002).

The second work in the *AD* issue operates on the scale of construction with the definition of architectural members. We see construction drawings from the Camera Obscura and Warm Up installation Dunescape by SHoP, which are featured as examples of accumulated versions, where initial geometries evolve into constructed elements (Figure 3.63-64-65). These projects exemplify how versioning can generate architectural assemblies through successive iterations, combining variations with tectonic precision.

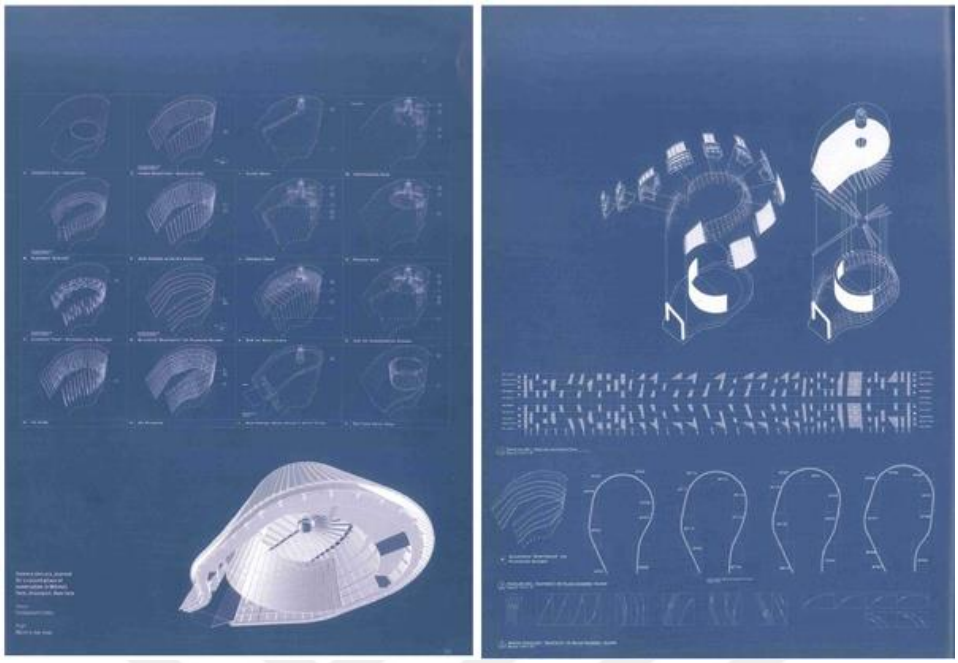


Figure 3.63 Drawings of Camera Obscura from the pages from the AD issue. Source: Sharples, Christopher, W. Sharples, K. Holden, and G. Pasquarelli. "Versioning: Evolutionary techniques in architecture." *Architectural Design* 159, 2002.

The Dunescape project, created by SHoP Architects for the MoMA/PS1 Contemporary Art Center and featured in the Warm Up 2000 installation, serves as a seminal example of versioning in practice. The project embodies a variation-based approach to architectural form, where surface, structure, and program are not separate systems but instead define a combination. The installation was developed as an ongoing process, with a triangulated wooden frame designed to meet both structural and performative demands. As the position of each structural frame changed, the triangulation's angle, depth, and geometry changed accordingly. These alterations were not dictated by a fixed formal image but by varying shifts that effectively responded to loading conditions and use scenarios, thereby creating a "versioned" environment (Figure 3.64-65). As the authors note:

> Programme shifts [were met] by varying the position of each frame relative to the next. Changes in surface and loading conditions were met by altering the angle, depth and locus of triangulation within each frame.[494]

This technique sidesteps traditional architectural hierarchies: instead of creating standard scaled drawings, SHoP issued full-scale, color-coded templates as construction documents (Figure 3.66). This method sped up the on-site assembly process with a simple kit of just two components—2x2 cedar sticks and 3-inch wood screws.

Just as Redtenbacher proposed operations like limiting and transition to articulate the relationships between elements, versioning uses digital systems to mediate constantly between forces, materials, and scales, resulting in architectures that are continuously varied rather than predefined**.** Versioning signifies a transformative shift in architectural practice, emphasizing a technological and form-based relationship between thinking and making. The operation of varying, through SHoP Architects' versioning, extends the logic of limiting and transition forms into the digital realm, where variation is not only an outcome but a technological method that invites architecture to continuously evolve.



Figure 3.64 Elements of Dunescape. Source: https://www.shoparc.com/projects/dunescape/

[494] Pasquarelli, 91.



Figure 3.65(continued). Elements of Dunescape. Source: https://www.shoparc.com/projects/dunescape/

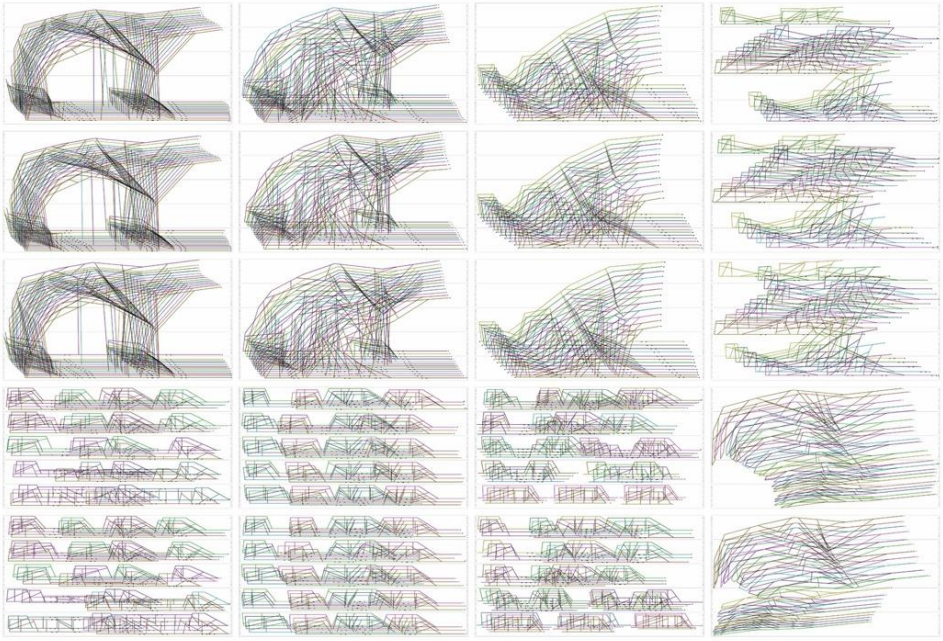
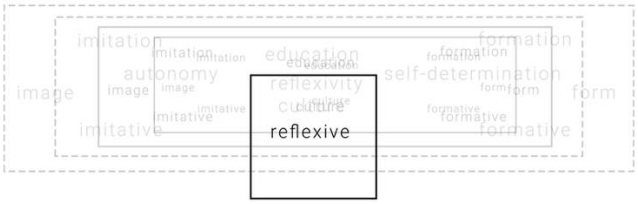


Figure 3.66 Construction drawings, elements of Dunescape. Source: https://www.shoparc.com/projects/dunescape/

Reflexive *Bildung*: Learning from Collecting Fragments and Varying Sequences



Reflexive *Bildung* builds upon the first two categories of imitative *Bildung*, which is grounded in the collection of fragments, and formative *Bildung*, which is rooted in the creation of generative rules, and emerges as a synthesis of the two. Instead of prioritizing either scenographical or technological approaches, this final category embraces the dynamic interplay between them, referring to itself and the others and positioning architectural knowledge as a reflexive process. This mode of *Bildung* resonates with Poliziano's *Mixtum*, where inspiration and invention can be regarded as not oppositional but as intertwined means of knowing. In architectural terms, reflexive *Bildung* suggests an open-ended mode of making that incorporates collecting and varying as mutually constitutive methods rather than as linear steps. In this study, the operation of imaging becomes central to articulating this mutuality. It is an operation that simulates not specific ideas but the act of thinking itself. Imaging goes beyond simple representation or creation; it emphasizes developing a framework in which architectural thinking operates reflexively. It is a process involving inquiry, assembly, and projection. This section of the thesis explores reflexive *Bildung* through a variety of contemporary architectural makings that illustrate this epistemological condition.

Imaging

The operation of "imaging," introduced by John May, is discussed separately here because, although it is a contemporary proposal, its conceptual structure closely

aligns with reflexive *Bildung*. [495] Defined in this study as a synthesis of imitative and formative processes, reflexive *Bildung* mediates between historical references and generative transformation. Imaging resonates with this definition, as it reflects a shift in how knowledge is formed and represented, marking a transition from the logic of orthography to that of imaging. May explains a fundamental shift in our technical and cultural landscape from the dominance of orthography to that of imaging. Orthography, for those born in the twentieth century, encompassed authentic practices like writing, drawing, and photography, which have lost their authenticity in the twenty-first century due to immersion in cloud data. [496]

The distinction between orthography and imaging is not merely a difference in representational techniques; it reflects a fundamental shift in ways of thinking. Orthography, marked by hand/mechanical movements following geometric rules, established archives that facilitate the interpretation and comprehension of historical time, fostering historicity and objectivity. In contrast, imaging, as a telematic technical form, provides endlessly revisable data versions, diminishing historical time, objectivity, and conventional interpretation. The cloud, as the domain of imaging, exists outside of time. May underlines the distinction between historical and statistical time. Historical time, characterized by the linear and archival nature of writing and drawing, highlights the relationship among the past, present, and future through physical records and their interpretation. In contrast, statistical time, which arises from the dynamic and data-driven nature of imaging, disrupts the linear progression and situates the present within numerous calculable future possibilities, resulting in a transition from historical consciousness to a statistical

[495] In his works, John May outlines foundational axioms that articulate the interdependence of thinking. The first axiom states that there are no pre-technical forms of thought—every way of thinking is inherently shaped by technical activities, and no idea, dream, fear, or desire exists independently of its technical age. The second axiom posits that nothing technical is simply technical; even the most seemingly insignificant technical elements are intricately linked to the deepest layers of consciousness and thus demand philosophical inquiry. The third axiom highlights that each technical system incorporates a specific understanding of time, which in turn shapes the types of thoughts and imaginations it enables or limits.

[496] May, 2017.

consciousness.[497] Imaging, referring to statistical time, is a form of photon detection.[498] The process involves detecting energy emitted from an environment and transforming it into discrete, measurable electrical charges known as signals. These signals are then stored, calculated, managed, and manipulated using statistical methods. The resulting images are outputs of energetic processes defined by this signalization, where the accumulated signals constitute data; therefore, images are data, and imaging is an act of data processing.[499] May states that "the radical difference between imaging and previous forms of simulation is that what imaging simulates is not specific ideas or thoughts but rather thinking itself."[500] Thus, the process of thinking itself becomes the medium, and imaging as an architectural operation aligns closely with the idea of reflexive *Bildung*, as both highlight the entanglement of thinking, representation, and technics. Rather than serving merely representational ends, imaging operates as an epistemologically generative process, simulating the very act of thinking rather than presenting fixed ideas. Like reflexive *Bildung*, imaging can locate itself in between the collection of fragments and the variation of forms, offering a mode of architectural inquiry that is both self-aware and open-ended.

Here, the understanding of imaging as an operation of reflexive *Bildung* is not intended to resolve form; instead, it highlights the processes by which architectural thinking becomes visible. Crucially, this synthesis is interpretative, and the following examples serve as expandable examples of making that illustrate this epistemological condition, each enacting reflexive *Bildung* in reference to both collecting and varying within different imaging sets. Being reflexive, each example is a process and a product that refers to itself and the juxtaposition of imitative and formative *Bildung*. While imaging is viewed as a broader operation, it can generate a range of other operations in different makings. The examples are drawn from

[497] May, 22.
[498] May, 12.
[499] May, 12.
[500] May, 22.

contemporary practices; accordingly, the creators are briefly introduced to provide context for their works. Through varied projections, temporal juxtapositions, speculative instrumentations, and reconfigurations of fragments in flux, these works exemplify how imaging becomes a means of thinking architecturally rather than merely representing architecture.

A Loose Collection of Objects, Images and Texts: MILLIØNS Architecture

The first example is the makings of MILLIØNS Architecture. MILLIØNS is a Los Angeles-based architecture and design practice, founded by John May and Zeina Koreitem. In their own words, "their projects span various scales and media formats, including buildings, interiors, exhibitions, furniture, books, and environments."[501] Imaging, as their introduction to the field, finds its definition in many projects of their practice.

Instead of highlighting a singular project, "A Loose Collection of Objects, Images and Texts," referencing their contribution to an exhibition at the Triennale di Milano titled *The State of the Art of Architecture*, curated by Joseph Grima, is used as the title of this section. That installation can be understood as a complete condensation of their practice, embracing looseness not as imprecision but as potential, indicating an active openness that encourages diverse combinations of fragments, assemblies, and relations in flux (Figures 3.67 and 3.68). Looseness, in their work, is both formal and conceptual, enabling movement across scales and media while remaining grounded in a critical inquiry into architectural representation itself.[502]

[501] https://www.millionsarchitecture.com/studio
[502] Zeina Koreitem and John May, "A Loose Collection of Objects, Images and Texts," lecture, Syracuse University School of Architecture Spring 2021 Lecture Series, February 9, 2021, online, https://soa.syr.edu/live/events/752-zeina-koreitem-and-john-may.

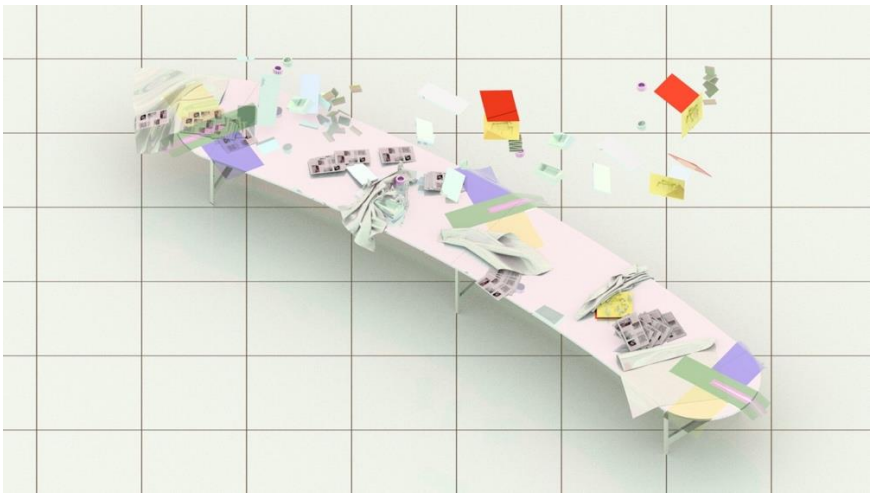


Figure 3.67 A Loose Collection of Objects, Images and Texts, MILLIØNS Architecture, The State of The Art of Architecture, Curated by Joseph Grima, Triennale di Milano, 2020. Source: http://www.millionsarchitecture.com



Figure 3.68 A Loose Collection of Objects, Images and Texts, MILLIØNS Architecture, The State of The Art of Architecture, Curated by Joseph Grima, Triennale di Milano, 2020. Source: http://www.millionsarchitecture.com

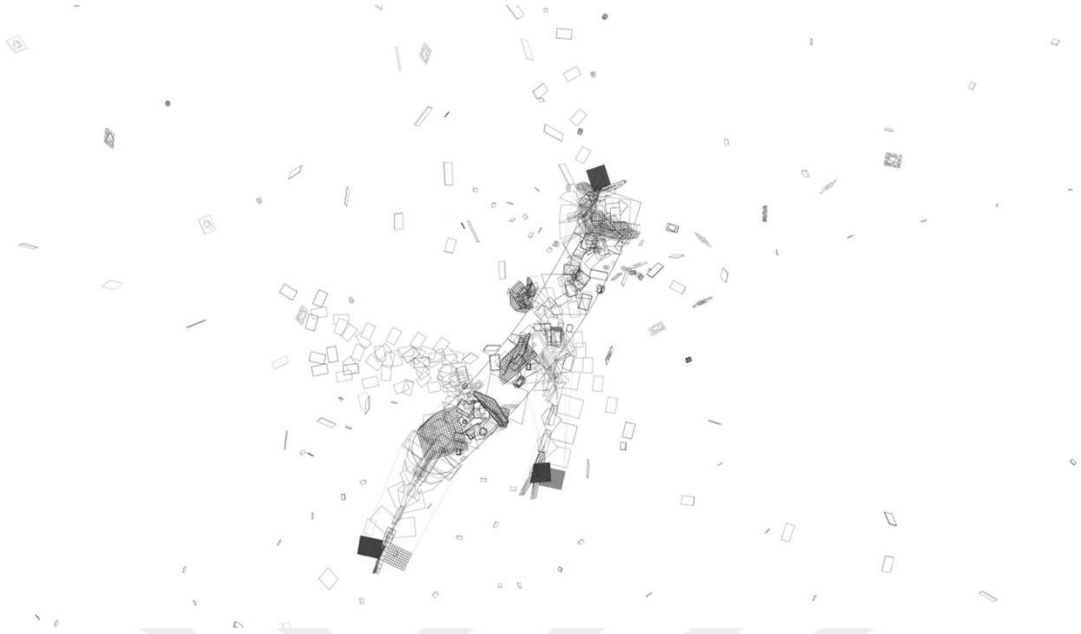


Figure 3.69 A Loose Collection of Objects, Images and Texts, MILLIØNS Architecture, The State of The Art of Architecture, Curated by Joseph Grima, Triennale di Milano, 2020. Source: http://www.millionsarchitecture.com



Figure 3.70 A Loose Collection of Objects, Images and Texts, MILLIØNS Architecture, The State of The Art of Architecture, Curated by Joseph Grima, Triennale di Milano, 2020. Source: http://www.millionsarchitecture.com

This installation exemplifies their operative logic as both scenographical and technological -perfect in between space of tectonic-, in which elements are assembled without being fixed to a final form, allowing for constant variation and recombination. This is further emphasized in their use of *statistical time as* a temporal framework that they define in parallel to imaging, shifting architectural thinking from the linear sequences of orthography to a more reflexive process (Figures 3.69 and 3.70).[503]

Throughout their work, MILLIØNS stages a reflexive dialogue between collecting and varying. This interplay is explicit in their "The Ghost Acres of Architecture," a contribution to the 2020 Taipei Biennial curated by Bruno Latour and Martin Guinard. This installation comprised modular tables populated by diverse fragments: rigid and pliable, static and kinetic, material and representational (Figures 3.71 and 3.72). "The Ghost Acres of Architecture" visualized the vast material and territorial footprint of the Seagram Building in Manhattan. By using dynamic, interactive projections alongside geological and architectural artifacts, the project traced the building's lifecycle, from raw material extraction to its present state, revealing the global scale and environmental implications of architectural production.

