

# LIMINAL MATTER

Diffuse, Adaptive Environments for a Future Dundas Square

by

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“Earth is home to millions of species. Just one dominates it. Us. Our cleverness, our inventiveness and our activities have modified almost every part of our planet. In fact, we are having a profound impact on it. Indeed, our cleverness, our inventiveness and our activities are now the drivers of every global problem we face. And every one of these problems is accelerating as we continue to grow towards a global population of ten billion. In fact, I believe we can rightly call the situation we’re in right now an emergency—an unprecedented planetary emergency.”<sup>[1]</sup>

LIMINAL

1. of, relating to, or being an intermediate state, phase, or condition<sup>i</sup>
2. The liminal period is the time and space betwixt and between one context of meaning and action and another, It is when the initiand is neither what he has been nor is what he will be.<sup>ii</sup>

MATTER

1. Something that is being done, talked about, or thought about.
2. The substance of which a physical object is composed.
3. The indeterminate subject of reality; especially :the element in the universe that undergoes formation and alteration.<sup>iii</sup>

## **Author's Declaration**

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.



“The delimiting surface unambiguously defines the datum thus differentiating inside– within the extends of property; from outside– beyond the extents. The surface-as-datum thereby takes on an additional, and perhaps more problematic role as ‘boundary.’ The architectural boundary inherently marks difference and ownership through a prescribed discontinuity. The physicality of the surface manifests this boundary as a barrier, container or edge, producing a very real discontinuity that is perceptually impenetrable if the surface is opaque, and that remains physically impenetrable even if the surface is transparent.”<sup>[2]</sup>

## Abstract

Emerging technologies challenge conventional approaches to the design of contemporary urban public space, both with regard to location and to organisational composition. With the arrival of compact, mobile and real-time wireless connection, entirely new methods and circumstances for communication have developed. The “immaterial” soft systems of physical and digital space are investigated for their potential to become enriched by nascent social and technological conditions. The thesis applies this research as a tool for the re-envisioning of Toronto’s Dundas Square. In its design, the capacity for an embedded, public, and adaptive architectural system to expose the liminal, “invisible” relations that affect the collective environment is explored.

The conventional and prevalent understanding that buildings and boundaries are visibly physical, rigid, and primary mitigators of the environment is challenged in favour of a diffuse architecture capable of both sensing existing conditions and calibrating new ones, providing a dynamic sensory framework for relationships between participants and built form. Material and immaterial thresholds are investigated at the scale of the individual and the collective, arriving in two sections of research and design. **The Expanded Realms of the Individual** first maps the comprehension of dilated physical and energetic boundaries of the human body as a measure of correspondence between other beings, while **Synthesis** uses this mapping to consider the potential for human relationships in the digital era. Accounting for the various boundaries of sensation in human experience, both built and speculative design work test the possibilities of an adaptive, responsive environment within the public realm.

The traditional understanding that architecture serves and that its inhabitants are serviced is placed aside in favour of symbiotic relationships between buildings and bodies. Under these circumstances, exterior and interior delineations are secondary to moments of diffuse spatial circumstances. The typically open, “flexible” design approach to public space is critiqued for its potential to alienate individuals through designing for a designated “average”. The methods and designs contained in this thesis argue for an actively empathetic architecture: a system of instruments and scaffolds that sustain an adaptive learning environment while assisting to forge empathy-driven relationships between architecture and its inhabitants – in other words, an architecture that actively associates itself with the complex narratives and emotions each person experiences daily.

SOFT: “The term “soft” is expansive in its meanings. Soft material, soft sound, soft-mannered, soft sell, soft power, soft management, soft computing, soft politics, software, soft architecture. It describes material qualities, evokes character traits. It defines strategies of persuasion, models of systems thinking and problem-solving, and new approaches to design.(...) [S]oft was deemed to enable individualism, responsiveness, nomadism, and anarchy.”<sup>iv</sup>

EMPATHY: “To describe the mental process by which one person enters into another’s being and comes to know how they feel and think.”

“Unlike sympathy, which is more passive, empathy conjures up active engagement...”<sup>v</sup>

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liminal matter

To Grandpa. And to all others who  
have offered love, support, and most  
importantly, understanding.

front matter

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## Prologue

\*\*\*

“Western culture has developed into a largely tolerant, pluralistic society, dominated by a mild-mannered political correctness, that this book is so necessary. In an architectural culture whose liberal openness is always prone to collapse into a libertarian conformity, it will have a particular relevance. The book will no doubt prove controversial, but if it succeeds only in eliciting criticism, it will have achieved its primary objective of stirring up debate in what is perceived as an all too complacent domain.”<sup>[3]</sup>

\*\*\*

“A radical view of human nature is emerging in the biological and cognitive sciences and creating controversy in intellectual circles, the business community, and government. Recent discoveries in brain science and child development are forcing us to rethink the long-held belief that human beings are, by nature, aggressive, materialistic, utilitarian, and self-interested.”<sup>[4]</sup>

\*\*\*

“I want to tell stories about relating in significant otherness, through which the partners come to be through flesh and sign... about evolution, love, training, and kinds or breeds help me think about living well together with the host of species with whom human beings emerge on this planet at every scale of time, body and space. The accounts I offer are idiosyncratic and indicative rather than systematic, tendentious more than judicious, and rooted in contingent foundations rather than clear and distinct premises.”<sup>[5]</sup>

We live in a technologically omnipresent world. The evolution of digital communication tools is ongoing and radical and the capabilities of network-enabled devices have created hyper-active realms of communication. This paradigm shift has seen direct and widespread impacts on human culture. Social behaviours have been permanently augmented and boundaries between lived, mediated, and synthetic experience are in conversation. As a result of these changes, urban publics have become increasingly complex –but this change is not often reflected in the architecture of the city. The ability to have an online, digital personality offers a person additional platforms for choice and expression where physical interaction is not necessary. Information is immediately available at a users’ disposal, ready to be sorted, “liked”, judged, or applied. Therefore, social experiences in the digital realm are partially curated by the user. Could the rise of the plugged-in individual be due to a shared desire for connection and control within a technological, social public? How can such considerations help to shape a city as a place where publics might “engage with humanity, its joys and fears, its actual and mnemonic context and its aspirations towards cross-cultural citizenry.”<sup>[6]</sup>

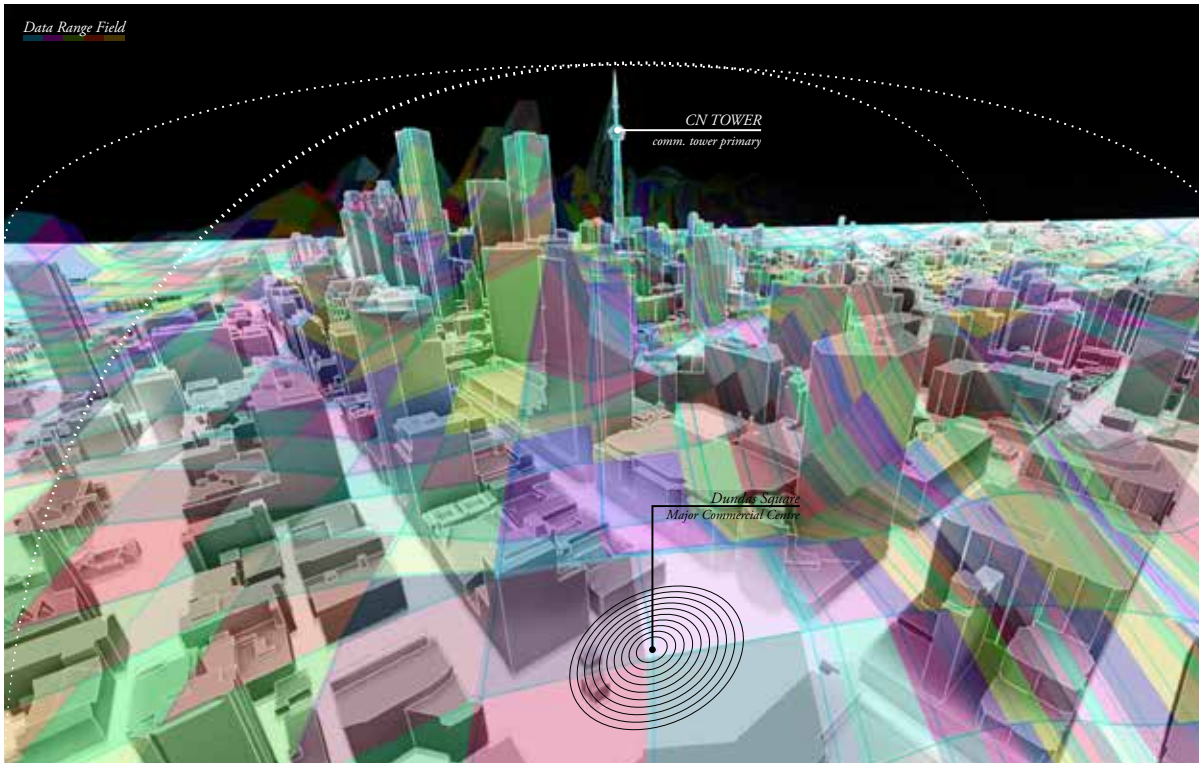
With online accessibility, urban publics are becoming increasingly heterogenous and fragmented collectives. Devices scattered throughout the urban fabric have formed a network of digital portals, constantly increasing in sophistication and population. A blanket of “soft” information covers the city. The mobility and flow of goods, ideas, people, and more, have diversified and accelerated through a system that is “invisible” in its processes, but palpable in the physical actions and emotional reactions that are caused by its existence. While these changes manifest in our daily experiences and built environments, the design and construction of public space is not always apace with the concurrent socio-technological evolution. However, the digital era has fertilized architecture with tremendous potential.

This era has had multi-scalar effects, impacting the global population and the individual citizen simultaneously. It has seen the emergence of social media, an unprecedented communication and economic platform. Social



liminal matter

Figure 1.1 Imagining Wi-Fi



front matter

Figure 1.2 “Invisible” Communication Fields

media has situated billions of the population within an immaterial realm created from within our physical spaces and by our physical actions. The recorded information that can define a single user within this global network has become extremely diverse and detailed. Followed by social media was the development of tools to help quantify and analyze individual actions. Through tagged data metrics containing records of an individuals behaviour, technology is being used on a daily basis to help understand and link external stimuli and experiences to the inner workings of the human body.

