TECTONIC SITES:
STRUCTURING THE LANDSCAPE WITH TEXTILE-DERIVED CONSTRUCTION
TECHNIQUES

BY

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THESIS
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ABSTRACT

Tectonic theory has a rich tradition in architecture. Tectonics can be briefly defined as the “poetics of construction” (Frampton, 2001). Discussion of tectonics has guided architects toward expressive construction and even pushed the discipline to redefine itself as one concerned with the creation of space, not symbolic form. Despite its influence in our allied profession, a tectonic theory of landscape architecture remains undeveloped.

This thesis explores the role of such a theory in landscape architecture, guided by the development of tectonic theory in architecture. Key moments in the development of architectural tectonic theory were Gottfried Semper’s focus on textiles in shaping a new origin point and theory of style for architecture in the late 19th century, and Kenneth Frampton’s description of a tectonic theory at the turn of the 21st century. The landscape-specific potential of Semper and Frampton’s ideas are revealed in my analysis of over one hundred landscapes that used textiles in their construction and model making.

Textiles are porous and flexible, uniquely suiting them to integrating, responding to, and even structuring landscape contingency. Textiles visibly intertwine with materials and organisms. They symbolize the integration of humans and their materials with other nature: the “natural cyborg” (Marrati, 2010). These concepts provide the basis for a possible tectonic theory of landscape architecture and could even give shape to a new myth of origin that replaces the definition of landscape gardening as an imitative art, as proposed by John Claudius Loudon over a century ago, with an alternative firmly grounded in landscape-specific constructive practice.

The adoption of tectonic theory based on these ideas would require landscape architects to act not as stewards but as actualized natural agents; to realize and engage the constructive potentials of contingency and time; to embrace and develop new expectations for successful design and aesthetics; and develop strong political and ethical stances.
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Chapter 1: The Nature of Landscape Construction

Tectonic theory, as described by architectural theorist Kenneth Frampton in *Studies in Tectonic Culture*, negotiates the relationship between constructive practice and theoretical ideals (Frampton, 1995). Despite the combination of theory and construction inherent to landscape architecture, tectonic theory has yet to develop in the discipline. Lack of discourse about tectonics is a missed opportunity that may prevent the full development of landscape architecture’s disciplinary potential. Information and ideas about how landscape architects can and should construct sites are present in many books, built works, and minds. However, no channel of discourse is dedicated to the consideration of the relationship of constructive practice and theory. Without a coherent, cohesive, and critical discourse on the subject, the knowledge and thinking present within the discipline cannot be organized, collectively discussed, or effectively pushed forward. Tectonic theory provides a framework in which ideas about landscape construction can be collected and arranged, allowing landscape architects and theorists to recognize patterns and discuss best practices. This thesis works to rectify the void, at least in part, by developing a tectonic theory for landscape architecture and thereby providing a basis upon which collective discussion of tectonic theory might develop.

This document describes not only the results of the thesis, a tectonic theory, but also but also the research processes through which the inquiry was initially identified and subsequently investigated. Chapter two, “From Textiles to Tectonic Theory,” traces the development of the thesis from generalized curiosity to the quest for tectonic theory. Chapter three, “Building Tectonic Theory,” describes the development of architectural tectonic theory and outlines a model conceived by abstracting the development of tectonic theory in architecture. This model, which consists of reconceptualization of the origin point of the discipline, a new theory of style, an ideological shift, and the development of tectonic theory, structures the thesis inquiry toward a landscape-specific tectonic theory. The history of landscape architecture as it compares with the trajectory in architecture is the topic of chapter four, “Loudon’s Collection: Landscape Architecture’s Missed Opportunity.”

Chapters five through eight transpose the sequence of events through which tectonic theory developed in architecture to the context of landscape architecture. Chapter five, “Textiles Outside,” establishes the inevitability of affecting environmental forces when constructing landscapes as an origin point that roots the discipline in
landscape architectural craft. This new origin point generates a new aesthetic logic described in chapter six, “Contingency and an Alternative Style.” Chapter seven, “Creating Space,” explains the ideological shift the alternative history and theory of style could catalyze in landscape architecture. Finally, chapter eight, “Tectonic Sites,” synthesizes a tectonic theory for landscape architecture and describes its potentials.
Chapter 2: From Textiles to Tectonic Theory

Developing a tectonic theory was not the original aim of this thesis. Rather, the goal of pursuing tectonic theory emerged from several initial research directions exploring the relationship between textiles and landscape architecture in a very general sense. This chapter describes how the thesis, which seeks to answer how textile-derived construction techniques might inform the construction of landscapes and, further, a tectonic theory for landscape architects, was generated and defined by these initial explorations.

“Fabric” in Landscape Architecture and the Limits of Metaphor

The word “fabric” peppers landscape architectural discourse, an attractive connection when considering the intersection of landscape architecture and textiles. For example, Catherine Dee uses “fabric” to describe landscape composition in her book, *Form and Fabric in Landscape Architecture*. She chooses to use “fabric” to describe landscape “because it suggests interconnected wholes made of parts which are created through process. It also suggests cohesion and robustness, which are considered to be positive qualities of designed landscapes” (Dee, 2001). In *A Dictionary of Landscape*, George A. Goulty defines the “fabric of the land” as “the totality of the geographic, landscape features and existing land-use, of a tract of land” (Goulty, 1991).

Dee’s and Goulty’s choices to use the word “fabric” suggest an intended comparison between textiles and landscape. However, though “fabric” is commonly used to refer to textiles, it also means “a framework or underlying structure” or “the arrangement of physical components” (Merriam-Webster, n.d.). Therefore, this initially attractive connection is weakened by the fact that the word “fabric” frequently encountered in landscape discourse does not necessarily refer to textiles.

Even when the author explicitly intends the understanding of the word “fabric” in the same sense as the word “textile,” the connection between landscape architecture and textiles falls flat. For example, in “Defining the Dimensions of Urban Design,” Stephen Marshall discussed the meaning of the term “urban fabric” and likened it to cloth, describing it as a “cloak” and a “shirt” (Marshall, 1998). Though this sort of imagery may be useful as an explanatory device, such metaphors draw a limited comparison. They do not speak to the actual constitution or construction of either the
city (or landscape) or a textile. For these reasons, the metaphorical use of the word "fabric" was eliminated from the thesis as a potential common ground between textiles and landscape architecture.

**“Textiles” in Landscape Architecture: The Lack of Constructive Conversation**

Another potential common ground is the use of textiles as a material for landscape construction. However, landscape architectural discourse offers little in terms of how textiles can be used as a material in landscape architecture. Deborah Dalton, a professor of Landscape Architecture at the University of Oklahoma, is perhaps the only person who has written about the concept of textile use in landscape architecture. In her essays in *Fabric Architecture and Landscape Architecture Magazine*, she expressed a lack of inventive use of fabric within the profession after identifying umbrellas, awnings, canopies, tents, banners, and flags as conventional uses. However, her own proposal for change focused mainly on the potentials of tensile fabric outdoor shelters (Dalton, 2004).