[503] May, 24.

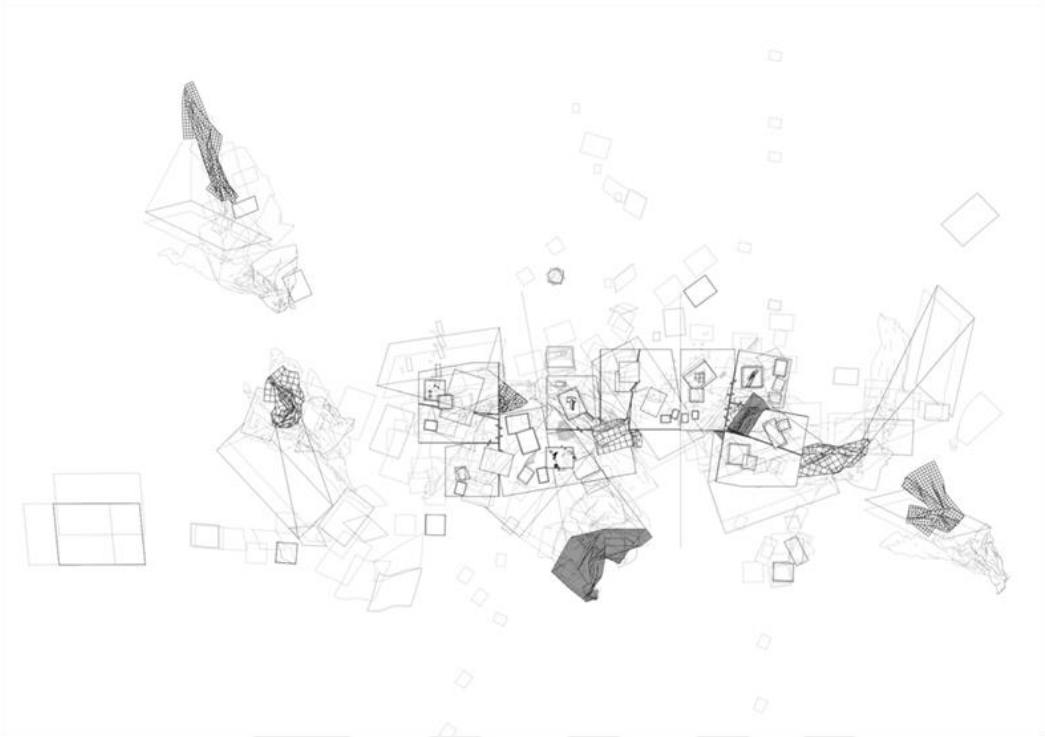


Figure 3.71 “The Ghost Acres of Architecture,” Taipei Biennial 2020, curated by Bruno Latour and Martin Guinard, Research: Kiel Moe, Projection Content: Peter Osborne, Exhibition Design and Curation: MILLIØNS. Source: http://www.millionsarchitecture.com.

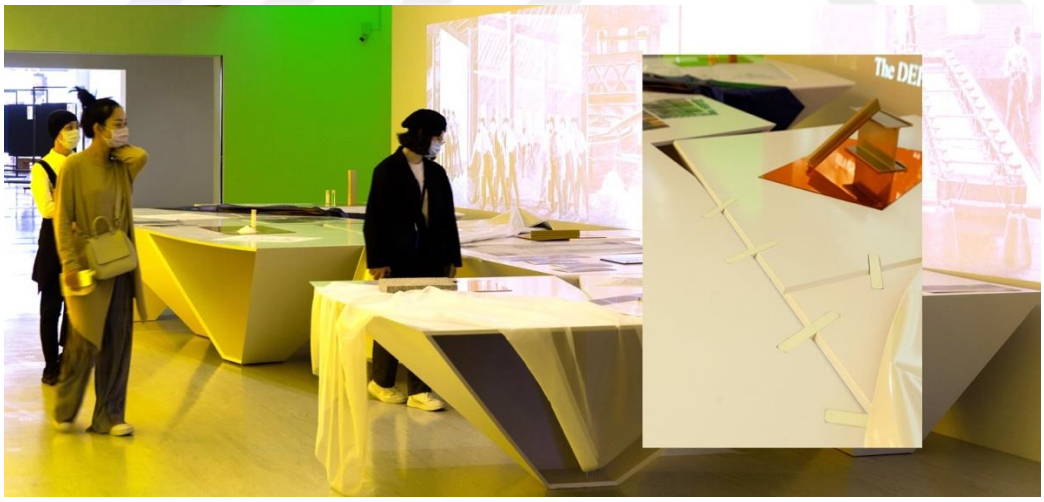


Figure 3.72 “The Ghost Acres of Architecture,” Taipei Biennial 2020, curated by Bruno Latour and Martin Guinard, Research: Kiel Moe, Projection Content: Peter Osborne, Exhibition Design and Curation: MILLIØNS. Source: http://www.millionsarchitecture.com.

Their intervention in the East Wing of the Everson Museum further developed this reflexive methodology. MILLIØNS has renovated the East Wing of the museum,

introducing “curatorial surfaces” that blend storage, display, and public engagement (Figure 3.73 and 3.74). The design features prismatic glass towers that showcase a functional ceramics collection, along with modular tables that serve as both exhibition platforms and communal dining spaces. Here, again, the reflexivity of imaging functions as both program and representation, scenography and technology, encompassing material, spatial, and conceptual tools.



Figure 3.73 Project for the East Wing of IM Pei’s Everson Museum of Art in Syracuse, NY A restaurant and display for the Rosenfield Ceramics Collection. MILLIØNS Architecture. Source: http://www.millionsarchitecture.com

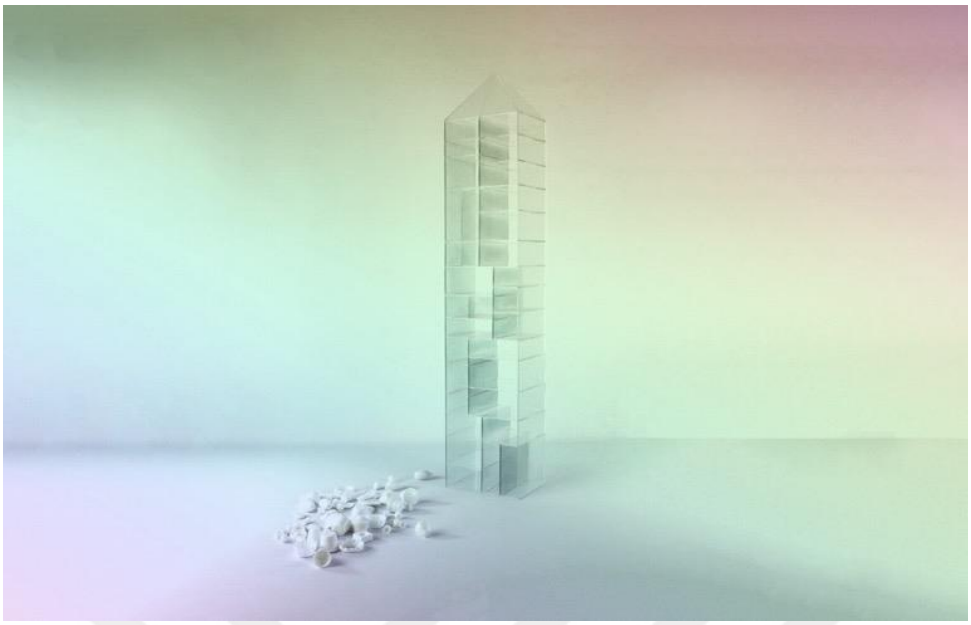


Figure 3.74 A Project for the East Wing of IM Pei's Everson Museum of Art in Syracuse, NY A restaurant and display for the Rosenfield Ceramics Collection. MILLIØNS Architecture. Source: http://www.millionsarchitecture.com

MILLIØNS's design approach is grounded in two key observations about the evolving role of representation in contemporary architecture. First, architectural tools have evolved significantly from stable orthographic instruments (plans, sections, and elevations) to fluid, multimedia processes that incorporate modeling, scanning, and digital outputs.[504] These tools are not neutral; they are integrated with processes of thinking and representing the world. Second, most of the representational tools currently used in architecture originate from external disciplines such as science, industry, and entertainment, bringing values such as efficiency, precision, and control. These embedded logics are often adopted unconsciously through the tools' interfaces and structures, transforming architectural practice in ways that are simultaneously productive and problematic.[505]

[504] Zeina Koreitem, "Some Notes on Making Images with Computers," *e-flux Architecture: Becoming Digital* (March 2019), https://www.e-flux.com/architecture/becoming-digital/248077/some-notes-on-making-images-with-computers/.
[505] Koreitem.

Zeina Koreitem characterizes their "proto-architectures" as deliberately bracketed off from conventional constraints—such as scale, orientation, and gravity—in order to focus on core material and technical operations. As she explains:

> In fact, the narrowness of our proto-architectures is even more extreme, because these projects are often even liberated from even more basic parameters such as scale, gravity, orientation, thermal boundary, etc. They are bracketed off from those larger realties precisely so that we can focus on certain fundamental technical and material operations—such as stacking, folding, piling, extruding, cutting, subtracting, adding, layering—that have become somewhat confused by the rapid expansion of media formats and platforms over the past several decades.[506]

Here, the emphasis is on technics over convention is an orientation that aligns closely with the reflexive, process-based nature of *Bildung*.

This emphasis is particularly evident in their *Projectors* series, which investigates imaging as a site of speculation, positioning digital images as both product and method, both outcome and tool. In these projects, they explore "image tectonics," investigating how images can become architectural in themselves underlining their scenographical and technological properties. Acknowledging the change in the perception and relations of architectural images, "Projectors I" (Figures 3.75, 3.76 & 3.77) asks a series of questions:

> How might techniques that belong to the world of the raster form the basis for material-tectonic decisions? How can images be reinserted into the process of architectural experimentation? What might be the consequences of such an approach for the processes of materialization that we collectively refer to as fabrication? How might contemporary processes of materialization be made to recognize the culture of the image? How does an image or raster image that is essentially always distorted communicate with automated tools? How might one work with images rather than on images?[507]

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[506] Koreitem.
[507] http://www.millionsarchitecture.com

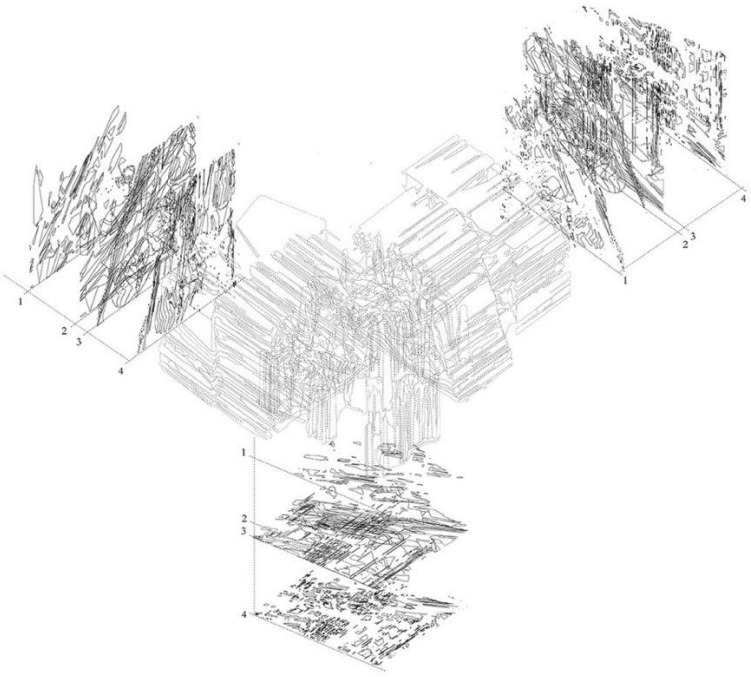


Figure 3.75 Projectors I, MILLIØNS Architecture. Source: http://www.millionsarchitecture.com



Figure 3.76 Projectors I, MILLIØNS Architecture. Source: http://www.millionsarchitecture.com

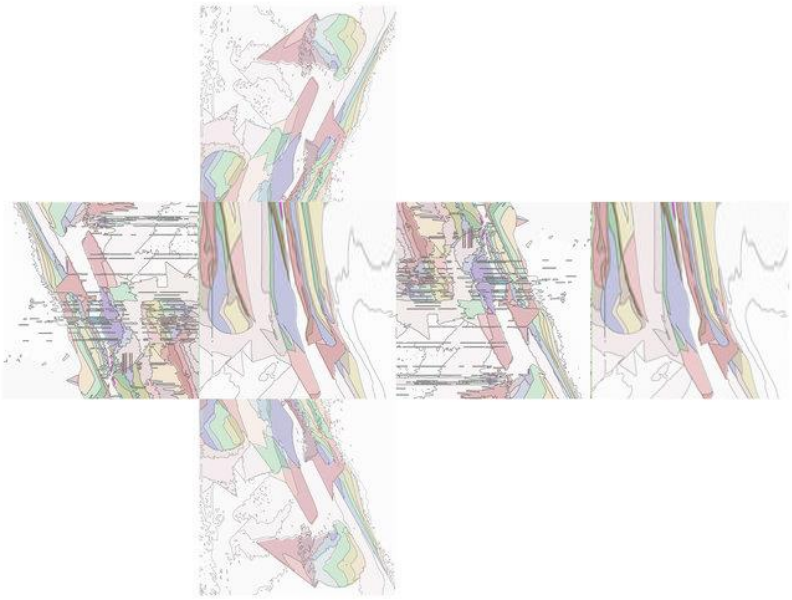


Figure 3.77 Projectors I, MILLIØNS Architecture. Source: http://www.millionsarchitecture.com

"Projectors II" (Figures 3.78 and 3.79) continues this investigation into image tectonics further. This idea encompasses not just the architecture (or the tectonic) of the image but how the image transforms into an architectural image, or the ability of the transient and often distorted image to create tectonics.[508]

Thus, the work of Zeina Koreitem and John May exemplifies the core principles of reflexive *Bildung*. It is similar to the way in which reflexive *Bildung* combines imitation with formation, viewing knowledge production as an ongoing, self-referential, and interpretative process rather than a fixed outcome. The practice of MILLIØNS Architecture can accordingly be viewed as a field of reflexive operations. Their projects are not representations of buildings; they are

[508] http://www.millionsarchitecture.com.

representations of thinking processes themselves that are unfinished experiments resisting closure and prioritizing architectural thinking .[509]