With the conception of this online, virtual world, digital networks have coexisted alongside physically occupiable spaces, but the link between the two is perhaps less obvious. Actions and choices made within digital infrastructures, whether it's the purchase of goods by a number of users or the forging of a friendship between two strangers, do more than simply manifest in the physical realm. They have tangible impacts on people and places. But how can the user be made accountable for these multi-scalar impacts? How can informed choices and actions be made in one realm the relationship to the other is concealed? Where is there an opportunity for empathy to be forged across platforms?

Primarily mediated by the digital screen, this flattened world is often mobile and, due to it's universal nature, placeless. Conversely, the physical world remains rigid, slow, and, in many ways, unmoving. It is hard to ignore the growing capabilities of the online interface as the tensions between the digital and the physical realm increase. In the interest of a greater stewardship for individual and collective human behaviours, more opportunities for the digital to manifest in the physical realm, and vice versa, is needed. The urban dweller spends most of their waking hours online in one way or another. If the built environment could tap into, reflect, and learn from an individuals digital processes, architecture can become a vehicle for self-reflection: a powerful space that gives materiality to the actions and choices of an individual and a collective. Public space could respond directly to the power and affect of its citizens while also considering their emotions, memories, and senses.

For architecture to achieve this, many non-traditional factors must be considered in order to synthesize an enriched holistic, localized, sensory experience. A rigid, built environment is always operating within the energetic, gradated boundaries of human occupancy. These boundaries expand and contract spatially, influencing human perception and social connection. Therefore, it is important to consider how built environments might act as a mediator of events, emotions, and relationships, and if architecture, too, can become energetically gradated in order to better relate

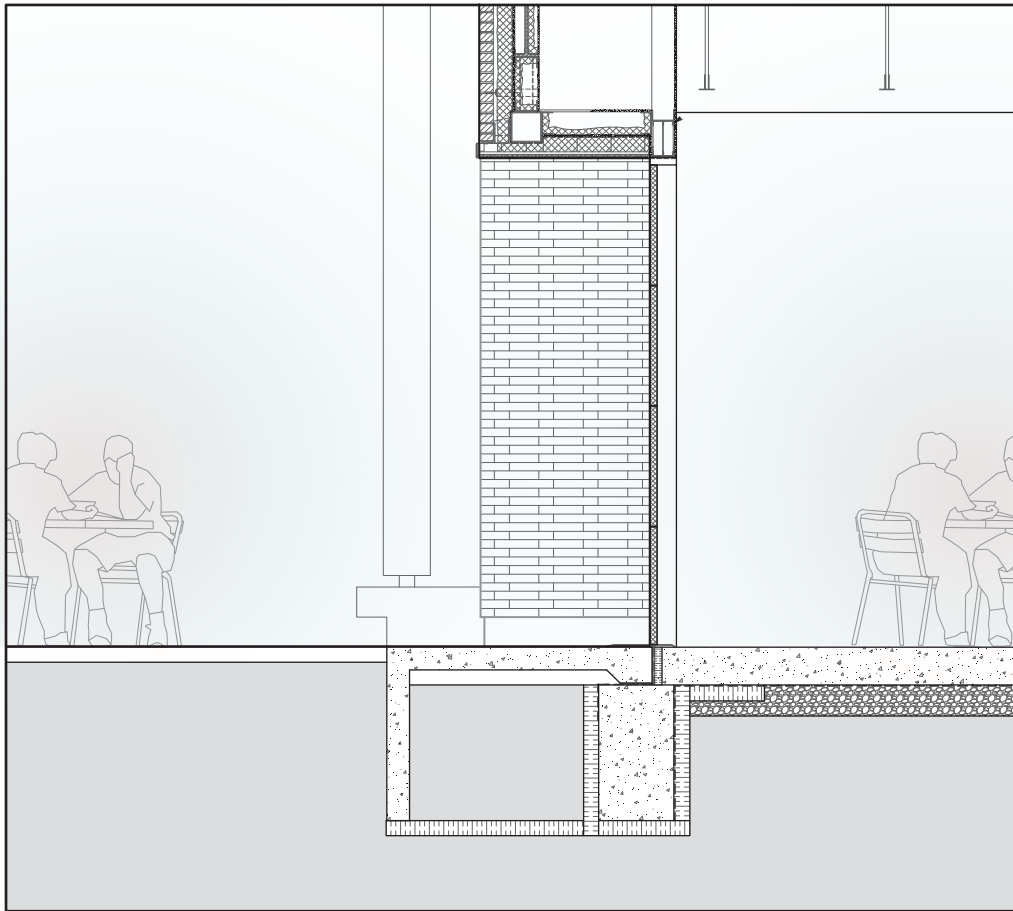


to its users. The conventional vocabulary of architecture which includes notions of ‘solid’ and ‘void’, ‘inside’ and ‘outside’, ‘within’ and ‘without’, requires a second glance. Such boundaries are not so black and white. The territories of affect, which is to say the energies of all things in the physical environment, overlap, interweave, vibrate against and layer upon one another, from the scale of the atom to the expansive reaches of the cosmos. How might architecture become a reflection of this complex and vital network?

It is time to look closer, both to our environments and ourselves. It is time to listen harder to the cues in our environment, and consider as designers the many ingredients that compose the ever-changing human experience. Throughout this thesis, building conventions and social models are questioned and critiqued. It may be perceived as polemic, however, this is in some ways, precisely the point. This work attempts to provoke a series of questions concerning a particular element of environmental awareness: the tensions that are created “between things”.

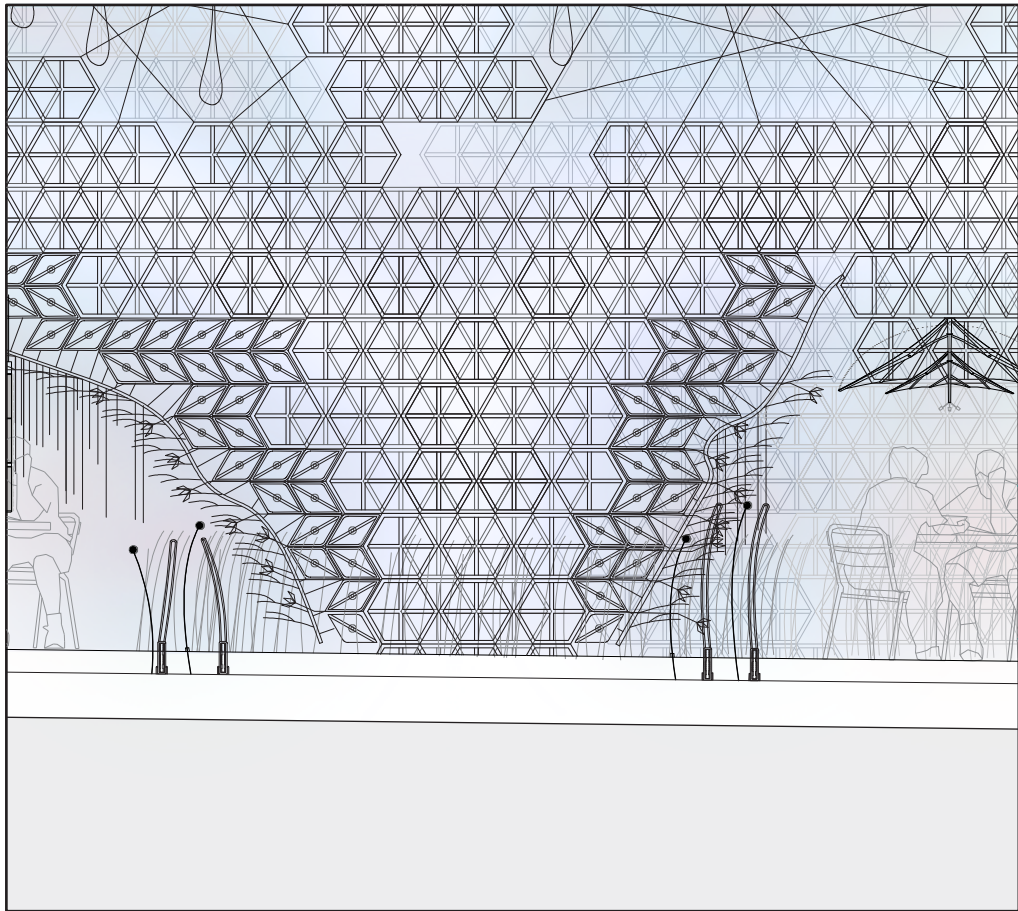
The open plan and cartesian inclusivity of Dundas Square, a major public space in Toronto, Ontario, is reframed with these energetic tensions in mind. The Square is imagined as a collection of blended, outdoor ‘rooms’, providing spaces for various programs, populations, and postures. The design fuses metabolic, emotional and atmospheric conditions into the physical structure of the space. The resulting environment, which both senses and responds, is closer to a sentient being and a companion than a container for activity. The architecture is, in effect, an experiment for a possible future where smart, empathic systems are emplaced, attentive, considerate, and invested in the social emotional well being of the individual, the collective, and the context. Rather than viewing the public space as a living room, the Square becomes a place of intimate comfort, culture and diversity—a home. The embodied space develops character and participates in the interactions that occur in its domain, contributing to the overall experience of the site while helping to develop meaningful relationships between users and with their environment. Types of spatial engagement made possible by a diffuse, responsive environment are multivalent and the increased activity of the Square encourages mutually enriched experiences between the body and its surrounding milieu. At its core, the architecture is driven by the energy exchanges and subtle chemical perturbations that accompany human action and behaviour,

Perception is driven by local, discrete, and transient energy exchanges between the human body and its immediate surroundings...The architecture of a perceptual environment is instead an architecture of



liminal matter

Figure 1.3 “Typical” Building Envelope



front matter

Figure 1.4 Proposed Diffuse Architecture

contingency: Not geometry and surface, but heat and light. Not form and materials, but sensuality and tactility. A contingent architecture emerges through interactions with the body, and respond to each body with behaviors that are specific to that moment in time and that individual. When the contingencies are designed, the objective totality of a geometrically-derived architecture gives way to subjective discretion.<sup>[7]</sup>

This thesis argues that, in the age of media interfaces and the emergence of a digital and social public, a shift in the conception of public space is required. The proposed building system is an amalgam of scaffolds comprised of hexagonal steel modules. These modules fuse to create dodecahedral clusters reminiscent of the complex three-dimensional geometry of the Weaire-Phalen structure. A kind of loose peristyle emerges, fragmenting sightlines and deconstructing the responsibilities of a conventional building envelope. An extracellular matrix reminiscent of the industrial vitality of Le Centre Pompidou or Cedric Price's Fun Palace, is created, taking cues from the the structural elements of Fujimoto's Serpentine Pavilion.