This area of research could be expanded to include realized examples of constructed landscapes in which textiles are used innovatively. Additionally, advocates of textile-based materials and techniques could argue for the inventive use of landscape-specific textiles, the appropriation of textiles for landscape construction designed for other uses, and the invention of new textiles by landscape architects. Textiles designed to have specific capabilities useful to landscape architects already exist and are used in landscape construction, for example, geotextiles can be used to create landscape form; filter fabric is used in stormwater management, and weed suppressing fabrics control plant growth (Thompson & Sorvig, 2008). In addition, fabrics developed for agriculture, outdoor recreation, and other applications have been inventively appropriated by landscape architects (Landscape Architecture Europe Foundation, 2006). Designers like Patrick Blanc have also created their own fabric-based systems in the service of their designs (Blanc, 2011). Examples of original landscape design solutions using textiles exist, but they had not yet been organized or analyzed. With this gap in the discourse, the study of textiles as a material in constructed landscape offered more potential for this thesis than did the study of textiles as a metaphor for landscape.
Fabric/Textile: Studying Terms and Finding New Ones

In common language, “fabric” and “textile” are interchangeable, both referring to a material made by knitting, weaving, or felting thin filaments. However, in addition to this definition, the etymologies of the words “fabric” and “textile” are both of interest (see figures 2.1 and 2.2).

The word “fabric” developed from the Latin fabrica, which means “workshop” or “an art, trade; a skillful production, structure, fabric.” Fabrica developed from the Latin faber, “artisan who works in hard materials,” which itself evolved from the Proto-Indo-European (PIE) word component *dhabh- “to fit together” (Harper, 2012). In contemporary English, “fabric” has many meanings related to this original etymology. “Fabric” may refer to a framework or underlying structure; a texture; the arrangement

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**Figure 2.1** Etymology of the word “fabric.” Diagram by author, developed from the Online Etymology Dictionary, http://www.etymonline.com/index.php.

**Figure 2.2** The etymology of the word “textile” reveals interesting relationships. Textile shares the root “*tek” with “texture,” “text,” and, significantly, “tectonic” and “architect.” Diagram by author, developed from the Online Etymology Dictionary, http://www.etymonline.com/index.php.
of physical components; or the act of constructing (Merriam-Webster, n.d.). “Fabric” came to have the same meaning as “textile” during the Industrial Revolution, evolving through the meaning “manufactured material” (Harper, 2012).

The word “textile” developed from the PIE root work “tek-,” “to make,” which evolved into the Latin texere, “to weave”, and the Latin textilis, “woven.” Unlike the etymology of “fabric,” the contemporary meaning of “textile” and the meanings of the words from which it developed have consistently described a material made by repetitive manipulation of thin filaments. Its meaning has only changed to include other techniques of making like knitting and felting. From “*tek-,” “texture,” “text,” “tectonic,” and “architect” also evolved. Conversely, though “fabric” also developed from early notions of craft, its etymological relations (contemporary words like “daft” and “forge”) are not relevant to landscape architecture. Since it has only recently come to mean the same thing as textile, the comparison of the etymologies of these two words supports the potential of gaining relevant insight from studying the intersection of textiles and landscape architecture.

In addition to showing a historical relationship between “textile” and (landscape) “architect,” the etymology shows, through the shared ancestor “-*tek” and the persistency of the notion of making in word meanings over time, that the significance of this relationship lies in the status of both textiles and landscapes as the products of constructional craft, further defining the focus. In addition, the etymological relationship of “textile” with “tectonic” established the first connection between textiles and tectonic theory.

**History of Textiles: Reinforcing Construction**

Textiles are etymologically linked to making because textile-related techniques were among the first methods of making humans developed (see figure 2.3). The techniques of making textiles began to develop over 30,000 years ago as early makers developed techniques for selecting, harvesting, and processing fibers. Over many generations, the fibers selected and the methods used to ready them for textile production were refined, and longer, finer threads could be produced. Longer threads made more efficient textile production techniques, like knitting and weaving, possible. Sewing techniques developed to join finished textiles together. Embellishment by embroidering, beading, and dyeing were also developed and refined throughout the history of textiles. The methods of selecting, harvesting, and processing fibers; joining threads together to make textiles; sewing; and embellishing developed independently in many distinct groups of people (Harris, 2004; Schoeser, 2003). The resulting wealth
Figure 2.3  Textile history diagram. Developed from  *World Textiles: A Concise History* by Mary Schoeser, 2003, and  *5,000 Years of Textiles* by Jennifer Harris, 2004.
Figure 2.4 Diagram by author analyzing the ability of textiles to slow and hasten environmental effects.
of textile production and manipulation techniques continues to expand with new fibers, techniques, and technologies today (Quinn, 2010). This richness also once again confirmed the potential of studying textiles in relation to construction.

**Thesis Methods**

The initial research just described developed the thesis question from a vague interest in the relationship between textiles and landscape architecture to a focus on how textiles and landscape architecture are related in terms of construction. Once this direction was established, the next research phase continued with three simultaneous methods of inquiry: reading texts from landscape architecture, architecture, philosophy, materials science, fine art, feminist theory, and others; finding and analyzing landscape architectural projects that use textiles as a material; and making abstracted models of textiles. These methods brought the thesis to its ultimate focus on tectonic theory.

The theoretical texts especially helpful in the recognizing the potential for the thesis to generate a tectonic theory in landscape architecture were Gottfried Semper’s works, including *Style in the Technical and Tectonic Arts*, and Kenneth Frampton’s *Studies in Tectonic Culture*, which are described in more detail in the chapter entitled “Building Tectonic Theory.” Iterative diagramming (see figure 2.4 for an example of early diagrams) revealed the intrinsic characteristics of textiles that make them of interest to landscape architecture, as is explained in more detail in chapter five, “Textiles Outside.” Model-making provided a tactile avenue of exploration to complement diagramming and reading. The development of the models parallels the development of the thesis. See figures 2.5, 2.6, 2.7 and 2.8 for examples. The results of these efforts will be described in the remainder of the document.
**Figure 2.5** Example of model series 1, modeling hyperbolic geometry by crocheting. Wool, 6”x 4” when folded as above.
Figure 2.6 Examples of second series of models exploring the effect of cutting on a sheet.
Figure 2.7 Examples of a series of models exploring weaving with vellum. The ability of spaces in textiles to perform became apparent through these models.
Figure 2.8 An example of a vellum model being translated into a textile, woven from felted cotton, that has the capability to catch solids from water.
Chapter 3: Building Tectonic Theory

Gottfried Semper, August Schmarsow, and Kenneth Frampton played important roles in the development of tectonic theory in architecture (Frampton, 1995). If distilled into a four-step sequence as in figure 3.1, the first event occurred when Semper described an alternative, construction-based origin point for the discipline. Second, Semper challenged aesthetic norms by developing his alternative history into a new theory of style. His ideas destabilized the discipline and catalyzed an ideological shift fully described by August Schmarsow (Mallgrave, 1996). Finally, a century later, Kenneth Frampton put forth a tectonic theory in an effort to help architects achieve ideological goals through constructive practice (Frampton, 1995). This historical progression transformed architecture from a discipline absorbed by the past to one excited about the potentials of the future (Mallgrave, 1996).