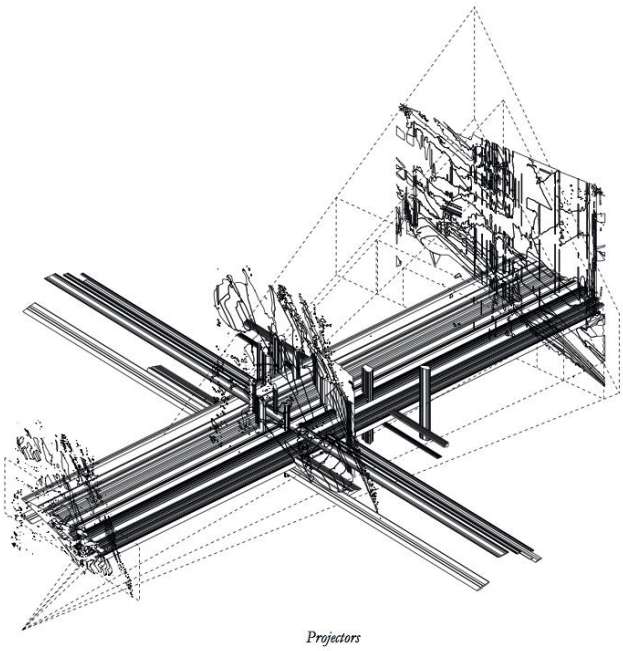
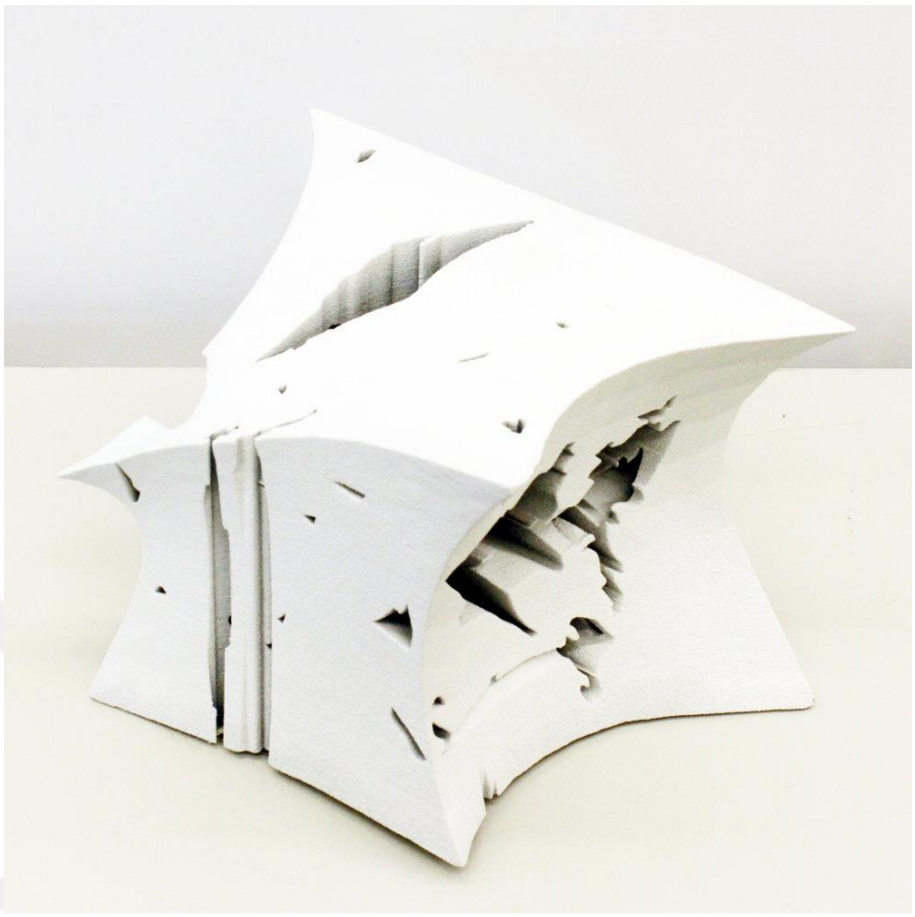


Figure 3.78 Projectors II, MILLIØNS Architecture. Source: http://www.millionsarchitecture.com

[509] http://www.millionsarchitecture.com.



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Figure 3.79 Projectors II, MILLIØNS Architecture. Source: http://www.millionsarchitecture.com

Process Drawing: Riet Eeckhout

The second example is drawn from the makings of Riet Eeckhout, a Belgian architect, researcher, and educator focused on drawing as a generative and speculative tool in architecture. Currently a postdoctoral researcher at KU Leuven's Faculty of Architecture, she has introduced "process drawing" as an act that transcends mere representation, serving as a method of inquiry and knowledge production. In the introduction to her doctoral thesis, *Process Drawing* (RMIT University, Melbourne), Eeckhout outlines her methodology as follows:

> This research is conducted through drawing. I explore and reflect on subjects through making observational hand drawings. This aspect of my practice developed from observational hand drawing, with an awareness of the subjectivity of the standpoint, to an investigation that explores the ambiguity of what I see and how I represent those observations. I use hand drawing to spend time with something, be it a site, a subject or an object. I use hand drawing to engage with the complexity of what is visible. I use hand drawing to speculate on the nature of an object or subject and I explore through speculative drawing how I can activate their presence.[510]

In Eeckhout's work, drawing is a method of inquiry in flux, which is a way of thinking through architecture. As she states: "Drawing is used as a research tool to find something out, a tool for reflection."[511] Her notion of process drawing is defined as "a verb in the present continuous," or an action unfolding in real time.[512] "Process drawing" begins with the identification of a situation, naming it as a site to be investigated (Figure 3.80).[513] She then initiates field drawings that help to understand the site and lay the groundwork for further exploration. In the field drawing step, Eeckhout demonstrates how models and drawings operate simultaneously, activated "through a haptic process in repetition and iteration" (Figure 3.80).[514] What follows is a recursive cycle of selection, tracing, and retracing, with the differentiation of elements, along with continuous transformation changing according to the situational site and field drawings inherent in process drawing.

"Process drawing" highlights her method's essence: a reflexive practice where drawing is both responsive to and constitutive of architectural understanding. Eeckhout's idea of process drawing can be understood as a form of imaging and as a reflexive operation that embodies architectural thinking. Her drawings are generative acts that unfold through iteration, haptic engagement, and differentiation.

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[510] Riet Eeckhout, *Process Drawing* (PhD diss., RMIT University, School of Architecture and Design, 2014): 9.
[511] Eeckhout, 9.
[512] Eeckhout,11.
[513] Eeckhout, 21.
[514] Eeckhout, 21.

In this sense, they align with John May's notion of imaging as a process that simulates thinking itself, rather than delivering pre-formed ideas. Eeckhout's approach, viewing drawing as *a verb in the present continuous*, resonates with a recursive and interpretative understanding of an "imaging" operation that oscillates between site, tool, and form.

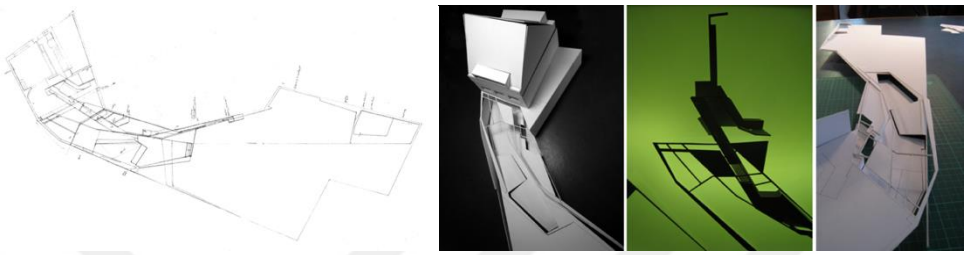


Figure 3.80 Cily House Site — Existing Drawing and Field Drawings
Source: Riet Eeckhout, *Process Drawing* (PhD diss., RMIT University, 2014).

To demonstrate this parallelism and understand "process drawing" as described by Eeckhout, this section showcases various "sites" and processes that Eeckhout created. The first example is "Lines of Resistance." The project site for "Lines of Resistance" is ink screed on paper by Jon Tarry in 2012 (Figure 3.81). In Riet Eeckhout's work, the qualities of slowness, repetition, and iteration are particularly emphasized.[515] "Lines of Resistance" refers to both physical and conceptual resistance, emphasizing the intentional slowness of the method and process.

[515] Riet Eeckhout, "Resisting the Representational," in *Pourquoi est-il si difficile de parler d'architecture?*, proceedings of a conference held in Brussels, December 1, 2013, ed. Judith le Maire and Christophe Van Gerrewey (Louvain-la-Neuve: Presses universitaires de Louvain, 2014), 122-135.

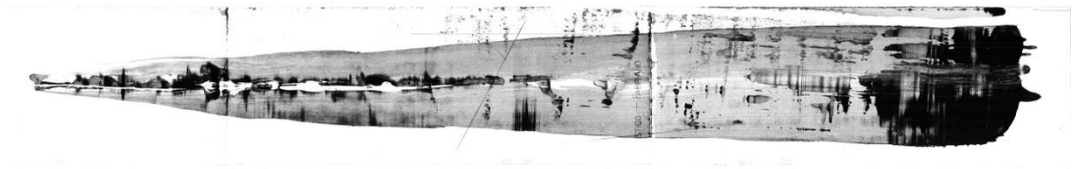


Figure 3.81 The project site for Lines of Resistance is the ink screed on paper by Jon Tarry, 2012. Source: https://www.rieteeckhout.com Riet Eeckhout, *Process Drawing* (PhD diss., RMIT University, 2014).

Eeckhout traces and retraces this site at different resolutions and with varying lines. According to her, "the process of tracing, drawing and redrawing by hand is a manual process of repetition and iteration."[516] "Lines of Resistance" is a precise illustration of how the reflexive act of imaging and process drawing, as a form of it, combine imitative and formative making with reflexive complexity (Figures 3.82 and 3.83).

[516] Eeckhout, 2014, 91.

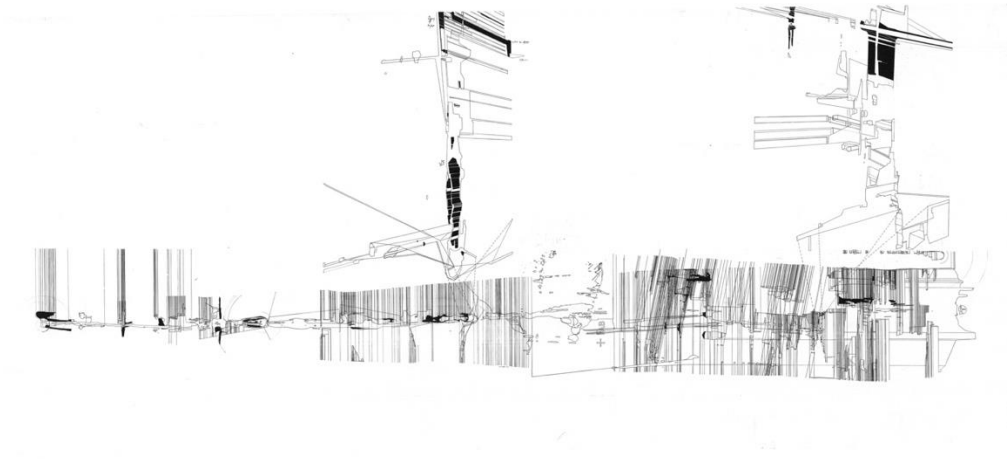


Figure 3.82 Lines of Resistance, Riet Eeckhout. Source: https://www.rieteeckhout.com

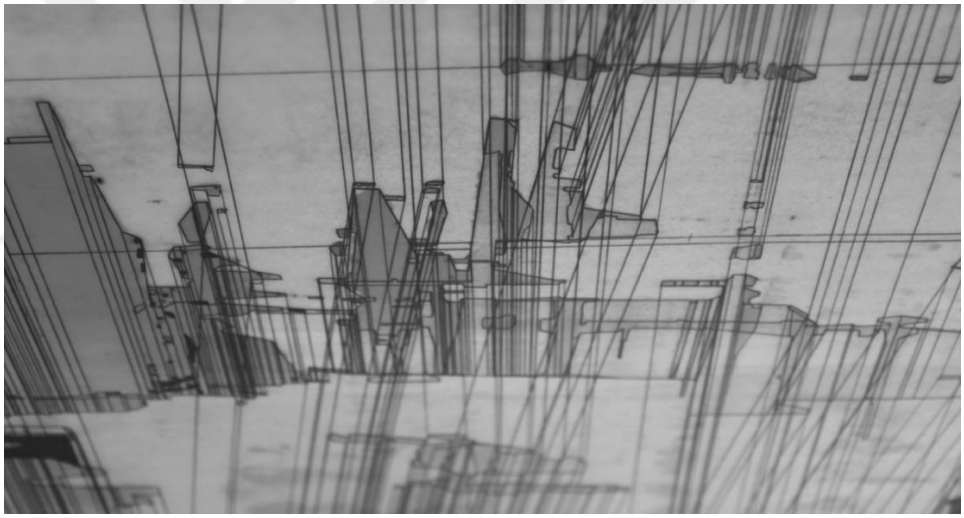


Figure 3.83 Lines of Resistance, Riet Eeckhout. Source: https://www.rieteeckhout.com

Another project, "Drawing Out Collapse," has another site, which is a sequence from the film *Prix d'Amour* by Jon Tarry. This film documents the demolition of a residential villa in Perth (Figure 3.84). The project shows a complex drawing that documents time, changing disintegrated forms and their movements and relations (Figures 3.85 and 3.86). Eeckhout states that in this project "point of view was not

present, there was no fixed point of view, but it moves slightly in each frame."[517] In her thesis, she explains the process as follows:

> As I am drawing, the field drawing starts to gain notational information relevant to this project only. Colour and line type are assigned a meaning. I test which information I need to use and what to drop. Where there was once material, in the next film frame it has changed form and moved to another place, and then it moved again. Every frame, the same object changes form. What becomes important in the drawings is the pivotal moment an object cuts loose from the main structure. When the object gains independence and presents itself as a separate object, the object is coloured green.[518]



Figure 3.84 A sequence from the film 'Prix d'Amour' by Jon Tarry. Source: https://www.rieteeckhout.com

[517] Eeckhout, 40.
[518] Eeckhout, 38.

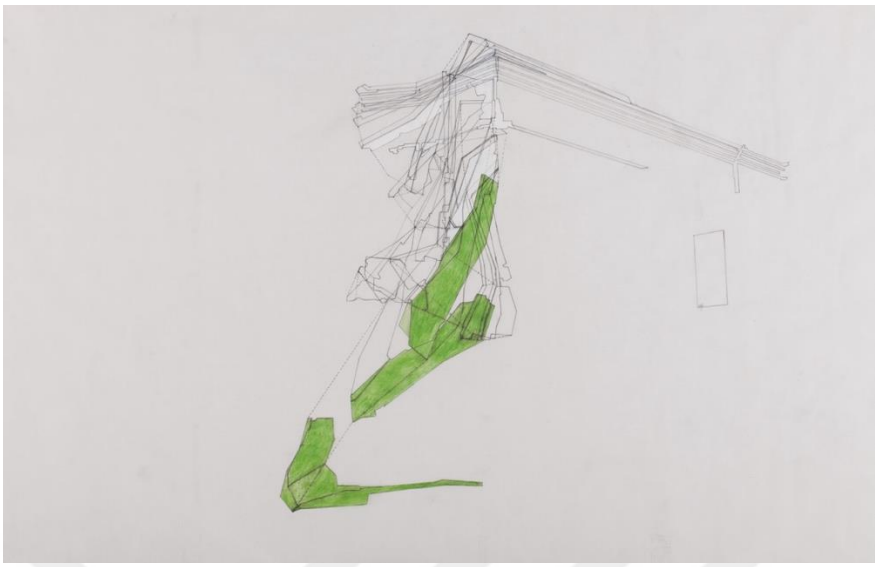


Figure 3.85 Drawing Out Collapse, Riet Eeckhout. Source: https://www.rieteeckhout.com

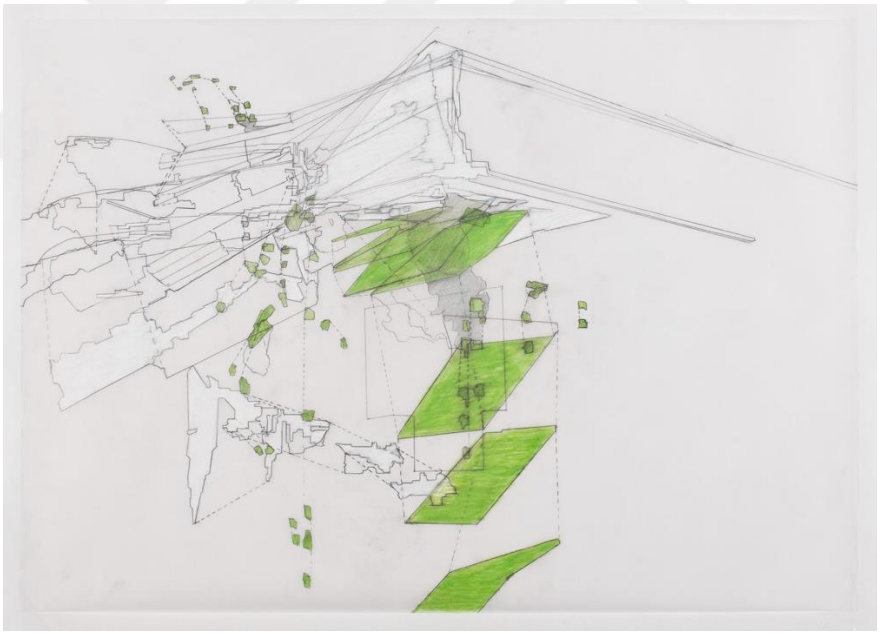


Figure 3.86 Drawing Out Collapse, Riet Eeckhout. Source: https://www.rieteeckhout.com

Through this drawing, Eeckout explores the transitional states between construction and deconstruction, documenting the ephemeral moments of structural disintegration. Tracing the falling debris and mapping the shifting figure-ground

relationships reveal spatial and temporal conditions that are mostly forgotten over time.