This versatile frame, both adaptable and flexible, is the foundational groundwork for the elements of an informal city. Structural components can be swapped in to the existing structure and technological components can be attached to suit various events and cultural programs. Sensing systems woven into the structure might hold thermal, aromatic, or acoustic responsibilities, responding to inputs such as user moods or durational speeds. The architecture therefore serves to augment of amplify the experience of its participants, actively situating itself between the digital and physical realms. Within this space, the ability to see an individuals actions, choices and behaviours create physical pulses is made possible. Through systems such as the breathing, inflatable lungs or the dispersed network of localized and collective light patterns, an individual can see how their participation in the environments collective mood or energy might impact an adjacent couple's experience of the space, and then how that couple's experience might effect a small group of friends nearby, and so on. Therefore, the simple and subtle actions of a single person takes immediate effect and provides opportunities for agency, self-awareness, and connection. The architecture connects and reflects the emotions, memories, and senses of its users, both at an individual and collective level. A layered, multisensory experience of the city brings its citizens together into this public, which is somewhat immaterial, somewhat material, but altogether social.

In many ways, traditional construction methods can learn from the simple phenomena of emergence and architecture. Consider

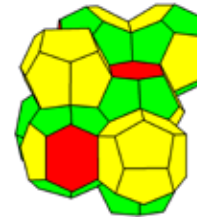


Figure 1.5 Weaire-Phalen Structure



Figure 1.6 Le Centre Pompidou



Figure 1.7 Fun Palace



Figure 1.8 Suo Fujimoto Serpentine Gallery Pavilion

the bird leaving its nest and learning to fly, or a plant growing with supports until it is strong enough to stand on its own. In a similar vein, consider Louis Khan's reflection on the Stoa, which he feels

was made most marvellously (...) no partitions, just columns, just protection. Things grew in it. Shops became. People met, meet there. It's shaded. You present a quality, architectural, no purpose. Just a recognition of something which you can't define, but must be built.<sup>[8]</sup>

Here, Khan posits that the greatest strength of the Stoa is how program is suggested rather than fixed. Areas can accommodate a variety of circumstances, but are better defined by the proclivities particular to the individuals and groups inhabiting the space. An architecture that allows for this type of contingency is able to be in constant conversation with its inhabitants, curious and learning, growing and processing. The thesis is in search of this architecture with the consideration of the digital era.

The design research is divided into two sections. The *Expanded Realms of the Individual* maps the dilated physical and energetic boundaries of the human body. The chapter is divided into three pieces:

*Understanding the Body in Space* unpacks the energetic relationships between the human body and surrounding environments. A brief overview of human perception covers:

- a) A chronology of the analysis of the human body and its movement through space and time
- b) Elaborations on brain functions and recent discoveries in cognitive processes
- c) The energy exchanges and the processes of the body activated by external stimuli and experience
- d) A variety human efforts to control and modulate environments in order to find comfort and homeostasis

*Understanding the Presence of Others* considers the expansion of these energetic processes into the spaces between people and environments. Using various relationships and couplings as case studies, effects on human emotions, understanding and communication are explored. Digital tools used for communication and network connection as the human bodies expanded physiology and their impact and role in human collectives is considered. The exploration concludes in a series of schematic propositions for an urban fabric that acknowledges the digital and physical realms at play in the human experience.

*The Living City* introduces the idea of a built environment that participates actively in these relationships. Energy exchanges actively modulate outputs of the system, which activate multisensorial changes in component activity. The chapter explores visionary architecture concepts that evoke similar propositions for architecture. The research is supplemented by tests in built, responsive architecture carried out in collaborative, exploratory design work. The incremental and related nuances of human experience revealed are considered a foothold for the development of an empathic architectural system.

The second chapter, entitled *Synthesis*, focuses on the development of dynamic systems and innovative technologies as a method for enabling a hybrid collective. A diffusive, embodied, empathic architecture is proposed. Dundas Square is interrogated, dissected, and reimaged for its potential to foster alternative modes and attitudes of building.

This thesis proposes a shift in urban development. At the heart of the work is moral reflection on architectural practice and shared human responsibilities. In his essay *Terra Fluxis*, James Corner references David Harvey to help illustrate the existing downfalls in the design of future cities. Corner states the focus should not be in form-making or aestheticism, but in the design of “socially just, politically emancipatory, and ecologically sane mix(es) of spatio-temporal production processes,”<sup>[9]</sup> which fundamentally identify with the best interests of the overall well-being of humanity and the surrounding environment. The design of spaces for people to exist and to carry out their lives should not be “imposed by uncontrolled capital accumulation, backed by class privilege and gross inequalities of political-economic power.”<sup>[10]</sup> Corner proposes a transition from formally focused architecture, which understands itself as a service-driven profession, to a conscious and self-aware architecture that constantly considers and assesses its impacts. The methods and designs contained in this body of research is in search of this architecture, one that considers notions of agency and the influence of human action on collective existence through the medium of built form.

A set of design principles for future public environments is proposed:

Built environments are seen as matter. Therefore, they are not made but grown or evolved. This matter has life. Its elements are modifiable, mobile, and fluid. They are open to and actively looking toward change.

#### **Number One**

Architecture is to be conceived as a companion species. The consideration of the individual and the built environment engaged in a symbiotic relationship can offer a deeper vitality to the human experience of architecture.

#### **Number Two**

Immaterial qualities in surrounding environments are integral to the understanding of the relations between bodies and the expanded field. This effort extends to the consideration of the individual within collective spaces, rather than creating “homeostatic” environments that ignore the fundamental differences of its participants. By designing with these differences in mind, a multi-sensory, adaptive and responsive architecture can help to encourage the accountability of the individual towards a collective good.

#### **Number Three**

Design must be a highly integrated and multi-disciplinary process. This extends beyond engineers, architects and designers, and includes professionals related to building program, individuals with exceptional knowledge of the nuances of place-based culture, and significant input from potential users or tenants, rather than primarily working with initial stakeholders.

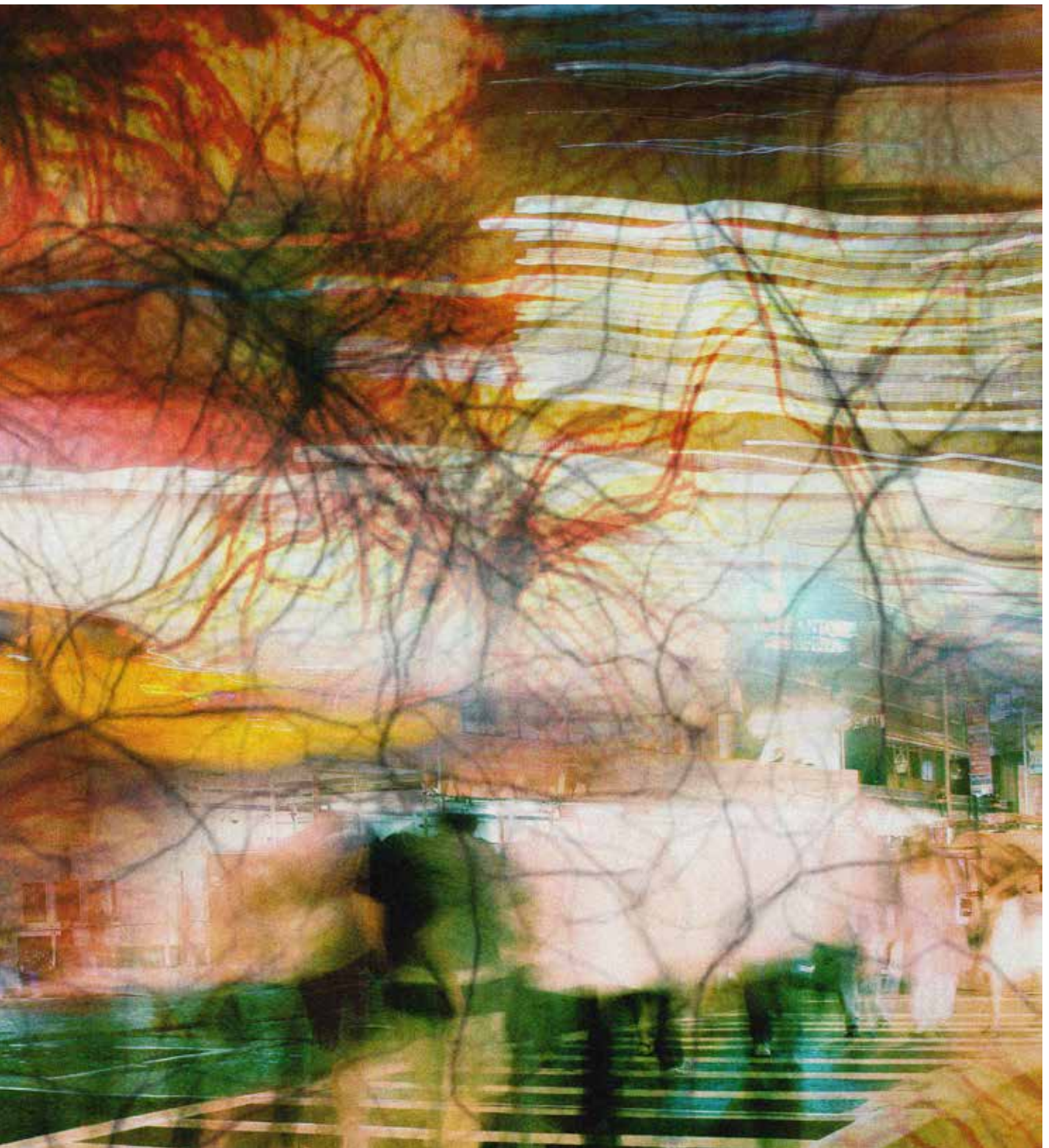
#### **Number Four**

Architecture should strive to prioritize its “soft” qualities ahead of the “hard” ones. These include the quantifiable translations of emotion and affect through actions and residual energy exchanges. Once this information is considered, a proposition for material and form can be made.

#### **Number Five**







front matter

Figure 1.9 Filament City

**The Expanded Realms of the Individual**

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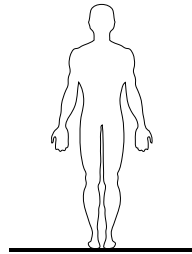
the expanded realms of the individual

Analyzing the effects of digital  
innovation on human perception and  
behaviour.