DEVELOPMENT OF TECTONIC THEORY IN ARCHITECTURE

MYTH OF ORIGIN

Other materials

Other purposes

Material Purpose

Technical product with stylistic ramifications

“Style is the accord of an art object with its genesis, and with all the preconditions and circumstances of its becoming.”
-Gottfried Semper

THEORY OF STYLE

“Architecture is the creatress of space.”
-August Schmarsow

IDEOLOGICAL SHIFT

“Mastery over the means of production ...to use this articulation as a stratagem bestowing an appropriate character on the work in hand...”
-Kenneth Frampton

TECTONIC THEORY

Figure 3.1 Timeline of the development of tectonic theory in architecture. Developed from Gottfried Semper: Architect of the Nineteenth Century by Harry Francis Mallgrave and Studies in Tectonic Culture by Kenneth Frampton. Portraits from Wikimedia Commons.
Gottfried Semper’s Alternative History

Gottfried Semper (1803-1879) played a twofold role in the development of tectonic theory in architecture. The German architect and architectural theorist's ideas revolutionized the discipline. Semper contributed by describing an alternative history of architecture (Semper, Mallgrave, & Herrmann, 2011) and developing this history into a controversial theory of style (Semper, Mallgrave, & Robinson, 2004).

In *The Four Elements of Architecture*, published in 1851, Semper presented his argument for an alternative version of architectural history (Semper, Mallgrave, & Herrmann, 2011). At that time, ideas about history and methods of historical inquiry were changing rapidly. Instead of primitive dwellings, as theorists before him like Antoine-Chrysostome Quatremère de Quincy had done, Semper identified the primordial crafts from which these dwellings had arisen as the beginnings of architecture (Mallgrave, 1996).

Semper also explained that these crafts arose thanks to the intrinsic properties of the materials used in their execution. He argued that by manipulating similar materials for functional or ritual purposes, people in distinct locations and times had developed similar craft techniques. From wood, fiber, clay, and stone, early makers developed carpentry, weaving, ceramics, and stonemasonry. These techniques became more sophisticated as many generations of makers incrementally improved upon them. As the foundations of making, these crafts were also the basis for architectural construction. Semper used the Caribbean Hut to explain the types of craft he saw as precursors to architecture (see figure 3.2. He associated carpentry with the roof, weaving with the wickerwork wall, fired clay with the hearth, and stonemasonry with the rammed earth mound upon which the hut was built (Semper et al., 2011).

Gottfried Semper’s Theory of Style

Semper extended his alternative history in *Style in the Technical and Tectonic Arts; or, Practical Aesthetics* (1863) with the intention of using a deeper examination of the evolution of art to develop a theory of style. Early in his career, Semper gave a lecture in which he questioned the usefulness of history for architects. He believed that architects should study history in order to understand laws, not to gain fodder for mimicry of form (Hvattum, 2004). Following this belief, he used the epigenetic theory he had developed in *The Four Elements of Architecture* to identify the basic rules of style that had evolved to influence architectural style (Semper et al., 2004). He thought that motifs of ritual, functional, and technical significance were passed from the first methods making as they incrementally evolved through new materials, techniques, and
contexts into architectural constructional methods. By extension, following stylistic rules from their simplest incarnation with the primitive crafts through their development into architecture could be used to develop a theory of style (Hvattum, 2004).

Of the constituent crafts of architecture, Semper considered textile arts of primary importance in the development of his theory of style. He examined textiles in more detail than the other constituent crafts of architecture because all other crafts exhibited symbols and types that had originally developed in the making of textiles. By linking primordial origins to the construction of buildings through a lineage of evolving craft, Semper showed the significance of decorative and structural features. For example, he described how plaiting branches to make wickerwork walls and fences evolved into weaving through the use of more refined materials (see figure 3.3). Weaving with colored threads allowed craftspeople to create patterned wall hangings. Other makers in turn refined the wall hangings further by knitting and piling them. Finally, patterns developed through weaving were used as decorative motifs on stone,
SEMPER’S TEXTILE ORIGIN OF ARCHITECTURAL SPACE

As textiles became decorations hanging on walls, they remained a symbol of the original spatial membrane. Wood, and brick paneling to symbolically represent textiles. With this lineage, as well as his example of the Caribbean Hut, Semper argued that textiles were the original spatial membrane (Semper et al., 2004).

The theory of style he put forth in Style in the Technical and Tectonic Arts; or, Practical Aesthetics valued “the accord of an art object with its genesis, and with all the preconditions and circumstances of its becoming” (p. 53). However, Semper’s identification of textiles as both the primary precursor for architecture and the original spatial membrane led to the most influential insight of his work. In the lineage he described, Semper noted a break from the heritage of textile motifs with the advent of stone arches. The rift created as architecture’s textile heritage shifted into the spatial use of stone in vaulted architecture represented an exciting new potential
for architectural expression. Semper advocated that the spatial use of materials represented by arched stone held great promise for the future of the discipline (Mallgrave, 1996).

**August Schmarsow and the Elevation of Space**

Though Semper’s ideas paved the way for space to take the place of symbolic form as a primary concern of architecture, it was August Schmarsow who brought the idea to its fully developed conclusion. In 1893, Schmarsow argued, using techniques and ideas borrowed from Semper, that architectural history could be studied in terms of spatial creation. Other contemporary theorists also recognized the potential of defining architecture as the creation of space (Mallgrave, 1996). The conceptualization of architecture as a practice that creates space caught on, and remains integral to contemporary theoretical discourse (Frampton, 1995).

**Kenneth Frampton’s Tectonic Theory**

Over a century after his work was originally published, theorist Kenneth Frampton brought Semper’s ideas back into architectural discourse through the tectonic theory he developed in *Studies in Tectonic Culture: The Poetics of*

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**Figure 3.4** Tectonic theory. Author’s diagram developed from *Studies in Tectonic Culture* by Kenneth Frampton.
Construction in Nineteenth and Twentieth Century Architecture. Semper had attempted to guide architectural expression in a time of rapidly changing material and constructional possibilities using his theory of style. As similar context emerged in contemporary architecture with the advent of digital design and fabrication technologies, Frampton observed that architects had become distracted by symbolic representation and were less able to create spaces rooted in human experience and constructional craft. Frampton insisted that since architecture is realized through construction, architects must understand the craft of building, and furthermore, use their mastery to construct poetically.

Frampton’s tectonic theory aims to connect thought about abstract form and the creation of space with the ability to realize these ideas through practice (see figure 3.4). He asserted that architects should “[Master] the means of production… to use this articulation as a stratagem bestowing an appropriate character on the work at hand” (Frampton, 1995). As an example of successful realization of architectural expression in a built work, Frampton pointed to Alvar Aalto’s Säynätsalo Town Hall, constructed in 1951 (see figure 3.5). In the town hall, Aalto created a feeling of enclosure in the entryway through the selection of dark brick as a material. The high ceiling, light wood, and concealed structural elements in the council chamber create a spacious, open feeling contrasting with the entryway, emphasizing the importance of the room.