Figure 3.87 Fragment of a sequence of a crash. Source: https://www.rieteeckhout.com

In the final example, the site is fragments of a crash. Eeckhout's drawing "Uncommon Ground" examines the spatial and material traces left by a controlled H12 helicopter crash in the Nevada desert (Figure 3.87). Described as exploring the "ground that speaks of the figure's passing," the drawing process articulates the in-between space of the moving object (the helicopter) and the terrain it redefines.[519] Eeckhout captures residual marks such as tire tracks, debris patterns, and disruptions in the landscape, highlighting the exchange of forces between the aircraft and the ground (Figure 3.88 and 3.89).[520]

[519] Eeckhout, 153.
[520] Eeckhout, 153.

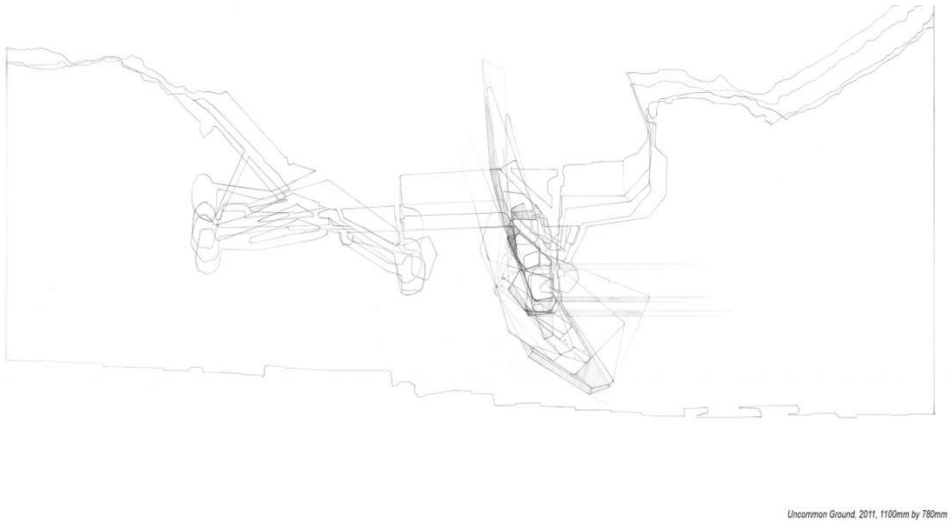


Figure 3.88 Uncommon ground, Riet Eeckhout. Source: https://www.rieteeckhout.com

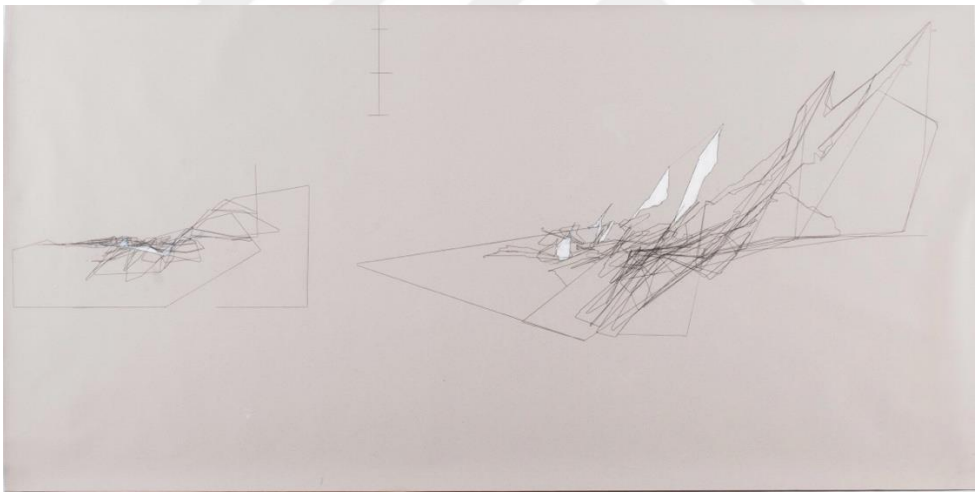


Figure 3.89 Uncommon ground, Riet Eeckout. Source: https://www.rieteeckhout.com

Eeckhout's projects, along with other studio and student works, emphasize situational sites and the methodology of process drawing, described

as "tracing what is visible, re-tracing what defines the visible."[521] In this context, imaging is defined as the shift in tools and the rise of multiple environments within architectural thinking, highlighting how thinking processes cannot be separated from the predominantly computational tools that currently influence design processes. Architectural thinking and making must acknowledge this plurality, and reflexive *Bildung* engages with these changing media and formation processes. Eeckhout's process drawing remains analogue, grounded in hand drawing and manual iteration. However, imaging, as proposed here, is not limited to digital production. It includes fragmented moments of observation across different sites. Accordingly, her work embodies reflexive *Bildung* by combining collected fragments of situated conditions with operations of iteration and transformation, making drawing both a documentation of perception and a tool for architectural becoming.

Prepared Instruments: Jonah Marrs

Another example can be drawn from the makings of Jonah Marrs. Marrs has a background in history, architecture, and electronics, culminating in a Master of Science in Architecture Studies degree from the Massachusetts Institute of Technology. His thesis, titled *Three 'Prepared' Instruments for Plotting, Meshing and Rendering*, investigates the relationship between architects and their tools, and particularly how computers "see" memory in a sequential way.[522]

In his project titled "Prepared Instruments for Computer Alchemy," Marrs examines the convergence of obsolete media technologies and architectural representation. By drawing on some precedents, such as the works of Clement Valla and Erin Besler, he situates his work within a lineage of designers who engage with the aesthetics and

[521] Riet Eeckhout, "Drawing on Situational Sites," *Architectural Design* 91, no. 4 (2021): 86-95.
[522] Jonah Ross-Marrs, *Three 'Prepared' Instruments for Plotting, Meshing and Rendering* (Master's thesis, Massachusetts Institute of Technology, 2018), https://dspace.mit.edu/handle/1721.1/118575.

logic of digital media. Drawing inspiration from John Cage's concept of the "prepared piano," Marrs introduces the notion of "prepared instruments" in the digital realm. He repurposes old hardware, such as cathode ray tube (CRT) monitors, VGA cables, and floppy drives, to create new forms of visual and spatial expression. Central to his method is hands-on interaction with the physical components of these technologies. By manipulating their internal mechanisms, Marrs uncovers hidden aesthetics and functional potentials that are frequently neglected in terms of the use of contemporary digital tools. This hands-on methodology challenges conventional uses of technology applications and encourages a critical reevaluation of contemporary tools and processes that parallels architectural thinking today.[523]

Jonah Marrs's work unfolds different media architectures of drawing, revealing how machines interpret images differently from human thinking. He investigates how machines "understand" models by using sequences, repetitions, and memory frameworks that differ from human drawing methods but still reflect an inherent subjectivity.[524] His prepared instruments offer a speculative perspective on the archaeologies of images, revealing how visual outputs are influenced by layered technical histories. Simultaneously, his projects create new archaeologies and curated archives of visual operations that emphasize a variety of processes.[525]

One such project, in which Marrs explores the operation of "plotting," involves the use of a prepared plotter modified with an interrupter device that allows manual manipulation of the drawing process (Figure 3.90). By disrupting the standard operation of the plotter, Marrs is able to stretch the elements of a drawing in time, resulting in what he describes as time-lapse drawings. This intervention slows down

[523] Jonah Marrs, "Prepared Instruments for Computer Alchemy," a presentation within the scope of the "Inspirational Talks" in the METU Graduate Program in Architecture, December 2024, organized by the WAWUT Collective initiated by the author.
[524] In his presentation, Marrs referred to different interfaces and how they model geometries. In his interviews with the coders of the interfaces, he found that these decisions were subjective and varied according to the "personalities" of people.
[525] The algorithmic terminology is not within the scope of this research; the methods, processual keywords, and operations will be briefly underlined.

the plotting process, creating images that evolve over different durations, transforming a typically automated and linear process into a performative one. Marrs explains the process as follows:

> The 'time-lapse' drawings are created by pulling the paper away from a specially designed plotter at regular intervals to interrupt drawing process and mark the sequence of drawing over time. Instead of being interrupted continuously, the drawing machine is interrupted after a set number of machine operations are undertaken.[526]

The result is a drawing that is an event in time. An instance of imaging reveals the temporal structures embedded in machine operations (Figure 3.91). Through the revealing of this sequential structure, the project engages with May's statistical time, a concept aligned with *Reflexive Bildung*, where thinking and making, converge in a recursive act of temporal and technical exploration.

[526] Marrs, 28.

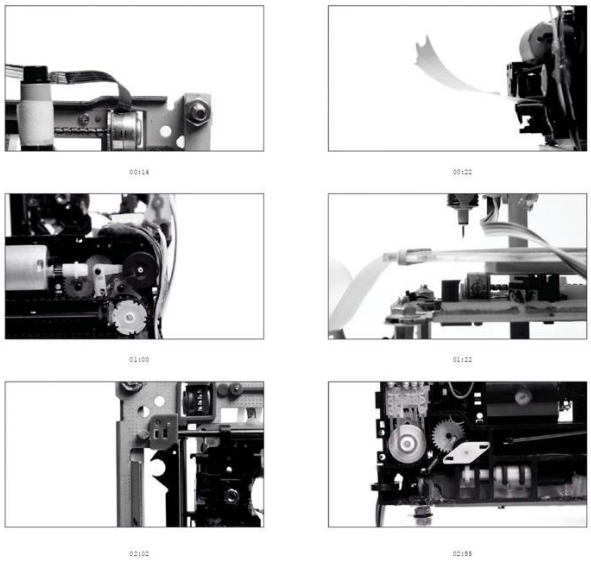


Figure 3.90 Click Space: Visualizing Computer Processes through Time-Lapse Representation "Time-lapse Drawing Machine Short, 2015, Film.Materials: Custom Drawing Machine, G-Code, CAM Software. Length: 3 minutes." Jonah Marrs. Source: https://www.marrs.io

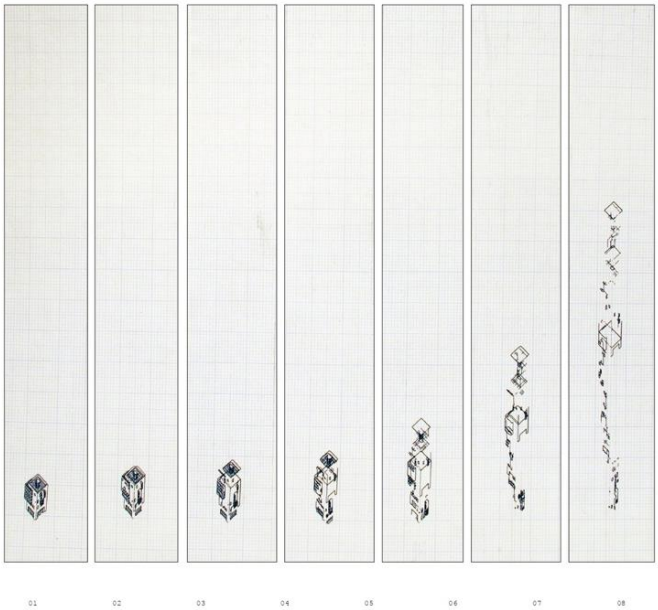


Figure 3.91 Exploring the Mechanics of Representation"O.M. Ungers Marburg Axonometric Time-lapse, 2015, Drawing Series A. Tools: Custom Drawing Machine, G-Code, CAM-Software, exacto knife. Materials: Graph Paper (8x8 quadrille), 0.1 Micron Pen. Dimensions: Seven 2" × 20" strips." Jonah Marrs. Source: https://www.marrs.io

Extending this method, another drawing series reinterprets canonical architectural plans using the same time-lapse process. Familiar and often symmetrical designs are reinterpreted through the time-lapse process, prompting unexpected readings. The symmetrical plans are stretched and fragmented into uneven, clustered configurations (Figure 3.92). Marrs explains these fragments of drawings as follows:

> Drawing elements which represent construction components become abstracted and compositional; Sinuous curves are fragmented into infelicitous shards; Modernist free plans are set loose to swim freely on the page and new patterns emerge from lines which were not originally in dialogue.[527]

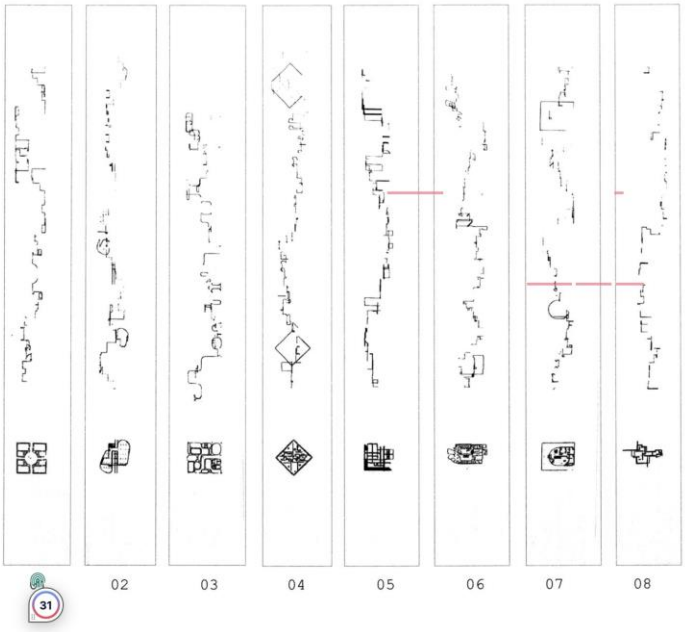


Figure 3.92 Exploring the Mechanics of Representation"O.M. Ungers Marburg Axonometric Time-lapse, 2015, Drawing Series A. Tools: Custom Drawing Machine, G-Code, CAM-Software, exacto knife. Materials: Graph Paper (8x8 quadrille), 0.1 Micron Pen. Dimensions: Seven 2" × 20" strips" Jonah Marrs. Source: https://www.marrs.io

[527] Marrs, 32.

Marrs also experiments with the operation of "meshing." He creates a series of time-lapse 3D prints that examine the temporal and spatial construction of digital models (Figures 3.93 and 3.94). Each piece begins with a found 3D model, often of a building or object obtained from online repositories. The models are treated as "found objects," converted into triangular mesh structures and then processed with the STL Exploder script to create time-lapse, indexical representations.[528] The base of the print presents the model in its unaltered state, while the upper layers deconstruct the geometry, exposing the sequence of its digital formation. Through this process, the triangular mesh structure underlying most 3D models is made visible through distortions. Marrs refers to these distortions as "explosions," which represent both literal and conceptual unbuildings that reveal the model's underlying logics.[529] By unfolding the object through time, Marrs transforms meshing into a process of imaging, allowing digital material to be open to interpretation, transformation, and reflexive inquiry.

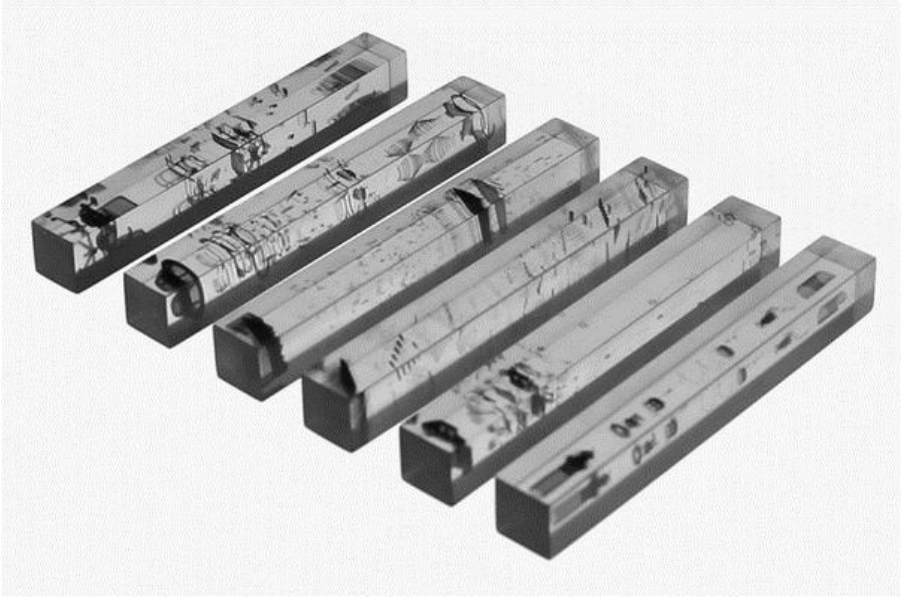


Figure 3.93 3D Printed models of "Click space", Autodesk Pier 9. Jonah Marrs. Source: https://www.marrs.io

[528] Marrs, 69.
[529] Jonah Marrs, "Prepared Instruments for Computer Alchemy," a presentation within the scope of the "Inspirational Talks" in the METU Graduate Program in Architecture, December 2024, organized by the WAWUT Collective initiated by the author.