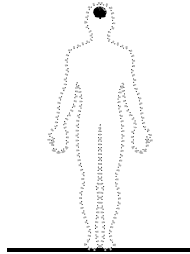
**Section Contents**

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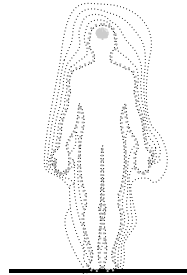
**Part I**  
Understanding the Body in Space



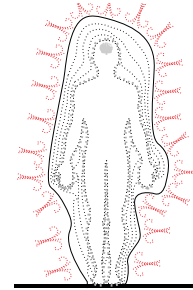
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The Body & Space



1.2  
Cognitive Processes

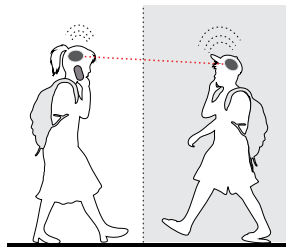


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Energy Exchanges

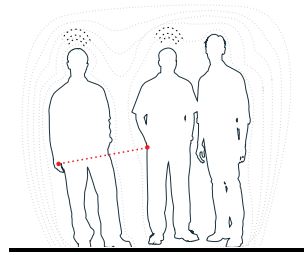


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**Part II**  
Understanding the Presence of Others

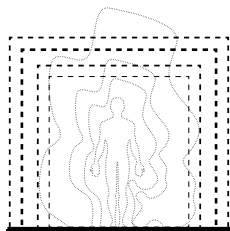


2.1  
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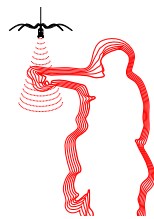


2.2  
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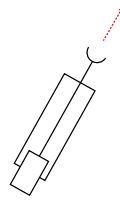
**Part III**  
“The Living City”



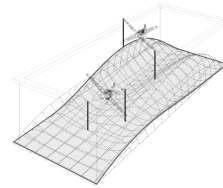
3.1  
Empathy and Accountability  
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3.2  
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3.3  
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3.4  
Case Studies

the expanded realms of the individual

**Part One: Understanding the Body in Space**



Figure 2.1 Caryatids at the Erechtheion

the expanded realms of the individual

## 1.1 The Body and Space

Throughout history, human cultures have considered spatial constructs—buildings in particular—to be analogous with the bodily form. In Western culture, this relationship was explored and indited by Vitruvius, whose theories were organized around notions of representation, proportion, symmetry and eurythmy.<sup>[1]</sup> The ancient Caryatid serves as a very literal representation of these ideas, the form of which is a sculpted female figure. Caryatids were used as architectural pillars in the construction of Ancient Greek temples, such as the Erechtheion in the Acropolis of Athens.<sup>[2]</sup> Vetruvian principles have continued to ground contemporary architectural design with basic ideas of human proportion and have laid important influence of the designed environment.

In the history of the human body in built form and its study and representation, physiological accuracy and realism has often been sacrificed in favour of an idealized form. Representing a dynamic body in static form distorts the figure, as is the case in the contrappasto or S-curved posture in Ancient Greek and Roman Sculpture. This technique can be seen in Myron's *David, The Discus Thrower*, a Greek sculpture from the end of the Severe period (490 to 450 BCE) and an early example of dynamic composition used to express rhythm, harmony and balance. Myron is considered to be the first to master this style. However, in pursuit of physical perfection, the muscular strain in David's torso is not physiologically appropriate for the action depicted, nor is the lack of emotion on his face.<sup>[3]</sup> In fact, researchers claim that the position of the body would be a fairly inefficient and unnatural way to throw a discus.<sup>[4]</sup> Regardless of such inaccuracies, these sculptures were considered a more enlightened evolution from archaic *understanding* of the individual. Key figures in the Western history of sculpture would continue to test the balance of true and fabricated representations of the human form. Baroque Sculptor, Gian Lorenzo Bernini composed his sculptures with intense drama, narrative and emotion. Early 20th century sculptor Auguste Rodin moved away from the formal idealism of classic figural sculpture, in favour of more realistic representations of the human body.<sup>[5]</sup> Conversely, Rodin's apprentice, Brancusi chose to explore the spiritual essence of human form rather than figural reality in his modern sculptures.<sup>[6]</sup>

The advent of photographic technologies (notably the works of Edward Mueybridge and Etienne-Jules Marey) provided the Italian Futurists to study representation beyond a static medium. In their work, a documentation of dynamicism and action came to the fore. The development of the work was founded in the human figure, but focused on its translation of motion through time. The performance of the body through time is explored in works such as Mueybridge's *Nude Descending a Staircase* and Boccioni's *Dynamism of a Soccer Player*. The Futurist work became more than an artistic style, operating as a social movement:

For the very ethics and physics of the futurist program, conceived as an open, far-from-equilibrium system, responsive to and willing to amplify

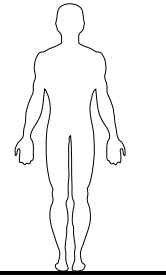


Figure 2.2 The Body in Space

“Yet futurism’s profoundest gift to our century was its seemingly hubristic attempt to link the biosphere and the mechanosphere within a single dynamical system.”<sup>1</sup>



every destabilizing fluctuation in the environment, necessitated its multiple impregnation both in and by the social, material, and affective systems that surrounded it. The futurist universe—the first aesthetic system to break almost entirely with the classical one—could properly be understood only in the language of waves, fields, and fronts. The type of movements it was obsessed by were those that carved shapes in time not space; it studied the stabilities achieved through homeostatic knots of force in perpetual strife, it embraced the beauty and evanescence of becoming.<sup>[7]</sup>

Alternatively, modernist architect Le Corbusier returned to Vitruvian values of human symmetry and physical proportion in his architectural design.<sup>[8]</sup> A burgeoning cultural interest in human proportion and the analysis of the human body is apparent in architectural work of this time. Bauhaus family member Ernst Neufert developed the *Architect's Data Handbook* as a means of standardizing bodily proportions for design and the built environment. The “ideal normatized body” became a misguided benchmark for designing architecture.<sup>[9]</sup>

The danger of standardization lay in the illusionary perception of an “average” being, leaving many individuals unaccounted for. The flattening of the human body not only created a prototype for an imaginary individual who typically did not fit the expressed criteria, but also created a system for architects to design primarily for this imaginary being. Recent and rigorous development in accessibility standards is one instance where the exclusions that occur from designing for the “average”, “capable” person are being alleviated.

Parallel to the evolution of architectural design and accessibility standards, the availability of data in the Information Era has improved the general awareness, methods, and measurements of the human body. The Bauhaus school was also home to Oskar Schlemmer, a designer and choreographer whose interest in theatre and dance fostered a meticulous observation of the body in time. Deconstructing of physical movements, Schlemmer rationalized and reconstructed the emergent nuances of a body in space and time visible in his *drawing of Man as Dancer*.<sup>[10]</sup>

A similar method emerging in the early 20th century was Labanotation, born as a means of tracking the dynamic human body. Dance was analysed and transcribed in terms of the direction and level of body parts as well as durational movements.<sup>[11]</sup> In this notation, the body was articulated in a manner that addressed its formal and temporal quality. The body was no longer considered static in its analysis.

Much of this research and resulting progress has focused on the physiology of an individual human form. This consideration for skin and structure,

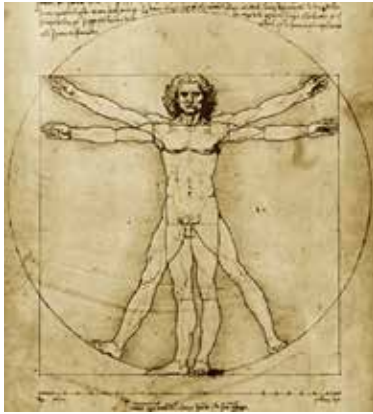


Figure 2.3 The Vitruvian Man, Leonardo Da Vinci, 1490



Figure 2.4 Nude Descending the Staircase, Edward Mueybridge, 1887



Figure 2.5 Man Walking, Etienne-Jules Marey, 1890-1891

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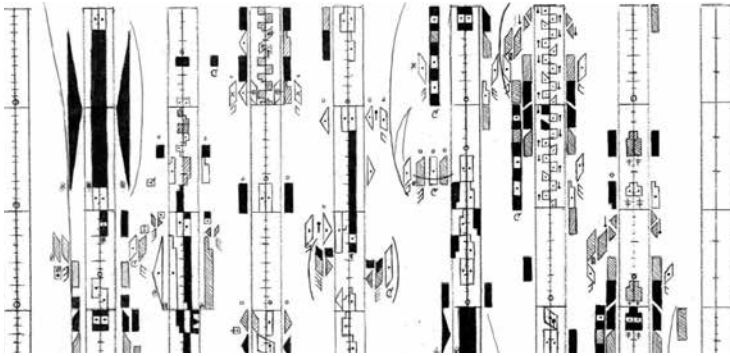