**Figure 3.5** Alvar Aalto’s Säynätsalo Town Hall. Author’s annotations developed from Studies in Tectonic Culture by Kenneth Frampton. Photographs from Larry Speck, URL: http://www.larryspeck.com.
A Framework for Tectonic Theory

The transformative role tectonic theory has played in the history of architecture shows the significance tectonic theory could have for landscape architecture. Tectonic theory cannot simply be borrowed from architecture. The simplified four-step development of tectonic theory in architecture described in this chapter provides an alternative if used as a framework to develop tectonic theory in the context of landscape architecture. The components generated by transposing this framework into the context of landscape architecture, including a rewritten history, new theory of style, ideological shift, and resultant tectonic theory, should each retain a connection to the reality of landscape construction. As will be described in the next chapter, the work of John Claudius Loudon contains traces of what could have been such a development. However, Loudon failed to deliver for landscape architecture what Semper had for architecture, leaving an altogether different legacy for the discipline.
Loudon’s Collection: Landscape Architecture’s Missed Opportunity

John Claudius Loudon was an influential 19th century landscape theorist. Before he began work as a writer, however, he had more technical pursuits. Loudon grew up on a farm, and after leaving home, managed a farm himself before he moved on to other pursuits. In addition to his abilities in plant husbandry, Loudon was also technically gifted with materials and machines. He revolutionized British greenhouse design with his inventions (Rogers, 2001). Loudon dreamed of being a landscape gardener, the term for landscape design in his time, but permanent injury to his leg forced him into a career in writing. Loudon, assisted after his marriage by his wife, Jane, wrote prolifically about agriculture, gardening, and landscape gardening.

Loudon’s most taxing works were the many editions he produced of The Encyclopaedia of Gardening, which was published at least eight times between

Figure 4.1 John Claudius Loudon. Portrait from Wikimedia commons.

Figure 4.2 The size of the circles in this diagram represent corresponds to the number of pages allocated to each topic of Loudon’s 1860 edition of The Encyclopaedia of Gardening. Diagram by author.
1822 and 1860. In *The Encyclopaedia of Gardening*, Loudon described many of the things Semper had described in *The Four Elements of Architecture* and *Style in the Technical and Tectonic Arts; or, Practical Aesthetics*. Loudon wrote at length on the history of gardening practices and style in ancient nations, developing an origin for the manipulation of the land. He also wrote extensively on the technical considerations of constructing landscapes, including environmental factors like soils, human labor and machines, and plants. His focus for the majority of the book is on the technical specifics of the construction of landscapes in the context of gardening and agriculture (see figure 4.2). Yet when he defined landscape gardening, he did not relate it to his extensive research and description of the specifics of landscape construction. Rather, he defined it as “the art of laying out grounds” (Loudon, 1860).

With this definition, Loudon separated landscape gardening from its constituent crafts. He did not describe landscape gardening as the expressive or artful application of the techniques he described over hundreds of pages. Rather than thus associating landscape gardening with the dynamic, immersive practices of landscape construction, he cited others who emphasized beauty as the primary goal of landscape

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**Figure 4.3** Loudon’s lack of critical analysis cut what could have been a developmental trajectory for tectonic theory in landscape architecture short. Diagram by author.
gardening (Loudon, 1860). Loudon did not even take a stance on the contemporary controversy of how beauty was to be achieved. He accommodated both those who believed landscape gardens should imitate the 19th-century idea of nature represented in landscape paintings as well as those who preferred the imitation of ancient formal gardens. In neither case, however, was the process of construction the focus, or even a consideration, of landscape gardening. The ideas Loudon documented in his encyclopedia proposed the goal of creation of landscape as the imitation of one sort of unchanging aesthetic work or another (Rogers, 2001).

In architecture, Gottfried Semper carried through the work of cataloging the history and craft of a discipline into critical analysis. However, having completed the same basic research, Loudon did not extend his inquiry analytically. Unlike Semper, who had the ambition for his books to promote a radical alternative view of the discipline (Mallgrave, 1996), Loudon’s goals were to induce young gardeners to think for themselves and to present experienced gardeners with a range of practices (Loudon, 1860). He wanted to collect facts and present them as reference, not collect and critically analyze facts in order to fuel a theory aimed at upheaving the metaphysical underpinning of the discipline. Regardless, it seems unfortunate that
Loudon did not take the next step and apply his knowledge to the development of critical ideas. Had Loudon analyzed his research critically, landscape architecture might have started with a fresh origin point and new theory of style based in constructional craft, the first steps toward the development of a tectonic theory.

Regardless of the nature of his contribution, Loudon was an influential figure in the development of landscape architecture (see figure 4.4). He influenced Andrew Jackson Downing during Downing’s travels in England. Downing brought Loudon’s ideas back to America, where he later mentored Frederick Law Olmsted and introduced him to Calvert Vaux, his partner in the design of Central Park. Olmsted, who began use of the term “landscape architecture” as a professional title in 1863, is commonly recognized as the father of the American landscape architecture. His influence on landscape architecture is inestimable, and only one degree of separation lies between him and Loudon (Rogers, 2001). In formulating a new tectonic theory, the popular interpretation of landscape architecture as the child of Olmsted is the story needing to be rewritten. An origin based in landscape-specific constructive practice is needed as an alternative.
Chapter 5: Textiles Outside

Step One: New Origins

When Gottfried Semper identified textiles as an origin for architecture, he described the ability of ropes and fabrics to string, bind, cover, protect, and enclose. Semper thought the intrinsic pliability, suppleness, and toughness of fibers were useful because these properties enabled the production of textiles that were well suited to dressing the frame of a hut and protecting people from the elements (Semper et al., 2004). In Semper's view, textiles were the first material to block the dynamics of the environment and shelter people inside a building.

The potentials of building with textiles outside Semper's textile enclosure, however, are vastly different. Outside, textiles can be fully acted upon by environmental contingency, as will be discussed further in the following chapter. The intrinsic pliability, suppleness, and toughness of a textile's constituent fibers can interact with and structure contingent environmental forces. Landscape architects and architects both design and construct to mediate human interaction with the environment. Expectations about the relationship of the built work and the people using with the environmental context, however, are distinct. Consequently, the implications of working with textiles as a building material are vastly different for the two disciplines. Thus, borrowing tectonic theory directly from architecture would ignore potentials specific to the discipline of landscape architecture. Instead, the utility of textiles as a building material for landscape, built upon through the framework derived from the development of tectonic theory in architecture, can be used to generate a landscape-specific tectonic theory. Such a theory can capture and develop the potentials unique to constructed landscapes.