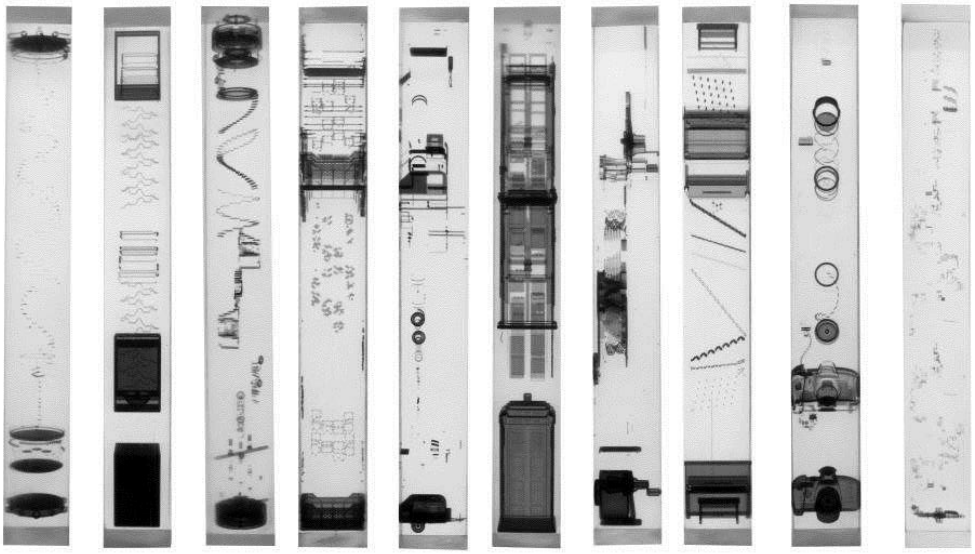


Figure 3.94 3D Printed models of "Click space", Autodesk Pier 9. Jonah Marrs. Source: https://www.marrs.io

Extending this inquiry into another medium, Marrs explores the operation of "rendering" in a project titled *Cathode Ray Tube Controller*. This series features the same drawings consistently displayed on a custom-modified CRT screen, highlighting continuity, flux, and an unending process of redrawing (Figure 3.95). Unlike the "Plotting" series, where drawings are divided into distinct time-lapse segments or "chunks," the CRT-based rendering captures a continuous temporal movement. Marrs explains the difference between rendering and plots and meshes as follows:

> CRT displays are not rendered just once, like plots and meshes, but constantly refreshed at least 30 times a second, creating cyclical patterns when recorded over time. There are no pen "lift-off" moments in the time-lapse renderings, the beam traces not only the drawing but also the path to move between different drawing elements. This gives the CRT time-lapse renderings a fluid

aesthetic, illustrating why CRT vector displays are also known as "calligraphic" displays.[530]

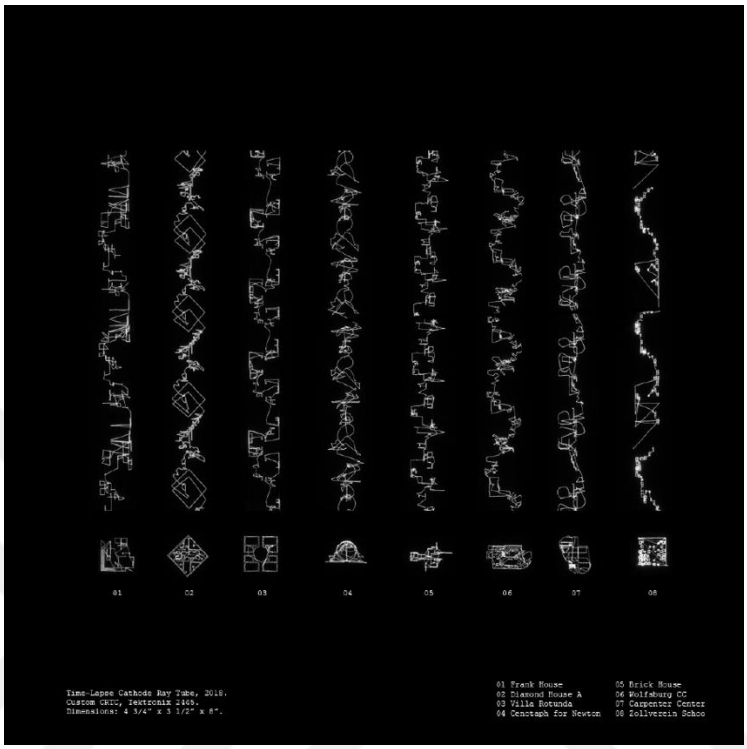


Figure 3.95 Set of drawing-explosions, Cathode Ray Tube (CRT) Controller. "Time-Lapse Cathode Ray Tube, 2018. Custom CRIC, Tektronix 2145. Dimensions: 4 314" x 3 112" x 8", Jonah Marrs. Source: https://www.marrs.io

In another drawing within the "Rendering" series, Marrs experiments playfully by randomly interacting with machine components, treating the CRT setup as a kind of image synthesizer (Figure 3.96). Here, a camera captures the screen through long-exposure photography, recording continuous cycles of visual data. This act transforms into another form of imaging. Marrs bends the machine's behavior to generate new variations from a set of collected architectural plans.[531]

[530] Marrs, 109.
[531] Jonah Marrs, "Prepared Instruments for Computer Alchemy," a presentation within the scope of the "Inspirational Talks" in the METU Graduate Program in Architecture, December 2024, organized by the WAWUT Collective initiated by the author.

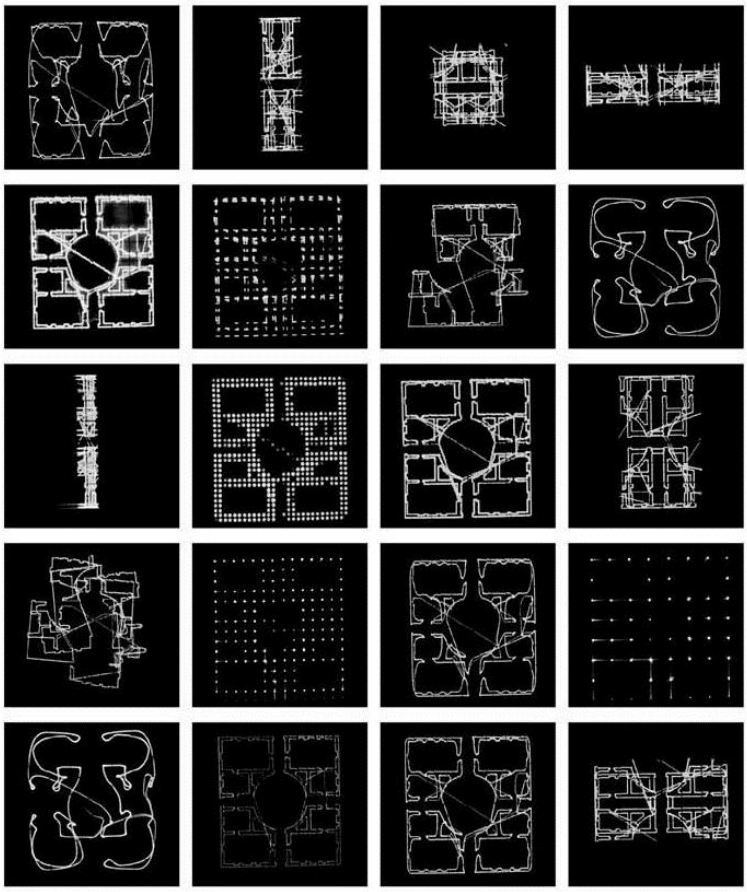


Figure 3.96 Plans, Cathode Ray Tube (CRT) Controller. "*Time-Lapse Cathode Ray Tube, 2018. Custom CRIC, Tektronix 2145. Dimensions: 4 314" x 3 112" x 8*", Jonah Marrs. Source: https://www.marrs.io

Marrs's practice does not produce images *of* architecture, just as John May defines imaging as simulating thinking, not representing objects. Marrs works *through* the machine's vision, interrogating how media and tools themselves become part of thinking and making. Marrs's process is recursive, experimental, and self-aware. It combines the collection of imitative media fragments with formative acts of reimagining in a reflexive relationship of inspiration and invention. This hybrid mode reflects the essence of *reflexive Bildung*, where making happens through reflexive processes and the production of knowledge through ongoing processes.

Mining the Scrap: Certain Measures

The next example in this section is the work of Certain Measures, a design studio founded by Tobias Nolte and Andrew Witt. Certain Measures is a creative studio operating at the intersection of architecture, technology, and design innovation.[532] Their practice combines data-driven methodologies with imaginative design to bridge physical structures and software solutions.[533] Referencing their work *Mine the Scrap*, the title of this section of the thesis, "*Mining the Scrap*," reflects the office's commitment to reinterpreting collections of overlooked materials and datasets as sources of design potential. In this section a few works produced by Certain Measures (structured according to two scales) that combine imitative and formative acts through collections and variations will be presented.

On the material scale, *[RE]TAIL* and *Kintsugi++* are two projects that draw inspiration from *kintsugi*, the Japanese art of repairing broken pottery with gold lacquer. Both projects explore the potential of repair as a design act, proposing alternative material futures with collected fragments and possible varied forms. *[RE]TAIL* speculates on the future of circular products by combining emerging materials such as algae, amber, and biopolymers with broken Laufen ceramics (Figure 3.97).[534]

[532] Witt, 2021.
[533] https://www.certainmeasures.com.
[534] Witt.



Figure 3.97 [Re] Tail, 2023, Certain Measures. Source: https://www.certainmeasures.com

A related project completed five years before [Re]Tail, *Kintsugi++*, reimagines the delicate gold-joinery of traditional *kintsugi* as a computational craft. The project collects rejected and shattered porcelain pieces that are "not perfect" and then uses computer vision to recompose them into varying mosaic forms (Figures 3.98, 3.99 & 3.100). By constantly assembling and disassembling, the overall process presents both the possibility of variations from the collected fragments and thinking and making processes that are juxtaposed.

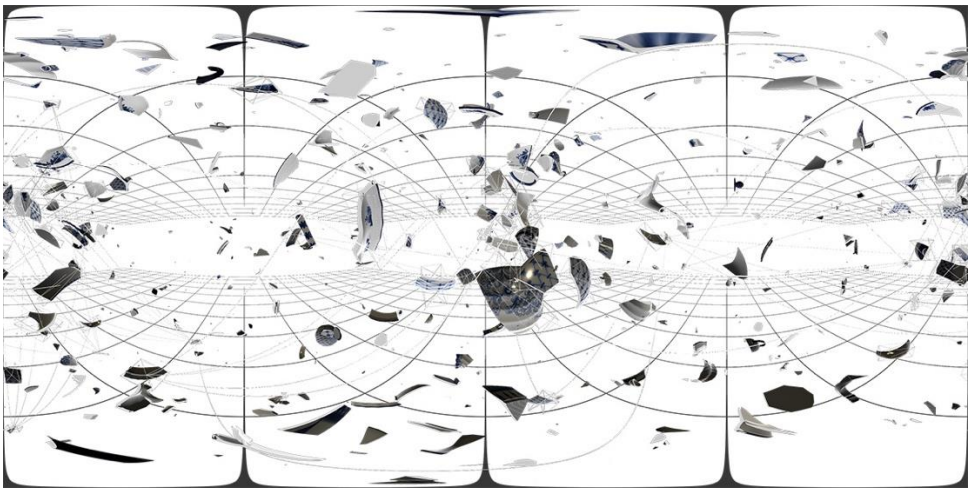


Figure 3.98 *Kintsugi++*, 2018, Certain Measures. Source: https://www.certainmeasures.com

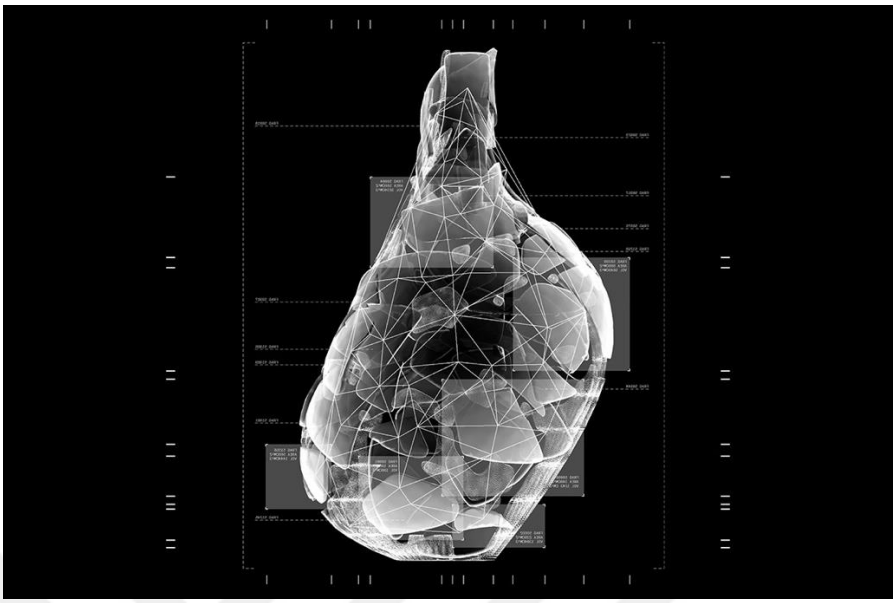


Figure 3.99 *Kintsugi++*, 2018, Certain Measures. Source: https://www.certainmeasures.com

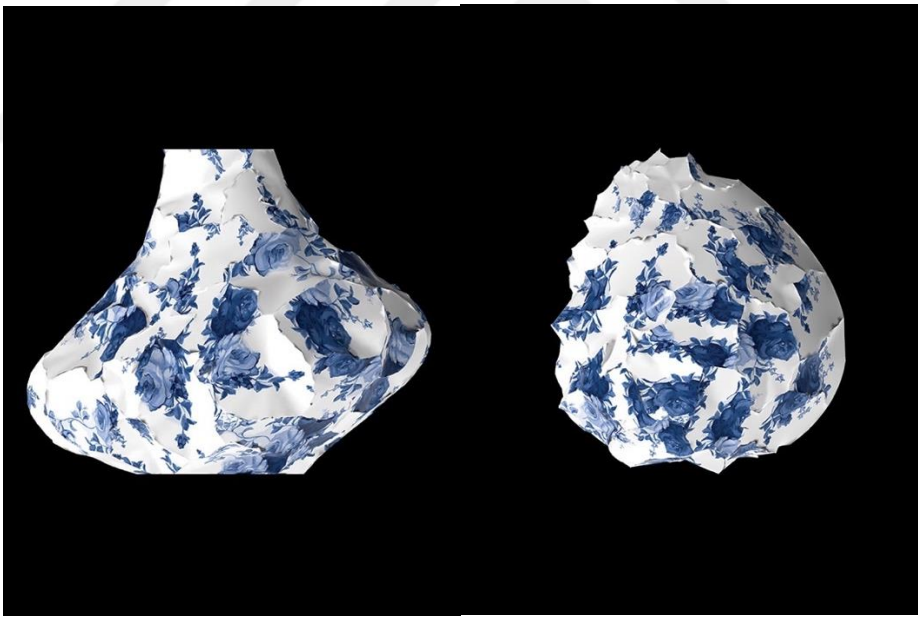


Figure 3.100 *Kintsugi++*, 2018, Certain Measures. Source: https://www.certainmeasures.com

Both *[Re]Tail* and *Kintsugi++* present imaging as a speculative and iterative process, assembling fragments into varied visual possibilities. These operations align with reflexive *Bildung*, combining collected fragments with formative variations.

Knowledge arises not through fixed solutions but from a process of exposed thinking, where making becomes a reflexive act of interpretation and transformation.