Figure 2.6 Example of Labanotation, Rudolf Laban, 1920's

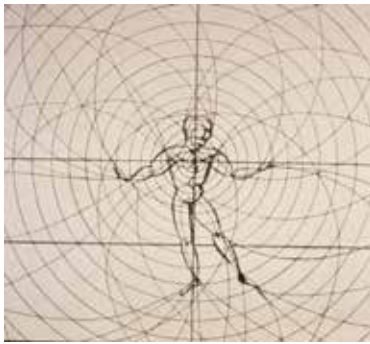


Figure 2.7 drawing of Man as Dancer, Oskar Schlemmer, 1921

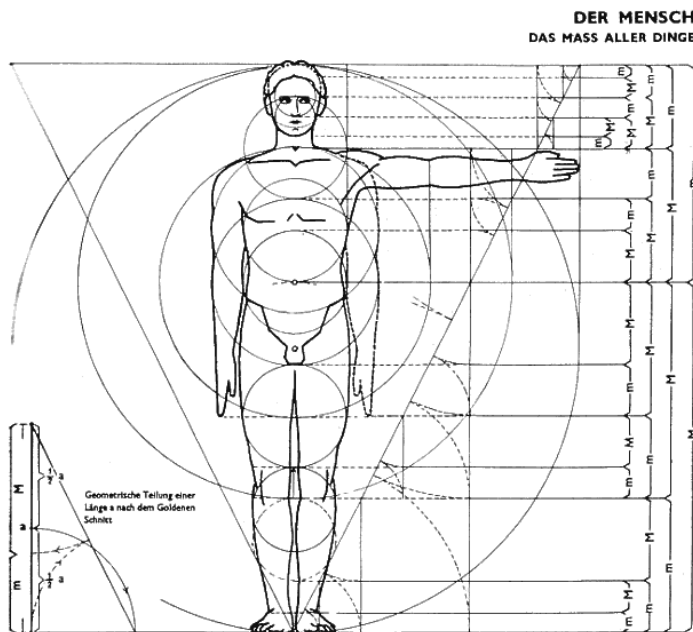


Figure 2.8 Bauteurfslehre, Ernest Neufert, 1936

the expanded realms of the individual

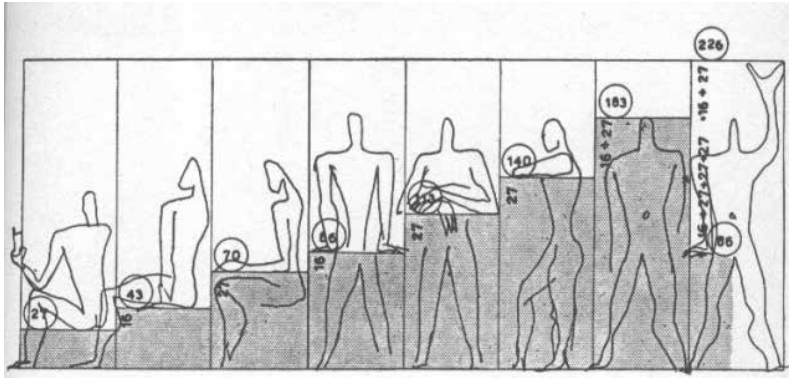


Figure 2.9 Modular Series related to Human Stature, Le Corbusier, 1954

liminal matter

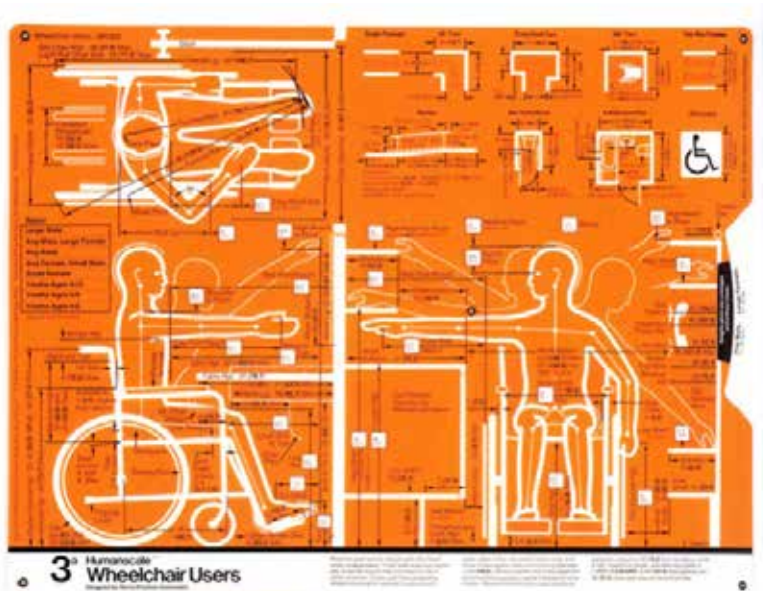


Figure 2.10 Wheelchair users. Handicapped and Elderly, Henry Dreyfuss Associates, 1974

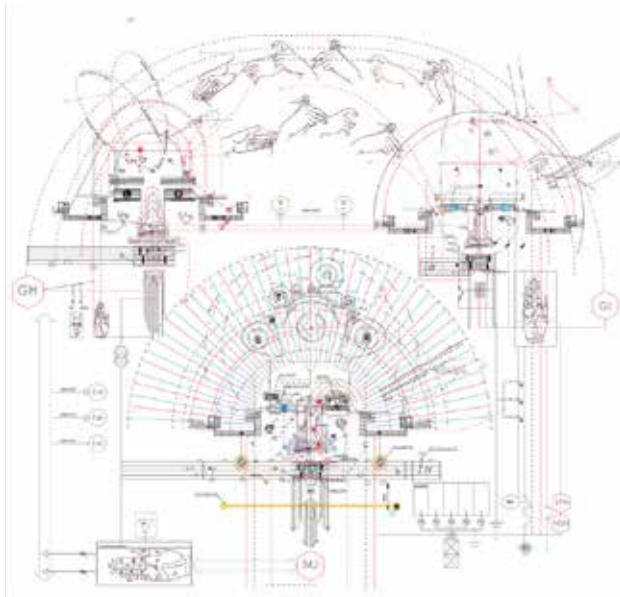


Figure 2.11 Bilingualism, Minjeong An, 2007

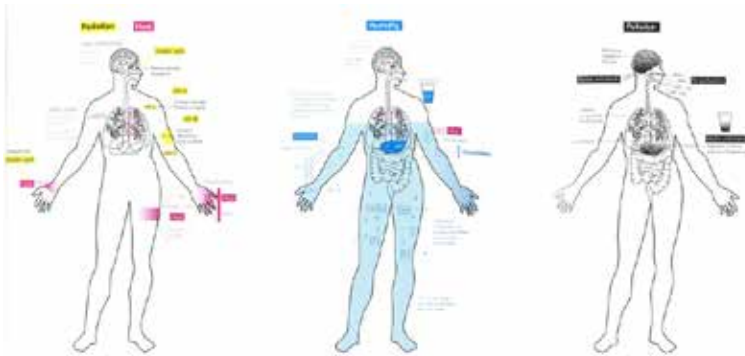


Figure 2.12 Body Diagrams for Phase Shift Park (Taichung), Philippe Rahm and Catherine Mosbach, 2011

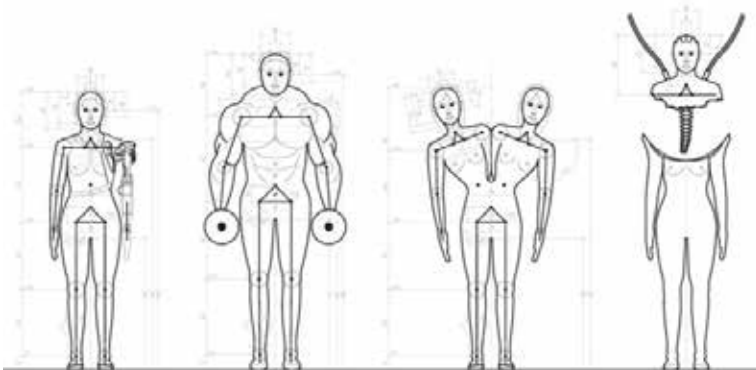


Figure 2.13 L'homme, Mesures de Toutes Choses, Thomas Carpentier, 2012

the expanded realms of the individual

materialized in physiological proportion, not only excludes the neurological processes of the individual, but also the systems within the body. Metabolisms, electronic messages, and digestion are systems intended to gather, process and allocate energy—but are ultimately omitted from such formal explorations. The skin is treated as an impermeable layer rather than its true definition: a multi-layered, mediating envelope between internal processes and external environment. However, this way of thinking about the body and its environment could only be articulated with the information obtained in the digital age of the 21st century. As Michelle Addington states,

the privilege afforded to the surface emanates from an a priori belief that perception is rooted in and determined by geometry. Geometry relentlessly tethers the built environment to static artifacts.<sup>[12]</sup>

With new understandings of human perception the role of geometry shifts, and the forms it can take will shift with it.

## 1.2 Cognitive Processes

To help supplement this conversation on the human body in space, an overview of the history of theories and ideas on human perception is valuable. In 1925, French Philosopher Pierre Teilhard de Chardin coined the term “Noosphere” to describe the sphere of human thought. Like the Biosphere, the space considered to contain all living things on Earth, the Noosphere is a phase in the development of human life. Teilhard asserted that this phase is critical to the evolution of human life towards its highest level of consciousness and complexity. Much like the futurists, his work dealt closely with this aspect of “becoming.”<sup>[13]</sup> Architect and Professor of Architectural History and Theory at Illinois Institute of Technology Harry Francis Mallgrave, supports this conjecture by offering an anthropological perspective on the matter in his essay *Cognition in the Flesh...The Human in Design* for the MIT Architecture department journal *Thresholds*,

Our much better understanding of our evolutionary history over the last few years has also put these issues into better focus. Homo sapiens, strictly defined, came into existence around 200,000 years ago, yet our immediate hominin ancestor, Homo erectus, extends our behavioral lineage back another two million years. In this light, the root of all of our presumably superior mental activity extends far into our pre-human past.<sup>[14]</sup>

Under this assumption, our cognitive processes have been evolving and maturing for a much greater length of time than any amount supported by previous theories. While these processes are very old, the technological innovations of the Information Era have brought with them an unexampled

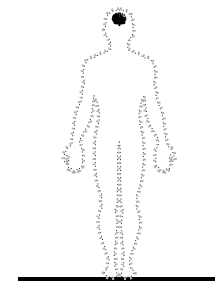


Figure 2.14 Highlighting the Brain

(and arguably higher) level of human cognizance. It is only in this period of time that we are witnessing the beginnings of the “quantified self”: the digital ability to measure and document oneself; biologically, emotionally, socially, and otherwise.<sup>[15]</sup> These invisible qualities—the neurological ingredients of emotion, big data systems, microscopic nano-systems and intangible sensory responses—are some of the many aspects of the human body and its’ environmental interface that are now trackable. The science of the human brain is only one of many areas of study that are blossoming due to these new ways of seeing, afforded to us by technology.