Intrinsic Textile Capabilities

The methods and materials from which textiles are made can be varied to create textiles with vastly different characteristics and performance (see figure 5.1 for examples). Textiles differ depending on their constituent fibers, the technique used for their construction, and the density at which fibers are joined. These factors can be recombined to create near-infinite textile configurations. First, the selection of materials determines what intrinsic fiber properties, such as elasticity, UV resistance, water resistance, durability, color, etc. that the textile will take on. The fineness or thickness of the fibers used also translates to a change in scale of the textile network. Second, the way fibers are joined to make a textile gives individual fibers varying abilities to slide

and stretch against each other. As a result, a knit textile can stretch and deform more than a woven textile, which is more flexible and mutable than a felt. Third, the density of fibers in a textile can be adjusted. Looser textiles are more flexible, weaker, and have larger gaps between fibers than do tightly constructed textiles.

Semper observed that some textile configurations were suited to cladding the primitive hut, creating an interior space distinct from the outside (Semper et al., 2004). These and other configurations, however, could also be useful for constructing landscapes. Unlike textiles used as a crucial layer to block environmental forces from entering a building, a textile used in landscape construction is subject to—but does not necessarily need to protect against—the constant action of unpredictable environmental forces, material flows, and biota. The capabilities of textiles for use in landscape architecture stem from their potential to be configured to perform in such a context.
The utility of textiles for landscape construction derives from their ability to respond to, and integrate, the contingent forces of landscape by absorbing materials, selectively filtering materials from flows, and diffusing or slowing forces. These capabilities arise because of the inherent flexibility and porosity of textiles, and can even be observed working in a discarded carpet remnant that has come to rest on the banks of a stream (see figure 5.2). Furthermore, by varying the fibers and construction techniques used to create a textile, the performance of textiles in the environment can be specifically configured. In the hands of a landscape architect, the interaction of a textile with environmental conditions can be designed. Textile characteristics can be fine-tuned by the designer to perform in specific local contexts, giving textiles the potential to structure and organize the contingent forces acting upon them.

The use of textiles in built landscapes is already part of landscape architectural practice. This section describes a selection of the precedent projects in which textiles are used, to varying degrees, strategically to structure contingent environmental forces. Though some projects take advantage of multiple textiles capabilities, the example

Figure 5.2 Photograph and diagram by author.
projects have been separated into three sections for explanatory purposes. These sections include textiles performing by integrating materials; by selectively filtering environmental flows; and by diffusing environmental forces.

**Integrating Materials**

Empty spaces in the textile network can change via the deformation of fibers bounding those spaces. The matrix of dynamic spaces allows textiles to accommodate and hold other materials like sediment, plant roots, and water. Furthermore, since a textile is supple, the sheet can structure dynamic processes in the form of any surface or framework to which it is applied. Naturaire®, Enkamat®, and Armater® take advantage of this textile capability.

![Diagram of how a textile can integrate materials](image)

**Figure 5.3** Diagram of how a textile can integrate materials by author.

The felt used in Naturaire®, an air-cleansing green wall originally designed at the University of Guelph, supports roots and bacteria in the interstices of the textile network (see figure 5.4). The small spaces in the felt retain a solution of nutrients and water through capillary action, yet also admit air, creating an ideal environment for the roots and beneficial bacteria that cleanse the air passing through the textile (Margolis & Robinson, 2007).

Enkamat® and Armater®, both manufactured by Colbond Synthetics, are geotextiles that take advantage of the textile’s ability to integrate materials in order to hold sediment, typically on a slope, and create conditions in which plant roots can develop to help with the work of soil stabilization. Neither is made with traditional textile techniques. Enkamat is a durable, flexible, three-dimensional felt formed from non-toxic polymer monofilaments that are fused where they cross (see figure 5.5a). Armater® is constructed by reciprocally connecting geotextiles into a honeycomb fabric (see figure 5.5b). Colbond can adjust the permeability and rigidity of the geotextile to be bonded and cell size of the honeycomb to tailor Armater® for different usage conditions. The
Felts are created by permanently matting fibers. Their selective porosity and ability to integrate other materials allows root penetration, thus enabling their use as a growth medium. The felt also supports beneficial bacteria.

**Figure 5.4** Natuara®, manufactured by Air Quality Solutions Ltd. Photograph from *Living Systems* by Liat Margolis and Alexander Robinson, 2007, p. 170. “Section” diagram adapted from same.
Figure 5.5 (A) Enkamat® and (B) Armater® geotextiles, manufactured by Colbond Geosynthetics; (C) Didipio Gold/Copper Mine Road by Infrate; (D) China Grade Loop Slope Stabilization by Southern California Geotechnical; (E) Colbond example project for Armater®. Photographs (A), (B) and (E) from Colbond Geosynthetics, URL: http://www.colbond-geosynthetics.com; Photograph (C) from Infratex, URL: http://www.infratex.com/projects/mining-industry/; Photograph (D) from Mirafi, URL: www.dx2.net/pdfs/CS-chinaloop-0701.pdf; Enkamat Steppe Stabilizaton diagram adapted from same.
construction of both Enkamat® and Armater® makes them rigid within the network, giving the textiles the strength to hold soil, yet flexible as a sheet so they can conform to terrain. Their construction also creates large spaces in which roots can develop. Roots intertwine with the textile, creating a stable, durable mat stronger than either component acting alone. With these geotextiles, vegetative slope reinforcement is an option on steeper slopes than previously possible (Colbond bv, 2004).

**Textiles Selectively Filter Materials from Flows**

In addition to supporting and ordering dynamic processes internally, textiles can structure relationships within sites. The empty spaces in a textile network, depending on their size, can exclude materials exceeding that size while allowing smaller particles to flow through. The size of the empty space can be changed by adjusting the fineness of the fiber and by modifying the density of fibers in the textile. Since textiles can be made or cut to any shape, are only limited in size by their manufacture, and can be folded, stretched, rolled, and crumpled, they can create many kinds of separations across which flows may be filtered. By configuring relationships between materials and interacting with energy flows in this manner, textiles create alternative site conditions and contingencies.

![Figure 5.6 Diagram of how a textile can filter materials by author.](image)

The fog catchers in Bellavista, Peru, are an example of this capability (see Figure 5.7). The fog catchers are made with a textile originally manufactured to shade young fruit trees. The screens collect water from the fog passing through the area daily. Miniscule droplets of water collect on the textile's filaments as fog passes through the screen. Touching droplets fuse together and eventually gain enough mass to trickle down the textile and into a reservoir. Kai Tiedemann and Anne Lummerich worked
Small water droplets in fog catch on the loose weave of the textile, form larger droplets, and trickle down the fabric into a collection tank.

**Figure 5.7** Bellavista Fog Catchers by Kai Tiedemann and Anne Lummerich. Photo of fog catchers and construction from *National Geographic Magazine*, URL: http://news.nationalgeographic.com/news/2009/07/090709-fog-catchers-peru-water-missions/. Detail of fog catcher textile from *The Same Landscapes* by Teresa Gali-Izard.
with community members to build the fog catchers. The water is used to irrigate trees whose foliage will eventually provide the same function as the screens, re-establishing the original hydrology of the once-forested area (Fields, 2009).