On a broader territorial scale, Certain Measures continues this logic through projects such as *Form Maps* and *Mine the Scrap*, both of which extend imaging into computational classification and generative projection. In *Form Maps*, fragments of billions of figure-ground compositions and building plans are scanned and synthesized using data-science techniques to reveal formal affinities and systematically classifying these architectural forms. For this process, a tool called RoweBot, referencing Colin Rowe's typological metrics, is used. The overall collection does not form geographic space; rather, it produces a "parametric territory of form" (Figures 3.101, 3.102, 3.103).[535]

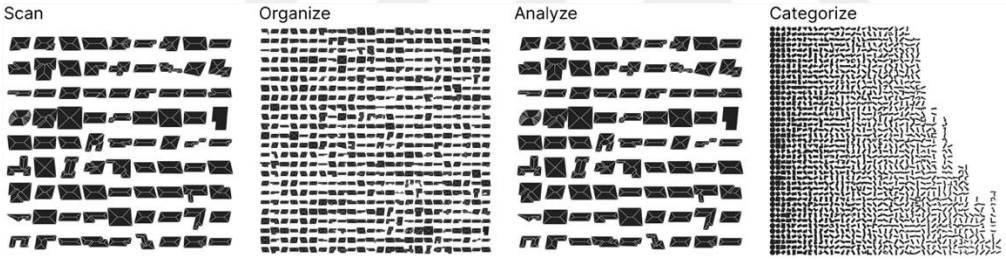


Figure 3.101 Form Maps, 2015 – Present, Certain Measures. Source: https://www.certainmeasures.com

[535] https://www.certainmeasures.com

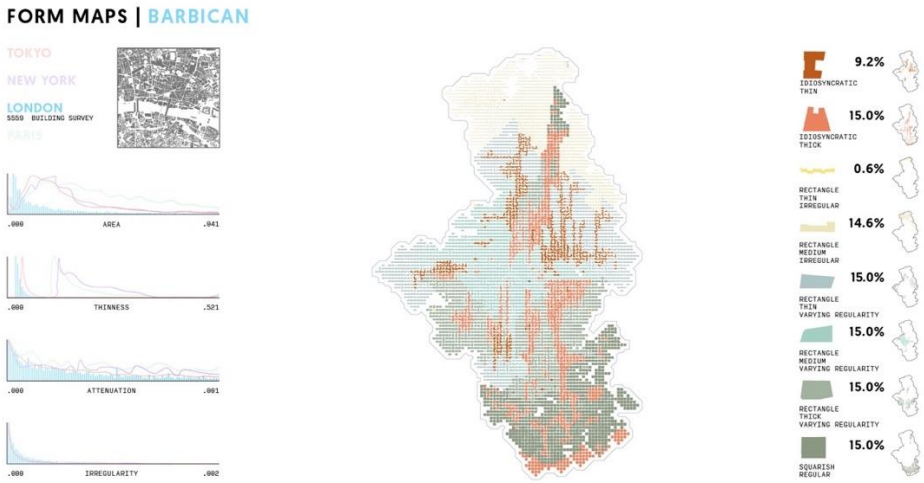


Figure 3.102 Form Maps, 2015 – Present, Certain Measures. Source: https://www.certainmeasures.com



Figure 3.103 Form Maps, 2015 – Present, Certain Measures. Source: https://www.certainmeasures.com

In parallel, the project *Mine the Scrap* employs similar processes to material waste based on pattern recognition and classification. The project transforms a collection of irregular, nonuniform construction scrap into new and varied structures through

scanning, classification, and generative design (Figures 3.104, 3.105 & 3.106).[536] Described as "a search engine for waste," it uses pattern detection techniques to find the "unique best use of each piece" within a new composition.[537]

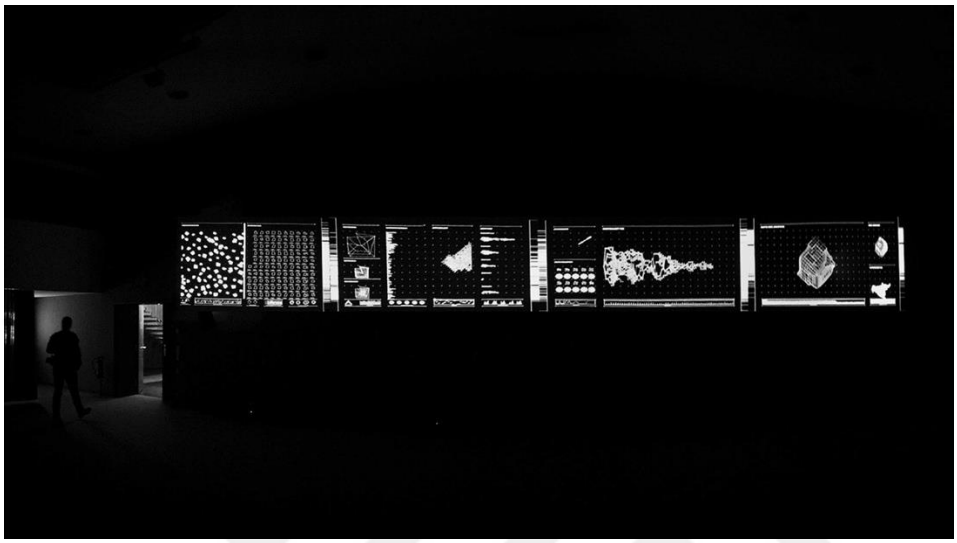


Figure 3.104. Mine the Scrap, 2015-Present, Certain Measures. Source: https://www.certainmeasures.com

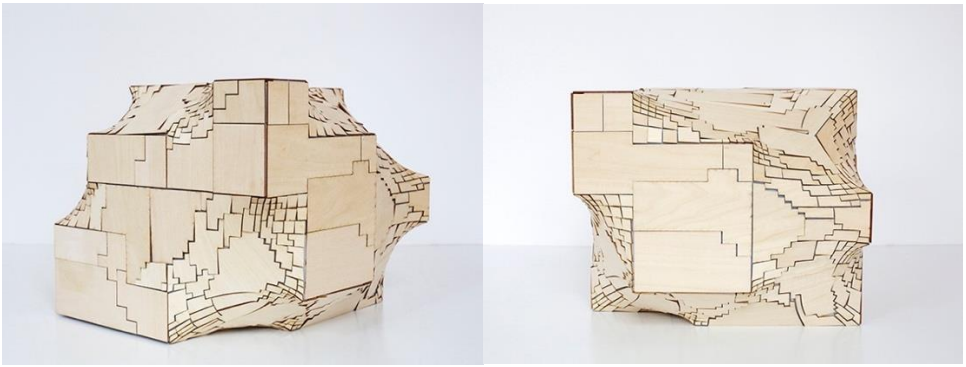


Figure 3.105. Models, Mine the Scrap, 2015-Present, Certain Measures. Source: https://www.certainmeasures.com

[536] https://www.certainmeasures.com
[537] https://www.certainmeasures.com



Figure 3.106. Mine the Scrap, 2015-Present, Certain Measures. Source: https://www.certainmeasures.com

Both *Form Maps* and *Mine the Scrap* are examples of imaging as a generative operation. Instead of representing existing forms, they simulate thinking through computational processes, projecting new variations from existing collections of data. These processes are part of reflexive *Bildung* as proposed by this thesis because Certain Measure's ways of thinking and making combine collected data with formative variation. Knowledge is developed through reflexive interaction with tools, archives, and material systems.

Crossing: MELT Studio[538]

MELT Studio is an Ankara-based interdisciplinary practice that blends architectural design, research, and product development. [539] As a young office founded by Cemre Önertürk and Ege Çakır, their conceptual and theoretical grounding aligns closely with contemporary architectural discourse. Their projects reflect differing intensities of reflexive *Bildung*, generated through the interplay of imitative and formative operations. Here, the two projects, *Kök* and *Ara[o]da*, help to illustrate and articulate methodologies that can be read as forms of reflexive *Bildung*.

Kök is a design proposal developed for the 100. Yıl Çarşısı area in Ankara, a significant urban site with collective memory for local residents. The project frames the competition site as an archaeological landscape, uncovering and interpreting not only the modern architectural heritage of the area but also the layered traces of its urban fabric, green spaces, and objects (Figures 3.107 and 3.108).[540] This first part of the methodological approach aligns closely with the act of collecting. By treating the site as a field of *buluntu*, or archaeological finds,[541] the project gathers architectural fragments and urban traces and reactivates their meaning through critical reinterpretation. *Kök* constructs a visual and spatial lexicon grounded in the accumulated knowledge of place. It also extends beyond collecting. The project treats historical material not as fixed references but as active elements in a process of spatial composition. It proposes varying spatial relationships between the collected fragments. Thus, *Kök*, illustrating MELT's making approach, is a precise example of reflexive *Bildung*. It operates at the intersection of imitative and formative *Bildung*, activating a design methodology that collects from the past but transforms what is gathered through spatial interventions.

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[538] "Crossing", MELT Studio, a presentation within the scope of the "Inspirational Talks" in the METU Graduate Program in Architecture, May 2023, organized by the WAWUT Collective initiated by the author
[539] https://www.meltstudioworks.com
[540] https://www.meltstudioworks.com/place.
[541] From Cemre Önertürk's ongoing PhD work.

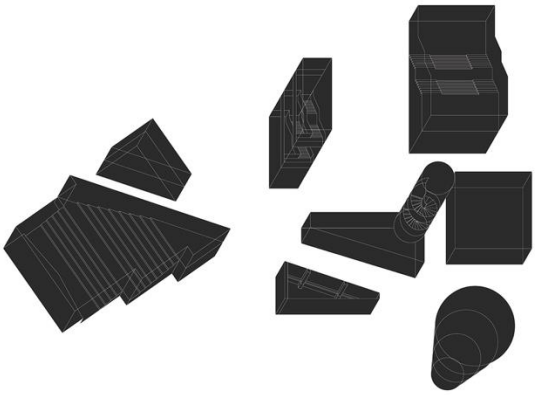


Figure 3.107. *Kök*, 2022, MELT Studio. Source: https://www.meltstudioworks.com/place

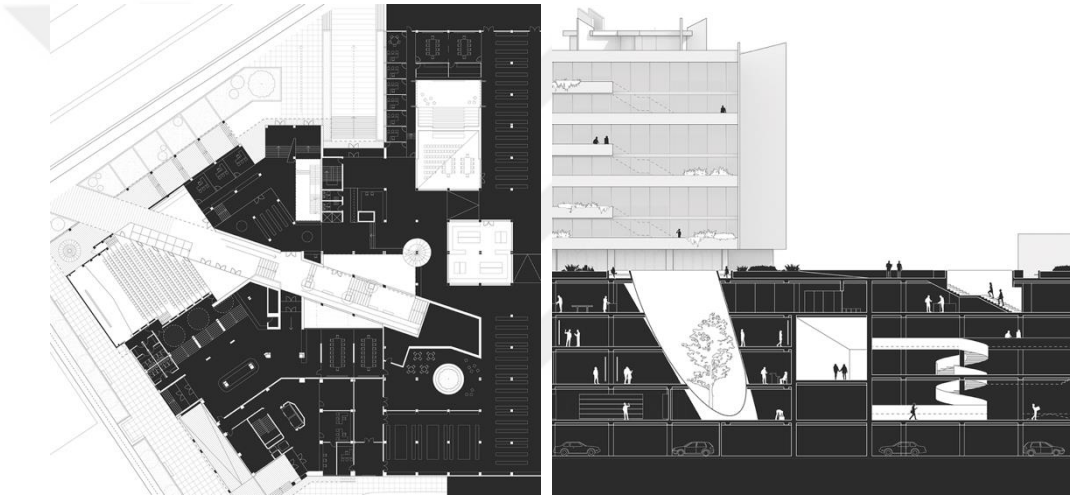


Figure 3.108. *Kök*, 2022, MELT Studio. Source: https://www.meltstudioworks.com/place

The second project, *Ara[o]da*, is a mobile spatial installation that interrogates the idea of in-betweenness. It was conceived in response to the contemporary "leaving-staying" dilemma, reflecting on the emotional and political weight of making (or being forced to make) decisions about displacement and remaining.[542] MELT explains:

[542] https://www.meltstudioworks.com/place.

> There seems to be an ‘in-between state’ that alienates individuals from their so-called ‘selected’ place of inhabitation. Any binary framing obscures the rich tapestry of this characteristic ‘state of in-between.’[543]



Figure 3.109. *Ara[o]da*, 2024, MELT Studio. Source: https://www.meltstudioworks.com/place.

This spatial condition is translated into a two-phase installation. Initially presented as a mobile wall, *Ara[o]da* encloses a confined interior (Figure 3.109). Inside, “familiar, everyday objects [are] deliberately arranged in an unconventional manner,”[544] forming a layout that “questions the point where space and objects begin and end.”[545] The arrangement constructs an architectural image of unsettlement, and the installation itself, when opened, unfolds into the surrounding space.

Ara[o]da’s first spatial (and making) condition resonates with imitative *Bildung*, collecting visual and domestic codes and assembling them into a spatial lexicon (Figure 3.109). The second spatial condition is defined through its transition into an open, transformative condition. The ability to reflect and respond to its environment reveals varying spatial conditions (Figures 3.110 and 3.111). The installation not

[543] https://www.meltstudioworks.com/place
[544] https://www.meltstudioworks.com/place.
[545] https://www.meltstudioworks.com/place.

only collects and composes fragments but also imagines new spatial possibilities through interaction.

This capacity to reframe lived experience through spatial composition and to internalize collection and variation as design strategies resonates with the method of reflexive *Bildung* as defined in this thesis. As an operation of reflexive *Bildung*, the project is an act of imaging that does not simply entail representing space; it involves generative thinking through making as a reflexive act that integrates previous knowledge with speculative projection.

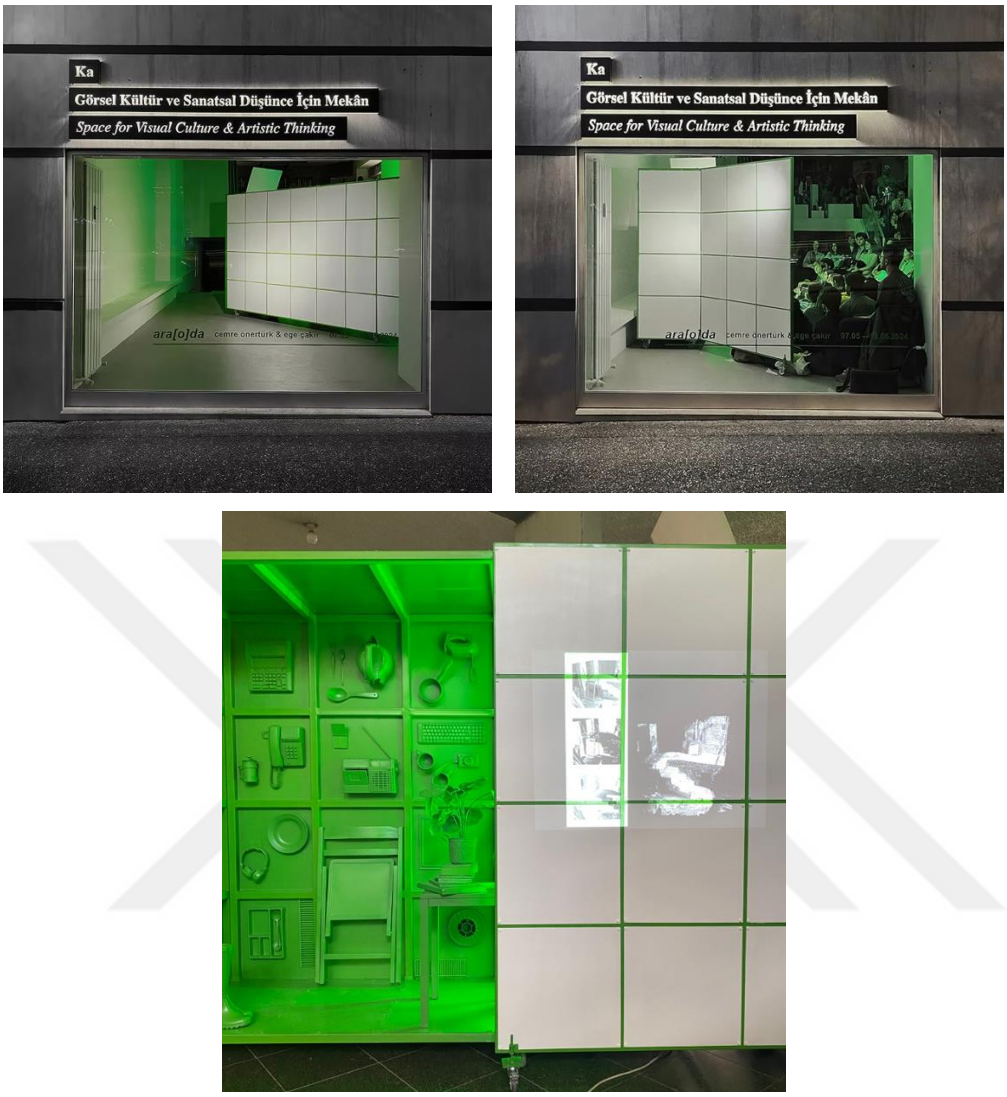
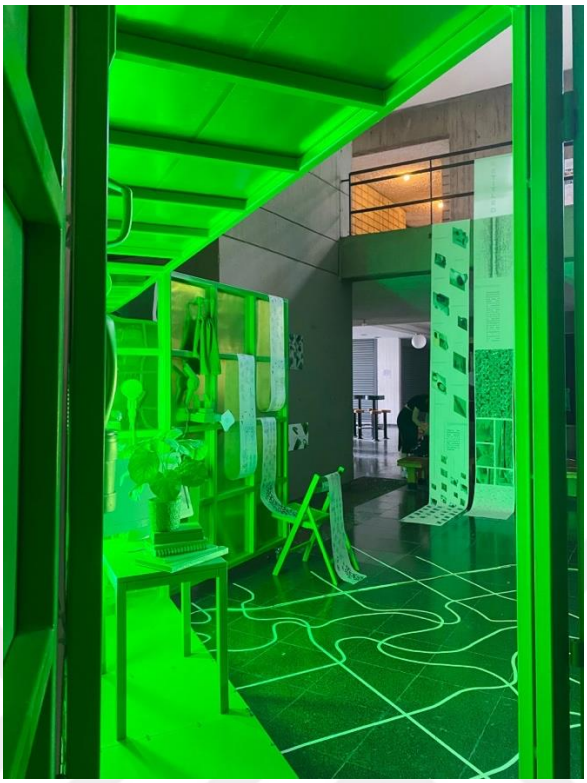


Figure 3.110. *Ara[o]da*, 2024, MELT Studio. Source: https://www.meltstudioworks.com/place; final photograph taken by the author.