The brain is the central hub of the body’s nervous system. This system is composed of a sophisticated network of neurons, which “fire” signals based on sensory stimuli. These signals—called synapses— and their physical infrastructure drive an individuals physiological and psychological response.<sup>[16]</sup> However, the field of neuroscience is quite young and a detailed understanding is still lacking of how these processes work. Decoding this complex mass of electrical infrastructure was unfathomable until very recently:

As computers have changed, so has the understanding of the human brain. Until 15 years ago, scientists thought the brain stopped developing after childhood. Now they understand that its neural networks continue to develop, influenced by things like learning skills<sup>[17]</sup>

Prior to this understanding of the brain, our ability to rationalize emotions and their origins was very limited. In describing the work of Jean Jacques Rousseau, Hannah Arendt writes:

To Rousseau, both the intimate and the social were, rather, subjective modes of human existence, and in his case, it was as though Jean-Jacques rebelled against a man called Rousseau. The modern individual and his endless conflicts, his inability either to be at home in society or to live outside it altogether, his ever-changing moods and the radical subjectivism of his emotional life, was born in this rebellion of the heart.<sup>[18]</sup>

Arendt points out the difficulty in mitigating the gap between external stimuli (environment) and internal processes (emotions). Because of this, she asserts that the human emotional response must be subjective. While this remains true, exciting leaps are being made in neuroscience towards a less ambiguous explanation for cognitive processes. The work of neuroscientist Henry Markram is focused on the mapping of the brain and the billions of synapses that pulse through the body. In deducing the neurological system to a series of traceable coordinates, a more detailed explanation of perception, memory, and mental illness becomes available. Understanding how the brain works and

why it sends complex electrical messages that moderate all actions is a great step toward comprehending the building blocks that compose an individual's behaviour.<sup>[19]</sup> Writing on the topic, Associate Professor at Rensselaer Polytechnic Institute School of Architecture, Ted Krueger explains in his essay *Emotional Architectures* published in *Euphoria and Dystopia: The Banff New Media Institute Dialogues* how perspectives on cognitive processes have changed:

One of the things that has become a real difference in the last several years is the way in which the mind and cognition are understood. Cognition is looked at more as a dynamical process, one that involves the body and the environment that that person is in, and you get a sense of a much greater integration of an entity within some media. We don't keep as much in our head as we would like to think we do. The world is assumed to be a stable repository for information, and one could just simply refer back to it when one needs to. Many of the things that we think we are keeping in our brain we are actually holding in the real world.<sup>[20]</sup>

Therefore, cognition is a constant and emergent conversation between memory and environment. With a more quantifiable understanding of neuroscience and psychology, these scientific streams are gaining considerable traction. This is evident in new attitudes towards space and its ability to affect depression, autism and other extensions of mental health. For example, accessibility standards are beginning to go beyond an assessment of a person's physical capability and recognize how a better quality of space can improve mental health. Additionally, consider the re-evaluation of North American prisons, healthcare facilities, and schools.<sup>[21]</sup> Furthermore, the Ontario Ministry of Economic Development, Employment and Infrastructure has developed an Accessibility Standard for Information and Communications for web accessibility, denoting a change in the system considerations that are being made toward the varying individual complexities of the mind.<sup>[22]</sup> The treatment of space and its relationship to human thought processes is in serious conversation.<sup>[23]</sup> Neurological exploration unpacks the growing possibilities of human relations, both between individuals *and* their surrounding environments.

This brief introduction will recognize two important discoveries regarding how the brain works. The first is the discovery of "mirror neurons" in relation to empathic response, as mentioned in the introduction of this book. This discovery occurred in the early 1990s and completely expanded neurological investigation.<sup>[24]</sup> These groups of neurons respond to perceptual experiences in a simulating fashion. A simple example; when someone sees another person experience physical pain, neurons respond as if the observer experienced the pain themselves. The response is not only applicable with observed emotions,



but also applies to observed actions. Mallgrave's essay *Cognition in the Flesh... The Human in Design* illustrates this by considering the power of music:

If I see or hear you playing the piano, mirror systems in my premotor and parietal cortices mimic areas of your brain activity as if I were playing the piano. If I am an equally skilled pianist as you are, these mirror systems are quite similar to your brain maps—except for areas of the motor cortex that would actually move my hands and fingers.<sup>[25]</sup>

This phenomenon is called “embodied simulation”. In experiments conducted to activate mirror patterns in human behavior, responses to observed interactions were recorded. Witnessing two people interacting (engaged in a hug, for example), an onlooker might involuntarily feel emotions similar to the ones they are observing. The same was found when the observer would look upon a human interacting with an object. Furthermore, the same was found when the observer would see an object interacting with another object, proving that mirror neurons are activated by observed relationships between other-than-human entities. The researchers came to a powerful conclusion on the imagining of space, stating that

the same neural structures involved in our own bodily-related experiences contribute to the conceptualization of what we observe in the world around us.<sup>[26]</sup>

The somatosensory cortex is activated, simulating the experience of touching physical material. Simply put, viewing physical matter can trigger a tactile response. These conclusions have exciting implications for architecture. The experiments suggests that the physical experience of a place has the potential to activate

mirror(sensorimotor), emotional, and hedonic systems. In other words, in experiencing a building we emotionally simulate the forms, materials, and details with our bodies.<sup>[27]</sup>

Human emotions and memories are attached to site and circumstance. Mallgrave writes, “we cannot in fact avoid emotion, however much we might try to do so. Emotions are the very lens through which we perceive the world.”<sup>[28]</sup>

The second discovery in neurological science relevant for the consideration of architectural design is the recognition of neural plasticity. The brain is an adaptive organ. In 1949, Donald Hebb made the discovery that the brain is able to grow and change depending on external stimuli. Therefore, learning is a process of synaptic bonding.<sup>[29]</sup> Describing Dr. Hebb's work, Mallgrave writes:

When two neurons fire together, growth in the synapse occurs, leading to a greater likelihood that they will fire in the same way under a similar stimulus. Through repeated firings, they will form established patterns

or neural maps that become associative networks. If firings become less frequent, growth will deteriorate and eventually the connection disassembles.<sup>[30]</sup>

This idea disproves the previously accepted notion that humans are “hardwired” once reaching a fully developed state. Instead, the brain is constantly and physically updating based on the new experiences and activities each person participates in. For example, the areas of the motor cortex that control the movements of the last two fingers of the left hand are found to be substantially larger for seasoned concert violinists, for whom the movements of these fingers must be incredibly dexterous, as opposed to those who do not play the violin at all.<sup>[31]</sup>

Another example are memory games, such as Sudoku or online game Lumosity, as well as simple physical exercise. These are all meant to sharpen one’s ability to remember, but are attempting to keep parts of the brain physically healthy as a preventative measure against Alzheimers.<sup>[32]</sup>

A standard CPU is a rigid, component-based system made to emulate the processes of the brain but ultimately lacking this quality of plasticity that has been developing since the early dawn of human cognition. Unlike the brain, it has a hardwired capacity rather than the ability to be environmentally affected and adaptive, though technological evolutions are being made to mimic these qualities. However, Innovator and Co-founder of Microsoft, Paul Allen and Computer Scientist, Futurist and Director of Engineering at Google, Ray Kurzweil debate on the timeline for this possible future, citing that many factors must be considered in the understanding of the human brain and the possibilities to embody biosynthetic states of cognitive processes. Paul Allen’s response to the potential singularity gives some insight to these factors:

The closer we look at the brain, the greater the degree of neural variation we find. Understanding the neural structure of the human brain is getting harder as we learn more. Put another way, the more we learn, the more we realize there is to know, and the more we have to go back and revise our earlier understandings. We believe that one day this steady increase in complexity will end—the brain is, after all, a finite set of neurons and operates according to physical principles. But for the foreseeable future, it is the complexity brake and arrival of powerful new theories, rather than the Law of Accelerating Returns, that will govern the pace of scientific progress required to achieve the singularity. Gaining a comprehensive scientific understanding of human cognition is one of the hardest problems there is.<sup>[33]</sup>

Whether or not the Law of Accelerating Returns will prove triumphant over the complexity brake, it is clear that the brain is an exciting and sophisticated organ worth understanding. Conversely, Mallgrave

suggests serious consideration of the implications of such sophistication:

On the one hand we can always learn new things and refine our thinking capacities, even increase our IQs as a few studies have shown. On the other hand neural plasticity means that we are more susceptible than we formerly believed to such things as environmental and cultural changes, whether it be the material elements of our built environments (architecture) or the technologies by which we navigate the world. Both, in fact, can enhance or inhibit our perceptual and cognitive processes, and at a much faster pace than conventional evolutionary theory allows.<sup>[34]</sup>

Some of the primary aspects that drive design today are energy, production, commodity and form. However, the cognitive processes of the human brain, which are intrinsically linked to spatial and material experiences, are worth considering for their impact on human emotion and, ultimately, health.<sup>[35]</sup>

The work of psychologist Lisa Barrett focuses on the basic psychological actions that compose human “emotional” response. Barrett posits that organisms experience two levels of affect when encountering a change in environmental stimulus. The first is a “core” affect: an indicator of initial pleasure or displeasure (referred to as valence) determined by a sensory analysis of an external environment’s impact on the body’s survival. Comfort is associated with a thriving environment for an organism’s vital condition, and discomfort, the opposite. After this initial core affect, the neurological response proceeds along two closely related pathways, both activated in the orbitofrontal cortex, which is a portion of the brain’s prefrontal cortex found behind the eyes (figure 1.15). On one path, a sensory system attaches “a preliminary value for the stimulus and its impact on homeostasis”.<sup>[36]</sup> The second path, referred to as the visceromotor, is responsible for modulating a response composed of autonomic, chemical, and behavioral actions. Collectively, these processes output an affective state, spurred by a particular situation. Therefore, emotional output is linked to bodily disposition. In other words, emotions are situational.<sup>[37]</sup>

In this vein, qualitative feelings and physical responses can be quantified. For example, positive stimulus activates the circuit responsible for pleasure, referred to as a “hedonic” response. This response activates neural activity in several areas of the brain, including the brainstem, basal ganglia and amygdala, orbitofrontal cortex, anterior cingulate cortex, and insula. A typical sensation for this kind of event, such as a high period of elation that comes with a compliment or an unexpected thoughtful gift, is a “flush” of happiness. Sensory reactions related to pleasure release dopamine into the bloodstream, which then flows throughout the entire body. Thus, an emotional

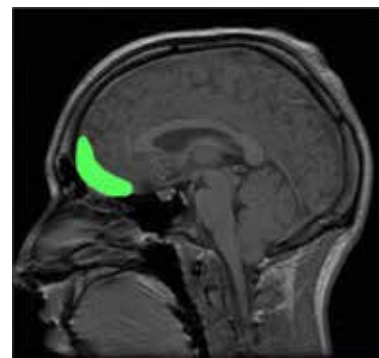


Figure 2.15 The Brain’s Prefrontal Cortex

In simplest terms, emotion “is the process by which the brain determines or computes the value of a stimulus”<sup>ii</sup>

experience is the result of physiological changes that can be quantified.