In Toronto, the soils of the West Don Lands presented challenges to landscape architects Michael Van Valkenburgh Associates’ (MVVA’s) planned development. Far beneath the surface, pockets of water-saturated, unstable soils peppered the site. To stabilize these soils, prefabricated vertical drains (PVDs) were installed, covered with a drainage layer of sand, and then covered with fill (see figure 5.8). The drains are flat, flexible, textile-like plastic pipes able to drain even when deformed. On either side of the pipe, geotextile filter fabric excludes sediment while allowing water to pass through. The pipes provide an escape passageway for water trapped far below the surface as the fill on top exerts pressure. Soil consolidation, which might otherwise require up to a year, takes only weeks when using PVDs, and construction is possible with far less intrusive techniques than would have been used previously (Arvidson, 2011).

**Textiles Selectively Filter Materials from Flows**

As well as physically separating materials from flows, textiles can slow the velocity of flows. Unlike a solid barrier that causes reflection and turbulence, textiles allow flows to pass through while pacifying them. The flow's energy is absorbed and dissipated throughout the textile matrix (Galí-Izard, 2005). Rather than being purely applied to moving forward, the energy is diverted to flexing and moving around individual filaments (Harris, n.d.).

![Figure 5.9 Diagram of how a textile diffuses a force throughout the textile network by author.](image-url)
A sand or snow fence works by slowing the wind. As the velocity of the wind slows, it can carry fewer airborne particles so sand drops back to the ground. In the Dehesa del Saler coastal development, Alfred Fernandez de la Reguera, Ignazio Salvans, and Jordi Sole installed dune fences to stabilize constructed sand dunes. The designers did not install the dunes in the final desired form, but in a form that, with the dune fences, would erode to match their intent (Topos European Landscape Magazine, 1999).

Textiles alone are not effective at slowing the velocity of flowing water in every situation. However, containers made with textiles can be placed to create a structure with a rough surface and flexible members, much like a textile on a larger scale. International Coastal Management designed the Narrowneck Reef, a key component of the Northern Gold Coast Beach Protection Strategy in Queensland, Australia. The reef was constructed with 400 nonwoven geotextile, sand-filled “mega containers.” The containers diffuse wave action, preventing the beach from erosion and making swimming conditions safer (Saathoff, Oumeraci, & Restall, 2007, p. 255).
Figure 5.10  La Dehesa del Saler coastal development by Alfred Fernandez de la Reguera, Ignazio Salvins, and Jordi Sole. Photographs from Wasser Water by Topos European Landscape Magazine.
The sand-filled geotextile tubes slow erosion to widen and protect an important tourist beach.

**Figure 5.11** Narrowneck Artificial Reef by coastal development by International Coastal Management. Aerial photograph from "Australian and German experiences on the use of geotextile containers" by Fokke Saathoff, Hocine Oumeraci, and Simon Restall. Geotextile photograph from URL: http://http://www.tradeboss.com/ and marine life photograph from URL: http://www.divingthegoldcoast.com.au/.
Chapter 6: Contingency and an Alternative Style

The first step in the development of a tectonic theory for landscape architecture, a new origin point for the discipline, was found by analyzing the potentials of textiles as materials for landscape construction. The inherent material properties of textiles reveal fundamental potentials of the constructive practice of landscape architecture. Textiles constructing landscape can integrate and structure dynamic materials, organize material distribution by selectively filtering, and diffuse forces. These capabilities can be summarized as the ability of textiles to adapt to, structure, and temper contingency in the environment.

Constructive Contingency

Contingency refers to unpredictable changes that occur based on chance events. Sanford Kwinter used Conrad Waddington’s model of the epigenetic landscape to describe the effects of contingency on the development of form (see figure 6.1). Waddington developed the model to explain how contingency affects form in cellular biology, but it is equally applicable to landscape form as Kwinter has suggested. In the model, each possible path the red ball could take represents a potential form. The surface, the ropes below it, and the anchors to which the ropes are attached are all susceptible to change based on chance events, and, since they are all connected to each other, each disturbance ripples through the system to effect the path of the ball (Kwinter, 1992; Waddington, 1952).

Figure 6.1 Conrad Waddington’s Epigenetic Landscape Model, from The Epigenetics of Birds. Color added by author.
In the landscape, the contingencies rippling through the system could be related to climate, distribution of biota, environmental cycling, action of humans, and at the extreme, natural disaster. The importance (or potential) of contingency to various fields of study – from biology to architecture – is constantly becoming more and more apparent, but it continues to be something most cultures (landscape architecture or otherwise) largely attempt to prevent or control rather than embrace. As philosopher Albert Borgmann has said, “Reality’s character at the close of the modern era is characterized by contingency… reality is far less controllable or predictable than we thought” (Borgmann, 1995).

Contingency is a constant in the built works of landscape architects (Chaloupka, 2000). Therefore, in built landscapes the process of construction is doubled - what a landscape architect originally designs is manipulated and changed by contingent forces after initial construction is completed. These forces are generally regarded as destructive. However, the capabilities of textiles as described in the last chapter reveal the possibility of engaging with these forces constructively. By strategically utilizing materials that can structure contingent environmental forces, landscape architects might configure these forces to work in support of their design intent. Thus, the perception of contingent forces as constructive or destructive as they affect a constructed landscape depends on how landscape architects design and how audiences are conditioned to view the changes resulting from such forces.

Step Two: An Alternative Theory of Style

Accepting the new origin point for landscape architecture and its implications leads to the second step in the framework, the formulation of a new theory of style. Semper wrote, “Style is the accord of an art object with its genesis, and with all the preconditions and circumstances of its becoming” (Semper et al., 2004). Landscapes, continually manipulated by contingent forces, are in a constant state of becoming. Achieving accordance between the design, initial construction, and reformulation of the landscape by contingent forces suggests that landscape architects might productively utilize materials in such a way that the action of contingent forces is constructive. In turn, realizing the potentials of seeing contingency as constructive requires a change in aesthetic and stylistic expectations.

If contingency were to be regarded as constructive force, the volcano-scarred face of Mt. St. Helens in Washington would not represent the loss of an ecosystem considered permanent. Instead, it would represent a chance for change, enrichment, and the development of emergent beauty (see figure 6.2). Built landscapes would
be appreciated and valued because they support and display the dynamism and constructive potentials of contingency, not because they imitate a landscape painting or any other object.

The assertion of a theory of style valuing dynamism over imitative beauty is at odds with the traditional, Olmsted-based origin point of landscape architecture. According to Catherine Howett in “Ecological Values in Twentieth-Century Landscape Design: A History and Hermeneutics,” Olmsted’s picturesque designs nourished the notion that landscape architects were expected to create something beautiful. Picturesque aesthetics, as Loudon described in *Encyclopaedia of Gardening*, aspired to replicate an idea of nature as represented in 19th-century landscape paintings. An expectation of this kind of beauty diminishes the conceptualization of landscape
as dynamic, living, and immersive while encouraging distanced contemplation of its apparently static beauty. However, perhaps it is merely the interpretation of history that is at odds with the theory of style. Howett also pointed out Robert Smithson’s argument that Olmsted’s picturesque designs were not intended to be static. Smithson supported his argument with the writings of Uvedale Price and William Gilpin, both of whom served as inspirations for Olmsted. Howett quoted Smithson:

Price and Gilpin provide a synthesis with their formulation of the “picturesque,” which is on close examination related to change and chance in the material order of nature. The contradictions of the “picturesque” depart from a static formalist view of nature… We cannot take a one-sided view of the landscape within this dialectic. A park can no longer be seen as “a thing in itself,” but rather as a process of ongoing relationships existing in a physical region… nature’s conditions are unexpected… (Howett, 1998, p. 93-4)

As Olmsted might have agreed, an alternative theory of style for landscape architecture prioritizes constructive dynamism over conventional ideas of static beauty. According to this theory, built landscapes should embrace the action of contingent forces in order to cultivate dynamic landscapes.