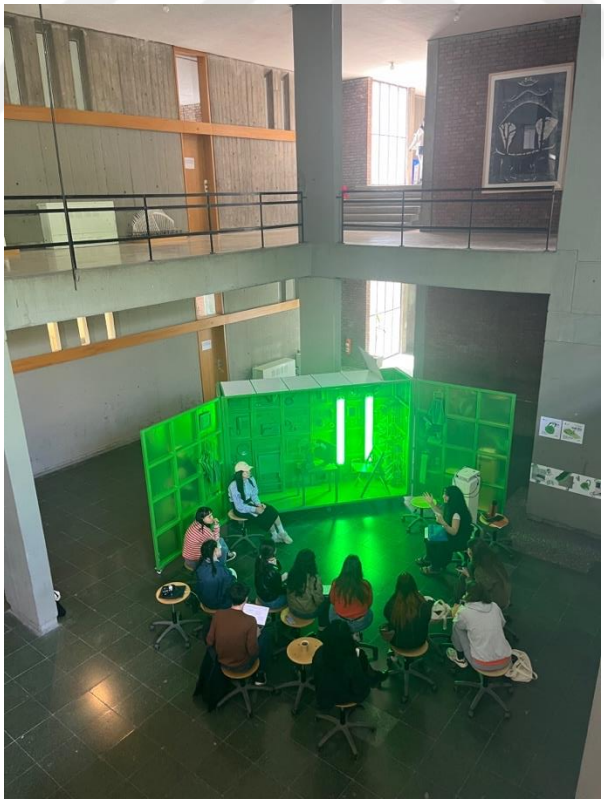


Figure 3.111. *Ara[o]da*, 2024, MELT Studio. Source: Photographs by the author and Ege Çakır.

Together, *Kök* and *Ara[o]da* demonstrate how MELT Studio's makings embody reflexive *Bildung* as an interplay between collecting and varying. Both projects include acts of collecting architectural fragments, cultural traces, and spatial codes, yet they do not remain within the realm of mere collecting. They also activate formative operations that transform these fragments into new spatial narratives. By doing so, MELT engages with imaging as a mode of thinking-through-making, where architecture is not only designed but also theorized and reflected upon.

Diagrammatical Synopsis

Overall, this curation displaying architectural *Bildung* through operations includes dialogues of visual and temporal layers. To illustrate these layers and operations within the curation, Robin Evans's diagram is used as a point of departure and further reworked to reveal the possibilities of methods of architectural making. Evans explains his diagram as follows:

> Projection operates in the intervals between things. It is always transitive. In the diagram, ten fields of projection are shown joining five types of targets. Four of the targets are almost always thought of as pictures/images or picture alike. The one exception is the designed object that too can be endowed with picture-like qualities.[546]

[546] Robin Evans, *The Projective Cast: Architecture and Its Three Geometries* (Cambridge, MA: MIT Press, 2000), 366.

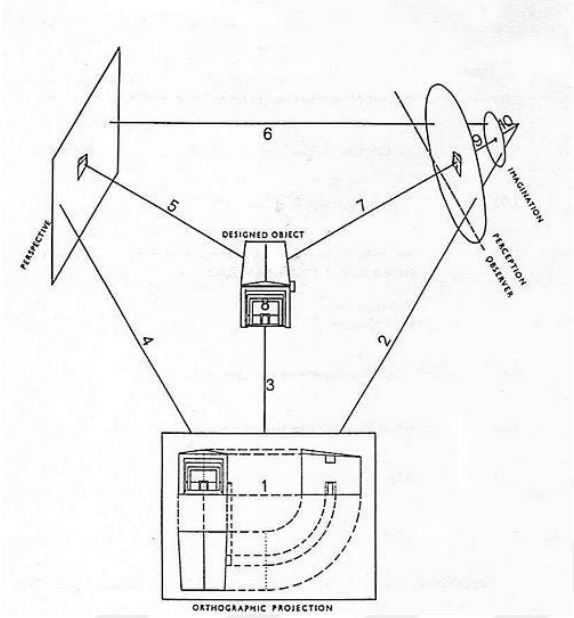


Figure 3.112. Robin Evans' arrested image diagram. Source: Robin Evans, *The Projective Cast: Architecture and Its Three Geometries* (Cambridge, MA: MIT Press, 2000).

Evans also adds that the part with which the observer engages for lines 2-6-7 and especially 9-10, and their relations, are left somewhat unclear (Figure 3.112). This research tries to reflect upon and expand those "unclear" relations, and this chapter of the thesis reflects upon and expands that ambiguity. The unclear relationship between perception and imagination becomes a productive site where architectural *Bildung* operates, revealing how acts of collecting, varying, and imaging generate new formations between perception and imagination. To illustrate this expanded conceptual field, a series of new diagrams were developed (Figures 3.113 and 3.114).

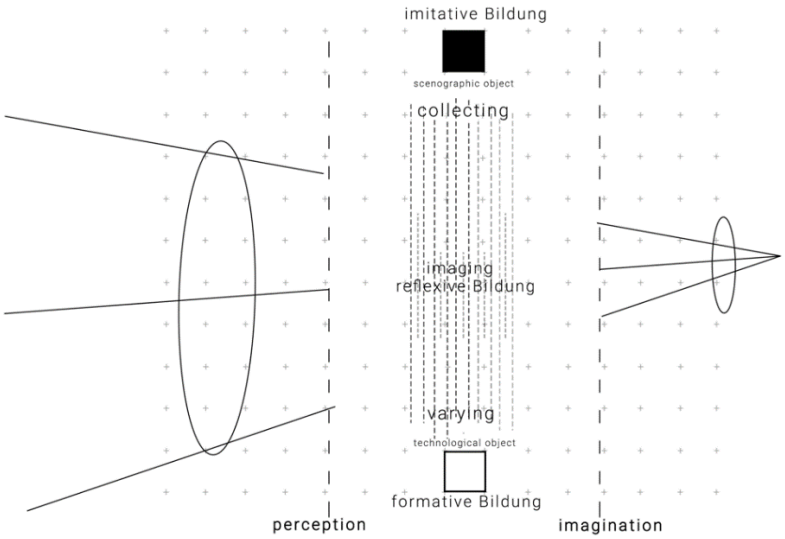


Figure 3.113. Redrawing of Robin Evans' diagram, reinterpreted to include the proposed *Bildung* understandings and related operations. Created by the author.

Figure 3.109 builds upon Evans's framework, reorganizing the process around the concept of *Bildung* and shedding light on the "unclear relations." The vertical axis connects imitative *Bildung***,** reflexive *Bildung***,** and formative *Bildung*, structured between the two perceptual horizons of perception (left) and imagination (right).

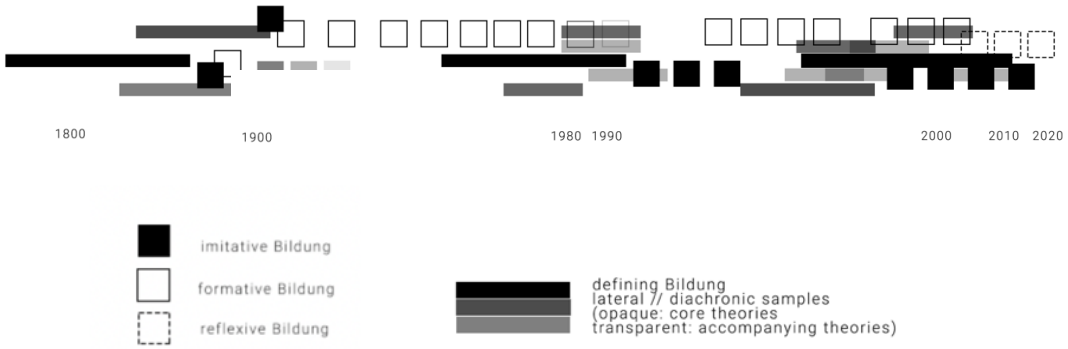


Figure 3.114. An interpretative diagram of categories of *Bildung* on timeline. Created by the author.

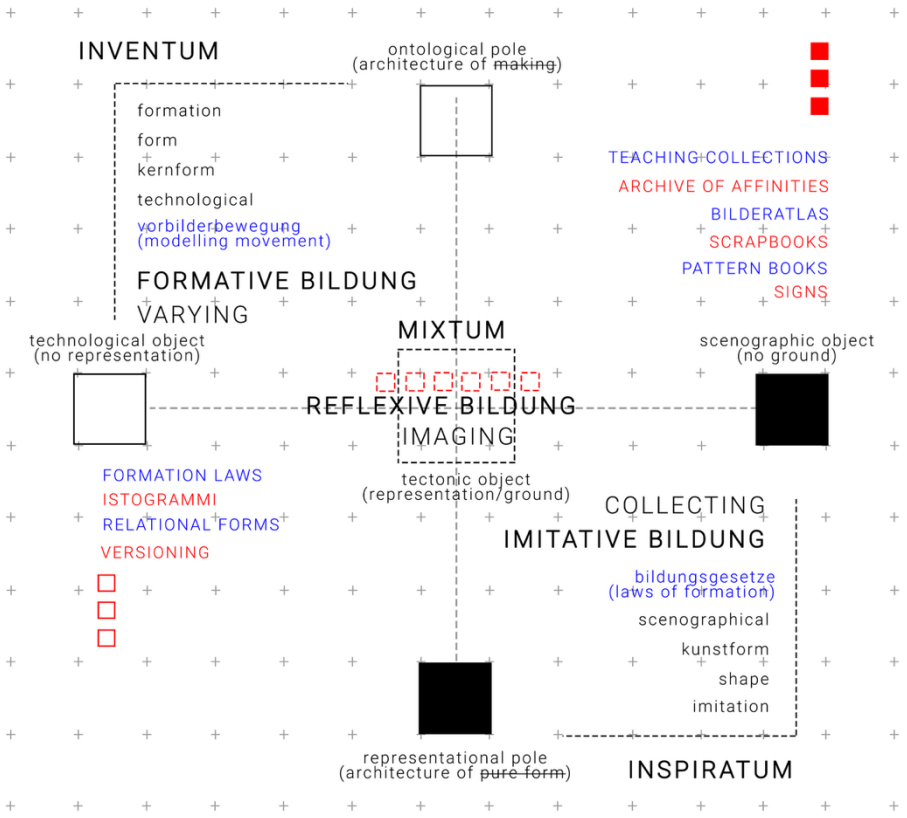


Figure 3.115. An interpretative diagram – continuation of the Fausch's diagram redrawn. Created by the author.

This chapter offers an operational curation of the three types of *Bildung*, framing them as interrelated modes of architectural inquiry (Figure 3.115). **Imitative *Bildung***, grounded in historical references and perceptual immediacy, is enacted through acts of **collecting**, from pattern books and teaching collections to scrapbooks and contemporary image assemblages. **Formative *Bildung*** engages with iterative processes that explore the generative potential of form through rules, variations, and transformations, articulated through the operation of **varying**. **Reflexive *Bildung*** emerges as a recursive interplay between perception and imagination, mediated by **imaging**, which is an open-ended process that does not fix form but reveals the conditions of thinking and making. These three operations do not function in isolation; rather, they overlap and inform one another, setting forth an expanded understanding of making.

CHAPTER 4

CONCLUSION: TOWARDS AN UNFINISHED ARCHITECTURAL *BILDUNG*



Figure 4.1. Pages from final version of *Mira Calligraphiae Monumenta*. Source: https://www.getty.edu/art/collection/object/103RWD

Returning to *Mira Calligraphiae Monumenta*, Figure 4.1 presents two adjacent pages. One is a richly finished recto; the other is an unfinished verso. These pages from *Mira Calligraphiae Monumenta* again offer a compelling visual basis for this thesis's exploration of architectural *Bildung*. The recto reveals a completed composition featuring dense calligraphy, botanical ornamentation, and symbolic imagery, while the verso features faint traces and compositional outlines like an

unfinished page, showing "construction of the not yet construed,"[547] yet still legible in its structure and intention. This visual pairing reflects the dual conditions explored throughout this thesis, which may be summarized as the formed and the formation. The combination of a seemingly unfinished verso that signifies a generative state, an "image in the making," or traces of the formation with the finished recto containing details exemplifies the very essence of *Bildung* itself. It is an open-ended reflexive process in which traces and finished/unfinished fragments contribute to an evolving form of knowledge. Reconsidering the German-origin concept of *Bildung* in the context of architectural theory and design, this study proposes an original conceptual and methodological framework.

Throughout this thesis, architecture has been approached as a form of knowledge production encompassing cultural, political, and material dimensions. In order to engage with architecture as such today, we must develop a renewed terminology that revisits and revitalizes neglected concepts in architectural theory and fosters a deeper understanding of diverse modes of making. While this revision could begin from many different concepts, *Bildung* offers a particularly generative entry point due to its layered etymological, philosophical, and interdisciplinary history. This thesis has thus aimed to reframe architecture through *Bildung*, compiling a comprehensive set of terms and operations that support both theory and design. It has also addressed a critical gap: *Bildung*'s limited presence in architectural theory, despite its notable influence on nineteenth-century art and aesthetics. This continuity is made legible through current theoretical discussions that reveal the "contemporaneity" of nineteenth-century thinking.

To unfold this argument, the thesis is structured into a glossary and a curation. While distinct, their relation is intrinsic: the glossary establishes a vocabulary to define architectural *Bildung* by reactivating well-known and overlooked terms, whereas the curation displays how the conceptual structure of *Bildung* can operate through

[547] Hartoonian, 83.

examples of architectural making, thus bridging conceptual reflection with creative production. This dual structure reflects the very nature of *Bildung* as both a theoretical and operative framework.

In reclaiming *Bildung* from its roots in German humanism and aesthetics, this research does not treat the concept as static; rather, it reconfigures it as an evolving epistemological structure capable of shaping architectural theory. Here, the "critical distance" of non-nativeness -neither being a native German nor English speaker- also becomes methodologically significant. Instead of a limitation, this distance opened space for unexpected connections and interpretive flexibility, turning the outsider position into a creative input for theory-making.

Referring to both Gadamer's and Koselleck's definitions further illuminates this reframing. According to Gadamer, in German, words derived from *forma*, such as *Formierung* and *Formation*, have long competed with *Bildung*. Since the Renaissance, *forma* has been interpreted more dynamically and organically, gradually losing its earlier technical meaning. Nonetheless, *Bildung* gained prominence, likely because it contains *Bild*, which is a term rich with ambiguity, encompassing both *Nachbild* (copy) and *Vorbild* (model). Thus, *Bildung* captures not only the process of formation but also its result, reflecting a frequent transition in German thought from becoming to being, or vice versa.[548] Koselleck further identifies three essential components of *Bildung*: autonomy, self-determination, and reflexivity. He describes it as a recursive rather than a linear process, a transformation that refers to both the act of becoming formed and the condition of having been formed, emphasizing its dual temporality and significance as both a method and a trace of knowledge-making.

While these definitions represent only a few among many philosophical interpretations of *Bildung*, this study builds its structure around the term's theoretical

[548] Gadamer, 10.

richness and explores its multiple meanings through parallel architectural and philosophical frameworks. These parallels clarify *Bildung*'s layered complexity in terms of both definition and display. Building on this foundation, this thesis redefines the conceptual link between architectural theory and the philosophical concept of *Bildung*. Working within an interpretive framework grounded in nineteenth-century theories, this study shows that *Bildung* is not merely a metaphor for cultural development; rather, it constitutes an active process shaping architectural culture and formation. This perspective underpins the two main arguments of the thesis, which together form the proposed interpretive structure. **The first argument is that the strands of architectural theories of the last two hundred years are composed of repeating reflexive double terms that have their historical basis in nineteenth-century avant-garde inquiries. The repetition of these doubles parallels the conceptual structure of *Bildung*, offering a way to define it within architectural frameworks.** In the chapter on "Defining *Bildung*," constructed as an expandable glossary, this thesis addresses the misuses and ambiguities surrounding familiar yet often misunderstood concepts. Misuses of widely used architectural terms, such as *form*, *shape*, and *technics*, are central to the glossary's construction, which aims to recover lost and overlooked strands of architectural theory. By reactivating fragmented terms, many of which appear as reflexive doubles, the chapter explores how architectural knowledge has been historically formed and continues to be re-formed.

The first argument in this chapter is grounded in two key theoretical foundations. The first of these is Reinhart Koselleck's *Begriffsgeschichte*, or conceptual history, which emphasizes how the meaning of key terms evolves over time in response to shifting historical experiences.[549] A single term, for example, may undergo significant semantic transformations in different time periods, while different terms may come to express similar or intersecting ideas across different contexts. This

[549] Koselleck.

chapter applies Koselleck's approach to architectural theory, emphasizing how clusters of terms or their substitutions recur across multiple historical periods. The second foundation is Michael Hays's influential essay titled "Critical Architecture: Between Culture and Form." Hays's analysis of "quasi-autonomy," as framed through the works of Stanford Anderson and Diana Agrest, is especially relevant. Agrest defines culture as a system of social codes that controls the flow of information into the public domain.[550] Her definition helps link architectural form to broader cultural systems.