Another qualitative instance can be found in those moments when one gets “chills down the spine,” a “phenomenon” that has now been evaluated through neuroimaging documentation and found to pass through the brain’s hedonic circuit.<sup>[38]</sup> These imaging studies have shown that the pleasurable experiences that activate this circuit can range in nature. As Mallgrave outlines, “maternal and romantic love, orgasms, a good meal, social acceptance, a beautiful sunset, a smile, and the visual and aural arts” all can be categorized within the hedonic circuit.<sup>[39]</sup>

To conclude this general overview of neural plasticity, embodied simulation and cognitive processes, and how they are part of a higher understanding of human emotion, two conditions are outlined. First, emotions directly impact individual response to external sensory fields, including the built environment, in a pre-reflective manner. This means that previous to fully experiencing the external environment, the brain is already formulating how it may “feel” based on previous stimuli, both direct and associative. Architecturally speaking,

the comfort of a door handle or handrail, the ease of a stair riser or tread, the texture of a floor material, the acoustic resonance or visual ambience of a room, the hand of a fabric, the smell of materials, and we do so largely intuitively, or rather, prior to conscious reflection.<sup>[40]</sup>

Arriving at a similar conclusion, these ideas are closely reflected in architectural phenomenology. Pertinent examples lie in Gaston Bachelard’s *Poetics of Space*, Peter Zumthor’s *Atmospheres* and other theories by Maurice Merleau-Ponty and Juhani Pallasmaa. While their ideas are not articulated with explicit empiricism, they are arguing for the existence of affects by spatial and architectural constructs. For example, Finnish philosopher Juhani Pallasmaa elaborates on the relationship between a body and its external environment,

As we enter a space, the space enters us, and the experience is essentially an exchange and fusion of the object and the subject... Similarly, atmosphere is an exchange between the material or existent properties of the place and our immaterial realm of projection and imagination.<sup>[41]</sup>

A second consideration for emotional response is that it is an embodied sensation. This means that all emotions activate the sensorimotor areas of the brain, which in turn control the movement of the body and the conscious awareness of said body in space. To explain this concept, Mallgrave refers to German philosopher Robert Vischer, who stated that we *einfühlen* or “feel ourselves into” this world through the interface of the body in an immediate way.<sup>[42]</sup> This manifests in the actions of crouching when transcending a narrow corridor with a low ceiling, or the corporeal relaxation when one emerges from

PHENOMENOLOGY: “is the study of essences: the essence of perception, or the essence of consciousness, for example. But phenomenology is also a philosophy which puts essences back into existence...it also offers an account of space, time and the world as we ‘live’ them.”<sup>iii</sup>

such a space, decompressing in a large room with high ceilings. These slight spatial calibrations—the change in feeling when an average person is cramped into a seat on a train or a plane with too little leg room, or the emotional register one feels when standing in a cue line that ends up getting too pushy, leaving people closely tucked between strangers—have an immediate impact on comfort and emotion.<sup>[43]</sup> Inversely, how does this emotional response change when attending a crowded sports event of a favourite team, or being pushed against the front of the stage while viewing a live concert?

These are all examples of bodily “thinking”: physiological responses to environmental stimuli. They indicate how the mind and body are bounded together in a feedback loop. In order to explain this in its relation to architecture, Mallgrave references Swiss art historian Heinrich Wölfflin’s 1988 doctoral dissertation entitled, *Prolegomena to a Psychology of Architecture*. This paper poses the question, “How is it possible that architectural forms are able to express an emotion or a mood?” Wölfflin posits that architecture is animated by the body’s habit of referencing itself. Through viewing physical objects and sympathetically making cognitive associations with what is being witnessed, a simulated embodiment is activated. This he illustrates with a person’s internal understanding of the force of gravity, which allows them to discern the weight and balance of a building in gravitational terms. Wölfflin claims that the beauty and enjoyment of architecture can be found in its ability to mirror the “basic conditions of organic life.”<sup>[44]</sup> And here we return to same idea traced back to the works of Vitruvius and the construction of the Ancient Caryatids: the human desire to make matter in their own image is to better relate to ones environment. In this act of creation, a greater sophistication and understanding is gained.

In summary, emotions are an “obscure” set of evolutionary “affect” programs generated in order to aid in the protection of the homeostatic processes of the body:

For the first time in human history, we are beginning to get a handle on our human natures, and the insights are forcing us to rethink radically the very tenets of our being.<sup>[45]</sup>

Part of this “radical” rethinking includes an awareness of the energy exchanges that drive external stimuli and the interior milieu. In exploring these relationships, further understanding of emotion as an empathic driver for the body and its’ homeostatic endeavours is gained. With this understanding, a greater conception of architecture and its potential can be unlocked.

The previously phenomenological processes of bodies, interactions, and internal responses are all emerging as quantifiable data. As one stands still, energies exchanged occur due to shifting external environmental processes. A person influences their environment as the environment influences them. We typically experiences these exchanges through as sensations, the five senses being the primary and most discernable ones. The knowledge that there are powerful, predominantly “invisible” systems at work within and around each individual profoundly extends perceptual awareness and fundamental understanding of being. As Marshal McLuhan warned, “Environments are invisible. Their ground rules, pervasive structure, and overall patterns elude easy perception.”<sup>[46]</sup> Generally, the word energy invokes terms such as hydro, electricity, oil, solar, wind, etc. These are all methods of manufacturing energy at a large scale. However, there are many more examples of energy all around us, comprised of the same building blocks that make up these energy sources, such as air, gas, fire, sound, odor, magnetic forces, and electronics as a few examples.<sup>[47]</sup>

These invisible, erratic forces that affect the human experience of the environment has been under study since antiquity. Roman poet and philosopher Lucretius who watched “motes of dust quivering and darting within the sunbeams of his Roman window,” and noticed how “rivers of motion took the particles in laminar flows, bringing degrees of certainty into the sight of barely tangible things.”<sup>[48]</sup> The human body is always completely immersed in matter, as if the environment were a soup of particles varying in physical consistency. Architectural theorist Sanford Kwinter paraphrases French philosopher Henri Bergson’s description of matter as:

made up of ‘modifications, perturbations, changes of tension or of energy and nothing else.’ ‘The forms of life differ from this only in their greater complexity of organization and their capacity to overcome torpor, for both are immersed within the same universal stream of duration and constitute not different entities, but rather different modalities, of a single *elan vital*.’<sup>[49]</sup>

In this vein, built form is only one shade of matter. The energetic perturbations described are what give a particular environment its qualities. A building is responsible for the quality of space it contains, but its tangibly physical qualities are only part of what creates the internal condition.

Energy changes are the building blocks of matter and are, as posited by Pierre Teilhard de Chardin, the basis for all interaction:

Under this name, which conveys the experience of effort with which we are familiar in ourselves, physics has introduced the precise formulation of a capacity for action or, more exactly, for interaction. Energy is the

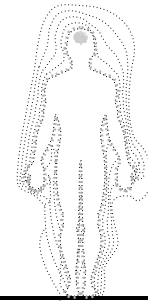


Figure 2.16 Emanations of Energy Surrounding the Body

measure of that which passes from one atom to another in the course of their transformations. A unifying power, then, but also, because the atom appears to become enriched or exhausted in the course of the exchange, the expression of structure. From the aspect of energy, renewed by radio-active phenomena, material corpuscles may now be treated as transient reservoirs of concentrated power. Though never found in a state of purity, but always more or less granulated (even in light) energy nowadays represents for science the most primitive form of universal stuff. Hence we find our minds instinctively tending to represent energy as a kind of homogeneous, primordial flux in which all that has shape in the world is but a series of fleeting vortices.<sup>[50]</sup>

Both our internal processes and emotional outputs, and how they manifest physiologically, are a result of this flux. In other words, material changes are due to these mostly “invisible” affects which propagate from energy transfers.

These invisible (yet perceptible and sometimes palpable) forces could be described with terms such as “realms”, “auras”, “envelopes” and “atmospheres”. These terms insinuate potentials for connection and interaction, be it physical or emotional, between individuals, groups and greater, all-encompassing environments. Architect Sean Lally, in *The Air from Other Planets*, describes atmosphere,

as an attempt to describe a quality of space distinct from the geometries that define the space... thought to be first used to describe the gaseous states that surround celestial bodies, having been emitted from the planets.<sup>[51]</sup>

These “phenomena” have been an artistic fixation for centuries: Baroque sculptor Gian Lorenzo Bernini’s representation of heavenly light in the *Ecstasy of St. Teresa*, or the halos painted atop the heads of holy figures, such as those in Massacio’s *Tribute Money*, demonstrate the presence of liminal space. Contemporary painter Alex Grey directly engages with this space, capturing the complex layers of surrounding energies by depicting the many layers of reality, revealing the interconnections of anatomical and spiritual forces. Grey’s work “evolves consciousness with a new symbology of the ‘networked self,’”<sup>[52]</sup> a deconstructed representation of what generally is considered “invisible.” Much like the aura of light around a saint’s head denoting his or her divine nature, auras and atmospheres are linked to the object from which they radiate. The objects allow the aura either to pass through them or reflect off of them, materially or immaterially.<sup>[53]</sup>

Considering atmosphere as an observed and historical phenomenon, One has to assume it...has existed since light from campfires first bounced off of cave walls or sunlight reflected off of a puddle of water to produce patterns on a nearby surface.<sup>[54]</sup>

“Alex developed depictions of the human body that ‘x-ray’ the multiple layers of reality, and reveal the interplay of anatomical and spiritual forces. After painting the Sacred Mirrors, he applied this multidimensional perspective to such archetypal human experiences as praying, meditation, kissing, copulating, pregnancy, birth, nursing and dying.”<sup>iv</sup>