**Precedent Examples**

Narrowneck Artificial Reef (see figure 5.11) and the Dehesa Del Saler Coastal Development (see figure 5.10), discussed in chapter 5, are examples of projects that successfully harness contingent forces. The soft corals and algae growing on the geotextiles in Narrowneck Artificial Reef increase the durability of the textiles and also create an unanticipated dynamic reef ecology so appealing it has become a tourist attraction (Saathoff et al., 2007). The dunes of the Dehesa del Saler Coastal Development, had they been created by designers intending a static form, would have been ruined by the wind. Instead, the designers engaged the wind as a constructive ally in the formation of the dunes (Topos European Landscape Magazine, 1999).

The P_Wall, designed by Matsys, is another example of the aesthetic potential of cultivating contingency (see figure 6.3). Each tile of the wall was constructed by pouring plaster onto a flexible fabric supported by dowels. A close inspection of the surface reveals that the texture of the textile’s knit is also imprinted onto the otherwise pristine white plaster surface. Matsys noticed when the wall was on display that even indoors it would catch dust and seeds. This inspired the designer to speculate about what the wall could look like were it allowed to weather outside. Originally intended
as a beautiful sculptural object, the wall becomes even more beautiful as it captures sediment, traps seeds, hosts vines, and shelters small animals. The ability of the form to unleash a unique ecology, as Matsys speculated, has more aesthetic potential than the does form itself (Kudless, 2009).
In another example, Klahn+Singer+Partner, in their Garden of Babel project, took advantage of the stylistic potential of contingent forces by setting up conditions to aestheticize the degradation of their garden (see figure 6.4. Seeded and fertilized hay bales wrapped in a textile sprouted and rotted over the course of the installation. The spaces between the fibers of the textile wrap and the spaces within the felt-like hay allowed water and air to enter and nourish an emergent ecology of decomposers and plants which dramatically changed the installation over the course of the season (Landscape Architecture Europe Foundation, 2006).
Figure 6.4 Garden of Babel by Klahn + Singer + Partner. Photographs from Landscape Architecture Europe: Fieldwork, edited by Landscape Architecture Europe Foundation.
Chapter 7: Creating Space

The ideological shift in the development of tectonic theory in architecture shifted the discipline’s focus from creation of symbolic form to creation of space. For landscape architecture, the ideological shift resulting from a new theory of style could be described as creating space as well. However, rather than creating space for human occupation or appreciation, landscape architecture could be described as concerned with creating spaces that might be acted upon and occupied by contingent environmental forces and material flows. Materials with such spaces and objects or landscapes built with them can be designed to be flexibly responsive to contingent forces and can also leave room for contingent material additions. Strategic use of these spaces enables landscape architects to structure contingency through design. Just as architects created space with each built work before their ideological shift, landscape architects already influence the path of contingency in the environment every time they build. The ideological insight merely shifts attention to a preexisting condition, allowing designers to engage with the phenomenon more intentionally and in such a way that results in a much wider range of effects.

The Natural Cyborg

Moving from the recognition that landscape architects influence contingency in the environment to the practice of intentionally engaging with that phenomenon is a shift fraught with implications. Henri Bergson’s Creative Evolution (1907) and the reinterpretation of his ideas by feminist philosopher Paola Marrati provide the groundwork for understanding the significance of such a reconceptualization. As explained by Marrati in “The Natural Cyborg: The Stakes of Bergson’s Philosophy of Evolution,” Bergson’s ideas provide a useful conceptualization of the place of humans in nature. His explanation is especially apt for understanding the implications of constructing landscapes. Bergson crafted his argument within the framework of an alternative view of evolution (see figure 7.1 for a diagrammatic representation of Bergson’s logic). He reasoned that although evolution can be understood in retrospect as the novel reordering of preexisting elements, it is impossible to predict. Contingent events occurring over time create novel situations to which evolving beings must adapt. Through contingency, time has agency. If one accepts the premise that time has agency, it follows that time, acting on preexisting elements, is a force that generates new forms. In evolution specifically, time works
with survival and fitness to determine which new forms arise through reproduction. Who gets to reproduce is determined by who survives, which is determined by who best adapts to environmental contingencies occurring during the given period of time (Bergson & Mitchell, 1913; Marrati, 2010).

In nature, this process produces new organisms with new organs. In the famous example of Darwin’s finches, distinct species of birds emerged by developing specialized beaks adapted to a specific type of food (Lack, 1983). Bergson saw such new organs as discrete solutions to the problem of surviving in a highly unpredictable environment. As such, emerging biological organs represent new sets of knowledge for dealing with environmental contingency. To Bergson, all forms of life are in and of themselves solutions to complex problems and thus possess knowledge. He defined instinct as the ability to use this knowledge, accessible simply by using organs. For example, the bird using its beak to eat seeds or a plant using its leaves to capture solar energy are both using instinct to solve complex environmental problems with the knowledge intrinsic to their inherited organs.

Bergson wrote that intelligence, the ability to make tools, is a different kind of knowledge, not a higher degree of it. Like organs, tools represent a new set of knowledge for dealing with environmental contingency. This knowledge expands an organism’s abilities to act in the environment. Though creating tools requires intelligence, using them only requires instinct. In other words, even if an organism hasn’t created a specific tool, it can and will use it to resolve its own problems (Bergson & Mitchell, 1913; Marrati, 2010). The plants inhabiting the discarded carpet fragment in figure 5.2 don’t care for what purpose the carpet was made. The plants

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**Figure 7.1** Diagram of Henri Bergson’s theory of evolution by author, developed from Paola Marrati’s description in “The Natural Cyborg: The Stakes of Bergson’s Philosophy of Evolution.”
can instinctively use the textile as an artificial organ to help them solve the problem of surviving and reproducing in an environment of unpredictable, uncontrollable erosion, so they do.

The existence of the carpet fragment itself, as well as the presence of the seeds that germinated on it, are manifestations of contingent events. Living beings, like the person who threw away the carpet and the plants that produced the seed growing in it, feed into the contingency of the natural system through their actions. The introduction of new organs, whether biotic through the creation of new organisms, or abiotic through the creation of new tools, amplifies this effect. Tools increase the potential effects organisms have on the natural system as a whole - they do not merely work to expand the abilities of an organism in adapting to its environment. Tools additionally produce new ideas and create wide-ranging effects.