Drawing on conceptual history and critical architecture, as well as understandings of culture as a system, the glossary offers a wide theoretical scope before focusing on three reflexive doubles: Artform and Workform/Coreform (*Kunstform* and *Werkform/Kernform*), Scenographical and Technological, and Shape and Form. The glossary aims to present these concepts as a primary collection of knowledge as clearly and directly as possible. This constitutes a response to the argument that many misuses of architectural terms stem from accumulated layers of interpretation over time.

The first double, Artform and Workform/Coreform or *Kunstform* and *Kernform*, is grounded in nineteenth-century theory, and particularly Bötticher's renowned distinction. The debate is extended by Hübsch's *Bildungsmomenten* (formation factors) and Schinkel's *Grundformen* (ground forms), and further developed through Semper's parallel terms *Kunstschema* and *Kernschema*. Semper's concept of *Körperbilden* (body-form) reflects the totality of architectural form as a structural and expressive body. These architectural theories significantly influenced nineteenth-century aesthetic philosophy, shaping interpretations of form through perception. The duality of *Kunstform* and *Kernform* continues in the distinctions between perceptual and conceptual experience, visual and kinesthetic perception, and inherent and effective form. Wölfflin's definition of style as a "formative

[550] Agrest.

system" reflects this influence, particularly in his contrast between tectonic and atectonic styles. Tectonic style implies a closed, finished form with clear constraints, while atectonic style reflects openness and fluidity within a still-ordered structure.

This first chapter explores the interrelation of these theoretical threads, showing how terms commonly used today are layered with complex meanings. Though it only includes selected terms, the glossary reveals the depth of these reflexive doubles. While these structures became less visible in the early twentieth century, this chapter reactivates and highlights their presence in current architectural discourse.

The second reflexive double focuses on renewed engagement with tectonic theories in the late twentieth century, especially in response to postmodernism's emphasis on scenographical expression. Kenneth Frampton's differentiation between the scenographical object and the technological object, with the tectonic object positioned in between, structures this discussion. Deborah Fausch's diagrammatic model further clarifies their relationships and is reinterpreted here as a key part of the thesis.

The four sub-sections titled "Translations," "Buildings," "Philosophies," and "Questions" help to organize these rereadings. In this section, Frampton and Schwarzer are discussed in depth because their works offer comprehensive yet divergent readings of nineteenth-century tectonic theories. While Schwarzer constructs a dense, text-driven analysis that presents a layered philosophical foundation, Frampton rereads the architectural makings of specific architects through his theoretical lens. Their work significantly contributes to the revival of tectonic thought in contemporary architecture.

As an additional note -and a possible subject for further research- one year before Frampton and Schwarzer's books were published, Frampton wrote a preface to Gevork Hantoonian's book, which offers a distinctive "philosophical" perspective on tectonics, illustrated through his interpretation of "buildings." In this interesting work, Hantoonian's concept of type-tectonic serves as a critical tool for

understanding both the positivistic thinking of the Modern movement and contemporary scenographical references to history.[551] According to Hartoonian, "type" refers to "a constructional form that endures and remains permanent" and, drawing from Semper, the tectonic marks a "breach between meaning and construction."[552] The concept of "type-tectonic" that he proposes is related to Martin Heidegger's understanding of *techne* as encompassing both tectonic and type, where *techne* signifies the "logos of making." In this thesis, *Bildung* is shown to be a more multivalent term than *techne*, as it encompasses not only the act of making but also processes of self-cultivation, cultural formation, and knowledge production. In this light, Hartoonian's *type-tectonic* resonates with the interpretive richness of *Bildung*, integrating both imitative and formative dimensions.

In contrast to the first two, the third double, Shape and Form, does not emerge directly from historical tectonic debates. Instead, it reflects a methodological intervention within this research: a speculative construction of a twenty-first-century reflexive double. Robert Somol's distinction between shape and form serves as a point of departure for developing a contemporary architectural vocabulary. Today's understanding of tectonics, particularly in its philosophical depth, continues to build upon such dualities, recognizing their ongoing relevance in shaping architectural discourse. This section begins by examining recent theoretical works that employ methodologies similar to those used in this thesis. It revisits earlier frameworks and re-engages with them in current debates, as introducing the shape/form double into the glossary requires contextualizing its possible continuations within contemporary architectural theory. Drawing on the works of Andrew Witt, Zeynep Çelik Alexander, John May, and Anna-Maria Meister, this section functions as a retroactive preview, emphasizing the value of re-understanding nineteenth- and twentieth-century concepts as precursors to present-day architectural discussions. Revisiting these earlier frameworks opens up productive perspectives for

[551] Hartoonian, 41.
[552] Hartoonian, 29.

interpreting contemporary issues. Within this context, Somol's distinction addresses the theoretical stagnation of late twentieth-century postmodern discourse. His proposal introduces a new set of operational categories and symbolic rules. This vocabulary has also influenced Pier Vittorio Aureli's further elaborations on the concept of form, which are included in this glossary. Ultimately, architecture thrives not by choosing between shape and form but through their dynamic interplay. The potential of architectural making lies not in binary oppositions but in reflexive relationships, balancing the immediacy of shape with the complexity of form.

The chapter on "Defining *Bildung*" proposes a glossary of three term-doubles that establish the critical framework necessary for understanding architectural *Bildung*. Re-articulating Deborah Fausch's diagram, the glossary traces reciprocal relations between the ontological pole (formation, form, *Kernform*, technological) and the representational pole (imitation, shape, *Kunstform*, scenographical), revealing both the technological and scenographical dimensions of architectural knowledge production. This open-ended structure allows for the addition of further terms and examples, emphasizing that architectural *Bildung* should not be understood as a closed system, but rather as an ever-expanding intellectual field.

The third chapter, "Displaying *Bildung*," supports the second argument of the thesis: that the complex interplay among imitative, formative, and reflexive interpretations of *Bildung* can offer an operational logic for architecture. This study reactivates *Bildung* not merely as a humanist or pedagogical ideal, but as a conceptual framework with creative potential for contemporary architectural discourse. Its adaptability across intellectual and historical contexts stems from its triadic structure with the interplay of subjective cultivation, collective historical consciousness, and natural generative processes. Although not presented in the same sequence, these three dimensions underpin the imitative, formative, and reflexive models of *Bildung* that guide this study's interpretive strategy.

Like the first argument, the second argument of the chapter is grounded in theoretical sets from late eighteenth- and nineteenth-century thought, incorporating the works of Kant, Herder, Hegel, Goethe, and the Humboldt brothers. These thinkers conceptualized *Bildung* through a dual lens, balancing subjective cultivation with natural processes. Rather than providing exhaustive analyses of each of these figures, this study identifies a shared conceptual ground, tracing how *Bildung* was differently articulated yet consistently situated among subjective formation, collective historical development, and natural growth. For Kant, *Bildung* referred to historical cultivation as both an individual and collective process. Herder framed *Bildung* within the philosophy of history, viewing the historical process as a mode of human formation and emphasizing its aesthetic and pedagogical dimensions. Hegel expanded the concept into a dialectical framework that integrated self-consciousness with cultural transformation. Crucially, his philosophy of history identifies three types of historiography: original history, in which historians and their times coincide; reflective history, which introduces temporal distance and interpretation; and philosophical history, which sees both past and present as evolving stages, allowing for a reflexive, process-based understanding of historical change. These historiographic modes mirror *Bildung*'s reflexive structure, reinforcing its dual role as both an individual and historical process. Goethe and the Humboldt brothers further enriched the concept with scientific and naturalistic perspectives. Goethe's vision of *Bildung* fused aesthetic experience with morphological development, aligning self-growth with natural processes. Alexander von Humboldt emphasized natural formation as an interconnected system, while Wilhelm von Humboldt conceived of *Bildung* as a harmony between objective knowledge (*Wissenschaft*) and personal self-cultivation within educational philosophy. These strands converge with Angelo Poliziano's earlier triadic model of knowledge: *Inspiratum*, *Inventum*, and *Mixtum*. This triad also echoes the imitative, formative, and reflexive categories proposed here.

Together, these demonstrate *Bildung*'s triadic structure, with interactions among collective historical consciousness, natural generative processes, and subjective cultivation. This enduring triad forms not only the philosophical foundation of the chapter but also guides the study's reinterpretation of architectural *Bildung* through three operational categories: imitative, formative, and reflexive *Bildung*. Each category translates the philosophical and inevitably etymological complexity of *Bildung* into architectural processes that are historically grounded yet open to reinterpretation. Two (overlooked) architectural concepts, *Vorbilderbewegung* (Modeling Movement) and *Bildungsgesetze* (Laws of Formation), help to theorize and illustrate these categories within architectural discourse, offering a historical lens for understanding how architectural knowledge has been reformulated and transmitted through exemplary models and generative principles.

The first category, **imitative *Bildung***, aligning with *Vorbilderbewegung*, is grounded in the act of collecting visual and material fragments. It reflects the nineteenth-century tradition of learning through exemplary models and typologies, while updating this method through contemporary strategies. The operation of collecting demonstrates how historical precedents and visual codes are recomposed within compilations, both analogue and digital. It is exemplified by the *Bilderatlas* tradition and Alison Smithson's *The Big Scrapbook*, which arranges architectural fragments into a subjective visual atlas. The collecting in sources like *Vorbilder für Fabrikanten und Handwerker* is echoed in Denise Scott Brown and Robert Venturi's use of symbolic codes as architectural elements. The act of collecting within the context of the pedagogical power of teaching collections is projected to Andrew Kovacs's *Archive of Affinities*, where digitized architectural fragments are compiled in an endless visual cloud.

The second category, **formative *Bildung***, draws on the lesser-known discourse surrounding *Bildungsgesetze* (Laws of Formation) and conceives of architecture as

a process of variation structured by rules and sequencing. Rooted in nineteenth-century theories of form, particularly those developed by Friedrich Heinzerling and Rudolf Redtenbacher, this mode is reactivated through contemporary design logic. Drawing from their theories, the operation of varying reflects a generative approach in which forms evolve through process-based rules. It is displayed by Superstudio's *Istogrammi*, a series of spatial diagrams where basic architectural forms undergo methodical rule-based transformations. Furthermore, varying, in the form of *versioning*, a term coined by SHoP Architects, is embedded in their procedural design methods, where architectural elements are developed as parametric sequences that represent both process and product. Overall, formative *Bildung* frames architectural design as a rule-driven yet creative process, in which formation occurs through variation and the exploration of possibilities.

Reflexive *Bildung* arises at the intersection of the first two and signifies self-reference. It is neither anchored solely in precedent nor driven exclusively by formal innovation; instead, it synthesizes collecting and varying into new making strategies. Most clearly expressed through the operation of imaging, reflexive *Bildung* enables architecture to become a medium of thinking itself. As seen in the practices of MILLIØNS Architecture, Riet Eeckhout, Jonah Marrs, Certain Measures, and MELT Studio, imaging simulates thinking. Reflexive *Bildung*, in this regard, enables architecture to operate critically, reflexively, and imaginatively.

The value of this operational curation, as seen in "**Displaying *Bildung***," lies not in presenting a definitive list of design methods but rather in proposing an expandable methodological model grounded in historical discourse and adaptable to ongoing processes. Each operation emerges from and reinvests in architectural *Bildung*'s conceptual and historical lineage, offering new ways to think through and engage in architectural making. The chapter reflects how architectural knowledge is not fixed; it is continuously formed and re-formed through both historical reflection and contemporary practice.

This understanding of architectural knowledge as a continuous process aligns closely with Hans-Georg Gadamer's formulation of *Bildung* as a philosophical ideal of self-cultivation and dialogical engagement, "an engagement that requires fully entering into tradition while maintaining a critical openness."[553] In this sense, the methodology developed in this thesis is itself a reflexive *Bildung*: a thinking-in-making that engages history without being bound by it. Drawing from this approach, the thesis redefines *Bildung* not merely as a historical term but as a contemporary methodological framework capable of tracing architectural knowledge through reflexive doubles and operational categories. Building on this foundation, the thesis is structured around two interrelated components: a curated glossary and an operational curation. Together, these parts move beyond traditional approaches to propose an experimental model for architectural theory. The glossary aims to clarify and expand the architectural vocabulary by recontextualizing misused or overlooked terms, while the curation displays making strategies.

As mentioned in the Introduction chapter, Mario Carpo has emphasized the renewed relevance of imitation in contemporary architectural discourse, particularly in relation to generative AI. He provocatively describes imitation and precedent as once "forbidden" concepts, now reactivated through digital technologies. According to Carpo, generative AI operates by analyzing large collections of images to produce new outputs, echoing historical practices where artists and architects engaged with precedents to develop new forms. This convergence underscores the dual nature of architectural making, with inductive processes grounded in existing models and generative approaches driven by invention. The distinction resonates with Anton Ehrenzweig's emphasis on "unconscious scanning" and "conscious planning" in the creative process, suggesting that architectural knowledge is produced not by mere copying but by oscillating between imitation and formation. This concern is echoed

[553] Brandist.

in nineteenth-century aesthetic philosophy and its architectural extensions in the twentieth century, where doubles such as perception and conception or norm and form framed the epistemological foundations of design. These doubles emphasize that architectural form is never autonomous; it emerges from both normative structures and perceptual conditions that demand both historical awareness and methodological rigor. In this light, the layered theoretical framework developed in this thesis also resonates with current explorations in AI-based design thinking. Recent research initiatives have demonstrated similar concerns, particularly in their emphasis on pattern recognition and open-ended processes of form-making.[554] This study does not address the technical infrastructures of machine learning or computational tools, but it proposes a broader conceptual framework grounded in the historical epistemology of *Bildung* that parallels many of the operative strategies found in these emerging design methodologies.

Extending from parallelity, this thesis situates imitative, formative, and reflexive operations as interpretative acts. In this sense, it challenges the paradigm of "architects who themselves become style,"[555] a condition where design degenerates into image replication devoid of epistemic depth. While imitation is not inherently negative, it becomes unproductive when detached from its hermeneutic correlations with formative reasoning and reflexive engagement. Conversely, when understood as part of the proposed methodological continuum, where collecting, varying, and imaging interrelate, architectural making evolves into a knowledge-making process. This integrated understanding parallels Gottfried Semper's layered theoretical framework, which introduces *Stillehre*, defining beauty as a result of deeper forces

[554] Two recent and rapidly evolving research groups are theoretically engaging with distinct yet complementary aspects of this study. Coded Objects (the Lisa Meitner Group at the Kunsthistorisches Institut in Florenz) focuses on the "forms of processes and the objects they produce," while Playing Models (University of Florida and the Chair of Digital Architectonics at ETH Zurich) explores "architecture as an intelligence of jointing and connecting seemingly disparate concepts, methods, and realms." See https://www.playingmodels.com/about and https://www.khi.fi.it/en/forschung/lise-meitner-group-meister/index.php.

[555] This phrase was used by Ayşen Savaş during our discussions on the thesis.

that include idea, material, technique, and symbolic purpose.[556] This definition of style emphasizes the generative conditions of form rather than its outward appearance. Semper's distinctions foreground an essential lesson for contemporary architectural knowledge: theorizing form must involve understanding its imitative qualities as well as underlying laws, not reducing design to solely imitative reproduction.

This integrated approach establishes a flexible yet rigorous framework for understanding architecture as an evolving process of *Bildung*. It also encourages more plural approaches in studio pedagogy. It offers a broader interpretive and methodological field that not only recontextualizes *Bildung* within architectural discourse but also proposes an operative lens for understanding how architecture evolves across different temporal layers. The glossary clarifies and expands architectural vocabulary through historical recontextualization, which is essential for responsive design work. Similarly, the operational categories, or different interpretations of *Bildung* with collecting, varying, and imaging, provide a set of flexible methods that can be embedded into design studios. These operations promote speculative thinking, encourage contextual and temporal sensitivity, and cultivate a creative mindset. They offer students strategies for moving between direct engagement with historical material through collecting and copying to achieve learning and transformative projection, rather than relying solely on abstract imitation. In this regard, the making of subjective inventories and exercises with sequential variation diagrams can serve as pedagogical acts that contribute to architectural knowledge-making. By activating both components in the pedagogical space, this thesis proposes a more plural and open-ended mode of design education.

Returning to the thesis's initial inspiration, the *Mira Calligraphiae Monumenta*, *Bildung* is reaffirmed as an unfinished, becoming-oriented concept. This open-

[556] The underlying inputs of Semper's definition of style encompass wide theoretical ground, including the works of figures such as Heinrich Hübsch and Karl Friedrich Schinkel.

endedness is reflected in the proposed methodology, which resists closure and invites further interpretation and expansion. In this sense, the proposed approach opens up a generative space between the "unknown relations between perception and imagination," in the words of Robin Evans, allowing architecture to operate as a field of continuous learning, transformation, and epistemological inquiry.

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