Therefore, time, contingency, and living beings are creative forces with the power to create new organs, whether made of living flesh or other materials. Humans and other forms of life are agents of creation, and the tools humans create change the ability, for good or for ill, of all life to adapt and change in the face of environmental contingency. Marrati calls the products of this cycle “natural cyborgs,” whether or not the true cyborgian nature of organisms is reflected in the materiality of their bodies. The words “natural” and “cyborg” (a being with both biotic and abiotic parts), reflect the mutual influence of humans, their materials, and other organisms on each other (Marrati, 2010).

**Step Three: Ideological Shift**

In Bergson's framework, textiles are artificial organs with the powers to extend the abilities of organisms and to create wide-ranging effects on the natural system as a whole. These effects would include their ability to accommodate material ingress, selectively filter, and dampen forces in the environment. The creative forces of time, contingency, and living beings can act upon and recombine textile organs to create new ones. Bergson recognizes that time and contingency, the forces that take over landscape construction once landscape architects have finished, are creative, not destructive forces. Bergson’s ideas not only support the ideas developed thus far, but also extend them further.

Bergson argued that not only humans, but also their materials and tools, belong in the realm of nature. Tools are artificial organs, and both artificial and flesh organs serve to extend the abilities of organisms. Furthermore, tools, once created, are capable of use by organisms other than the original creator (Bergson & Mitchell, 2010).
By designing and building landscapes, landscape architects favor certain organic organs over others, produce artificial organs, and introduce environmental pressures on nature. As a landscape architect, creating evolutionary pressures through the modification of the environment is unavoidable. Landscape architects are particularly powerful agents of natural change.

Reconceptualizing the role of landscape architects in this manner brings about the opportunity for an ideological shift in the profession in which landscape architects stop seeing themselves as stewards of nature, and start to recognize themselves instead as actualized natural agents. Building a landscape can be reconceptualized as the destruction of existing organs and the provisioning of new ones, setting up a fresh set of preexisting conditions upon which time, contingency, and biota can act.

The cyclical nature of Bergson’s creative evolutionary process also reveals the futility of seeking permanent solutions through landscape construction. Since new solutions in the form of new organs and new tools feed back into contingency, new problems constantly emerge as solutions are implemented. This realization pits humans against a set of constantly emerging environmental problems, a logical reality for nature characterized by contingency and change. Living in such a world requires continual adaptation and constantly emerging knowledge.

To best operate in a reality “characterized by contingency,” as Albert Borgmann (1995, p. 35) might say, landscape architects should recognize themselves not as the sole master builders of a landscape, but as collaborative agents feeding into and orchestrating the contingency found there. Landscape architecture should be redefined as a practice that productively structures contingent natural processes. Landscape architects could use the structuring of dynamic nature as a common anchor for the explorations of the discipline in providing adaptive solutions for human settlements. Engaging with contingency necessitates seeing the world as a place that requires continual adaptation and constantly emerging knowledge gained by making and analyzing the products of making. This is exactly the kind of knowledge design research centered on tectonic theory can build.
Chapter 8: Moving Landscape Architecture Forward

Kenneth Frampton described tectonic theory for architecture as, “Mastery over the means of production… to use this articulation as a stratagem bestowing an appropriate character on the work at hand” (Frampton, 1995). A tectonic theory for landscape architecture would emphasize the importance of developing knowledge and techniques enabling landscape architects to masterfully set up the initial conditions upon which contingent forces act.

Tectonic theory, however, does not only provide a forum for the evolution of technical knowledge within landscape architecture. It also provides a platform for the promotion of a new aesthetic logic based on a theory of style prioritizing constructive dynamism over conventional ideas of beauty. Martin Heidegger said that architecture can reveal both the materials from which it is made and different ways that the world comes into being. These words extend, perhaps with even more meaning, to landscape architecture (Frampton, 1994). Built landscapes can evoke the multiplicity of actors contributing to the construction of the world, not only designers, but also time, contingency, and other organisms (Bergson & Mitchell, 1913; Marrati, 2010). The material capabilities of textiles especially—physically enmeshing sediments and life in their fibers, sorting and organizing flows of materials, and dampening forces in the environment—represent a cyborgian interpretation of the construction of nature.

Biohaven® Wild Floating Islands, Field’s Point, Swamp Garden, and Not Garden each reveal the mutual interaction of biota and textiles in the landscape (see figures 8.1-8.4). Textiles, however, are only one kind of material that landscape architects must master. In a speculative project, William Hai Liang Chen designed the Reef Surface Mobile Island (see figure 8.5). The island is made of concrete molded by sewn fabric into a form inspired by fishing nets. Like the plaster P_Wall by Matsys (see figure 6.3), this is an example of how textile characteristics can be achieved with other materials. The porous concrete form slows and diffuses the action of waves on the shore. By calming the water and providing a framework for growth, the filigree concrete also provides habitat for coastal trees and marine life (Chen, 2008).

Textiles can also be combined with programmable responsive systems to create more precisely controllable ways of engaging with contingency through landscape intervention (see figure 8.6). The Barcelona Regional Agència Metropolitana de Desenvelolupament Urbanístic I d’Infraestructures used a pneumatic dam as part of the environmental restoration of the Besòs River. The stream floods during the rainy
Figure 8.1 Biohaven® Wild Floating Islands by Floating Island International. Photographs from Living Systems by Liat Margolis and Alexander Robinson, 2007.
Figure 8.2 Field's Point by Abby Feldmen. Renderings from Living Systems by Liat Margolis and Alexander Robinson, 2007.
Loosely hanging sphagnum moss from a warp of cable creates an ephemeral wall and allows the fibers to freely move in the wind.

Figure 8.3 Swamp Garden by West 8 Landscape Architects. Photograph from Radical Landscapes by Jane Amidon, 2004.
season, yet is dry for much of the rest of the year. The dams are typically inflated to maximize the visual effect of limited water during the dry season. During storm events, the dams deflate to allow water to safely pass through (Margolis & Robinson, 2007).

Discovering new knowledge through a discourse of tectonic theory requires that landscape architects nurture a culture of material exploration. As a goal, landscape architects should strive for the ability to nimbly manipulate materials to achieve design intent, not in spite of, but by taking advantage of the difficulties of building in an environment characterized by unpredictable change. This will require embracing the etymological heritage of the word architecture, from tek, to make, to architekton, master builder, with materials suited to the context of landscape. Whether the materials themselves are stable or dynamic, tectonic theory can guide landscape architects toward directing the forces of contingency to work productively.
**Figure 8.5** Reef Surface Mobile Islands by William Hai Liang Chen. Panel connection detail, island form possibilities, and fabrication prototype images from Environmental Tectonics: Forming Climatic Change, edited by Steve Harvey. Image of reef ball (similar artificial reef inhabited by fish) from Reef Beach Company, Ltd. URL: http://www.reefbeach.com/.
Laminating textiles achieves different functionality

**Figure 8.6** Environmental Restoration of Besòs River by Barcelona Regional Agència Metropolitana de Desenvolupament Urbanístic i d'Infraestructures S.A. Photographs from *Living Systems* by Liat Margolis and Alexander Robinson, 2007.
References