Figure 2.17 Ecstasy of St Teresa, 1647-1652, Gian Lorenzo Bernini



Figure 2.18 Tribute Money, c. 1420, Masaccio



Figure 2.19 Theologue, 1986, Alex Gray

liminal matter



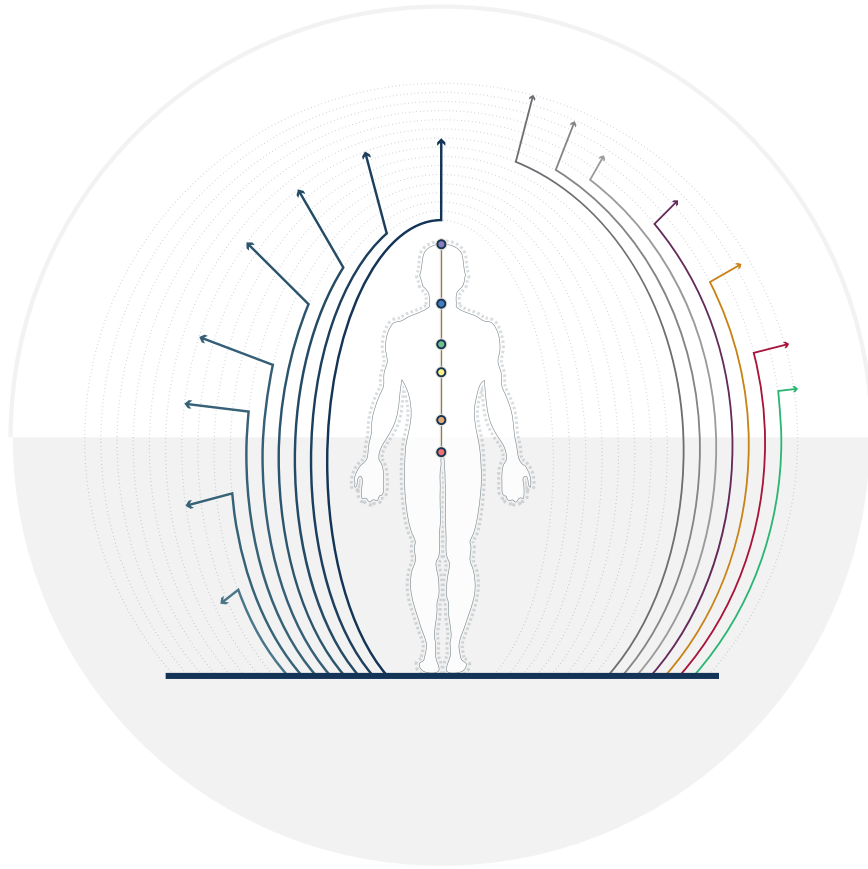
Today, we depend on both natural and artificial light, and our built environments have become increasingly complex. So too has the diversity of atmospheres encountered in day to day living. Sean Lally's *sensorial envelope* diagrams perceptual realms that surround our body (figure 1.20).<sup>[55]</sup> Senses are activated at varying distances, resulting in invisible sensing territories. Within these territories, changes in the environment are registered and the body is calibrated accordingly. The primary sensors are the five human senses: hearing, sight, touch, taste, and smell. Senses are responsible for processing information affecting us, including "invisible" stimuli such as thermal, electromagnetic, acoustical, or chemical fluctuation. This image, however exciting its practical applications may be, must be clearly understood as a diagram. The distances indicated between "concentric" lines are completely subjective, dependent on variables such as physiology, emotional state, past relatable memory, and ambient environmental stimuli, among others. Thus, the events attached to sensorial territories are dictated by an individual experience and the interactions occurring within them. Alain de Botton, philosopher and author of *Architecture of Happiness*, reflects on how architecture plays a passive observer to human life,

We can feel anxious and envious even though the floor we're standing on has been imported from a remote quarry, and finely sculpted window frames have been painted a soothing grey. Our inner metronome can be unimpressed by the efforts of workmen to create a fountain or nurture a symmetrical line of oak trees. We can fall into a petty argument which ends in threats of divorce in a building by Geoffrey Bawa or Louis Kahn. Houses can invite us to join them in a mood which we find ourselves incapable of summoning.<sup>[56]</sup>

While architecture can certainly have an impact on human emotion, it cannot perfectly regulate a person's cognitive outputs.

By designing with energy, the root of matter and interaction, a more dynamic architecture may be able to transcend aesthetic workmanship and work towards specific goals to improve social and mental health. As MIT Professor of Architecture and Media Arts and Sciences William Mitchell describes, the human body is surrounded by "multiple "skins" or boundaries." These boundaries are not imaginary lines, but rather expanded zones. For Mitchell, the natural skin "is just layer zero of a nested boundary structure."<sup>[57]</sup>

The system Mitchell has described is used to relate and to navigate through the surrounding environment. His search for a greater definition of fine-grained boundaries and conditions is in hopes of an alternative perspective of human existence,



liminal matter

Figure 2.20 Sensorial Envelope

predicated on the calibration of understanding the beings and bounds at play beyond the visually perceptible. By approaching the environment and the body not as definitive and separate forms, but as gradated, continuous layers of energy that converge with one another, a new set of design tools become available. In reference to German sociologist Niklas Luhmann, Carey Wolfe writes,

the environment, the ‘outside,’ is always already the outside of a particular inside, since what can be recognized as a perturbation or stimulus for a system depends upon the system’s own qualities and capacities<sup>[58]</sup>

Therefore, the referential baseline remains the exterior envelope of the body. Although the boundary is blurred, the skin mediates internal processes from external stimuli.

To be constantly receiving external stimuli means that the nervous system is in a continuous process of action and reaction. Revisiting the brain, neurons fire and send messages to one another. Billions of conversations are happening between different parts of the body in order to allow each person to function, think, and act:

The human senses respond only to change. Thermo-receptors in the skin are only activated when the difference between skin temperature and core temperature changes; environmental temperature is one of many factors, but not the direct cause of thermal sensation. Photoreceptors in the eye only respond when specific clusters in the retina encounter a change in the rate of photon strikes (a difference in luminance); otherwise, the eye is incapable of distinguishing between white and black.<sup>[59]</sup>

These invisible but perceptual auras create varying fields of sensing. Activated senses create reaction or inaction to the environmental situation:

Active energy exchange occurs at the boundary between a thermodynamic system and its surroundings. The classic diagram of a thermodynamic system depicts its boundary as soft, deformable, and malleable.<sup>[60]</sup>

In his work, Sean Lally considers these sensing bounds and expanded qualities of the human envelope while also recognizing their subjective nature. Architecture must reflect this process of “becoming” and recognize the multiplicity of sensing layers in order to better respond to human needs:

[T]he sensorial envelope is a different calibration device for defining architectural shape that takes into account the body’s increased sensitivity to layered and multiple sensory perceptions, permitting the detection of our surrounding environments with new lenses and greater levels of interaction. The human body’s engagement with its material surroundings is becoming more robust due to a range of technological advancements currently occurring outside the discipline

of architecture, which include both pharmaceutical enhancements to our central nervous system and brain as well as implants to improve our existing senses of sight and hearing. Sensorial envelopes comprise a quantifiable series of sensory perceptions for detecting and defining the shape of space.<sup>[61]</sup>

Lally's graphic of sensorial territories does not fully capture the variation in their scale, proportion, and range that occurs based on the individual, the environment, and the event. If this variation is not easily represented, it must be made clear that these 'boundaries' are in a state of perpetual flux. In order to address this quality, the investigation of sensorial perception that follows is categorized into three "scales": **Internal** (Within and "Beyond"), **Short-Range** (Immediacy), and **Long-Range** (Vicinity or Locale). These scales correspond with Lally's organization of interactions between the body and the environment into trophic (internal metabolic) processes, physical interactions (where force is exerted on the body), and informational relationships (signifiers of way-finding), respectively.<sup>[62]</sup> Classifying these ideas in terms of scale begins to spatialize these self-referential, and inevitably anthropocentric systems, at a more detailed level. Regardless of the number of influences that can be affecting a particular individual, representations should capture the fluctuating nature of these systems. However traditional, the envelope of the individual body is the liminal matter deemed the primary protective threshold between interior processes and exterior stimuli.

In order to illustrate the relationship between scales and senses, consider the example of a person interacting with a campfire, a primitive demarcation of space. As Reyner Banham states in *The Architecture of the Well-Tempered Environment*, a campfire is a primitive demarcation of space and an environmental aid that does not include the presence of a robust physical structure.<sup>[63]</sup> The fire signifies the environmental dialectics of inclusion and exclusion, warmth as comfort and warmth as danger, as well as absence as insecurity and absence as privacy. It holistically activates the senses, through its warm glows of dancing oranges, reds, yellows and blues, and the crackling of water popping its escape routes from beneath blackened bark. It denotes a social realm for stories and fills the nose and mouth with the smoky, subtle aromas of different woods. In the exploration of internal, short-range, and long-range scales that follows, the scenario of the campfire will be used for its ability to demonstrate the full range of senses and material exchanges contained in a simple environment. Scalar interactions will also be paired with the metrics of social interaction developed by anthropologist Edward T. Hall and applied in the work of architect Jan Gehl as documented in the book, *Cities*



Figure 2.21 Environmental Conditions Around a Camp Fire.  
1. Zone of radiant heat and light  
2. Downwind trail of warmed air and smoke

*for People*. The following investigations marry memory (previous experience), feelings associated with environmental experience (synthesis of sensory inputs), and the biological processes that occur (material energy exchange) as a means of deconstructing the ingredients that compose the act of relating.<sup>[64]</sup>

#### Internal (“Within” and “Beyond”):

This layer is everything “known” and “felt” to be true. The former cognitive process is a virtual projection of what can’t be seen (*beyond*), while the latter describes internal metabolic processes (*within*).

“Within” refers to the continual, self-reflective index based on internal chemical and biological processes affecting the body’s ability to perform. This generally manifests in our recognition of bodily aches and pains, or other changes in energy state, such as fatigue from exhaustion or caloric lethargy. This process is articulated by Pierre Teilhard de Chardin, who writes on the premise of energy exchange:

What makes the crux — and an irritating one at that — of the problem of spiritual energy for our reason is the heightened sense that we bear without ceasing in ourselves that our action seems at once to depend on, and yet to be independent of, material forces. First of all, the dependence. This is depressingly and magnificently obvious. ‘To think, we must eat.’ That blunt statement expresses a whole economy, and reveals, according to the way we look at it, either the tyranny of matter or its spiritual power. The loftiest speculation, the most burning love are, as we know only too well, accompanied and paid for by an expenditure of physical energy.<sup>[65]</sup>

This idea of a “burning sensation”, whether it used to describe love, as Teilhard has, or to describe a physical pain, is an example of transposing the memory of a haptic experience (i.e. coming too close to a burning flame) onto a sensation where no physical agent (fire) is present. Thus, the sensation evokes a memory as if to indirectly relive a previous experience and generate an immediate sensory response from its reconstruction. Related emotions tied to this memory will influence the response. For instance, a burning pain might invoke feelings of uneasiness, much like a previous experience of sitting by the campfire and looking into the surrounding dark felt unsettling. However, there are indirectly related thoughts in this cluster of emotions tied to this memory, such as the feeling of security when gazing into the campfire and feeling its warmth. Regardless of how they manifest, a complex of emotional responses from past experiences comprise our sensory responses.

Next, “Beyond” refers to the brains’ ability to recall previous experience in order to fill in the gaps of experience. Using the example of the campfire, a

person who sees smoke in the distance might associate it with fire without having seen the root cause. In this instance, external stimuli trigger a conscious awareness of the changes in the environment. This, in turn, activates internal biological processes. As Carey Wolfe states, the illusion of observation is primarily non-representational in its origin:

observed phenomenon is not grasped but is rather generated—brought into intelligibility—by the particular biological and perceptual mechanisms of the observer, and also in the case of human beings, by the conceptual schemata and knowledge-making codes we use to describe what we experience.<sup>[66]</sup>

and the bias that is incurred through the acquisition of knowledge and experience,

the price we pay for our knowledge is a fundamental non-knowledge of whatever is excluded by our modes of perception and our conceptual coordinates. As Luhmann puts it in a Zen-like moment, 'Reality is what one does not perceive when one perceives it.'<sup>[67]</sup>

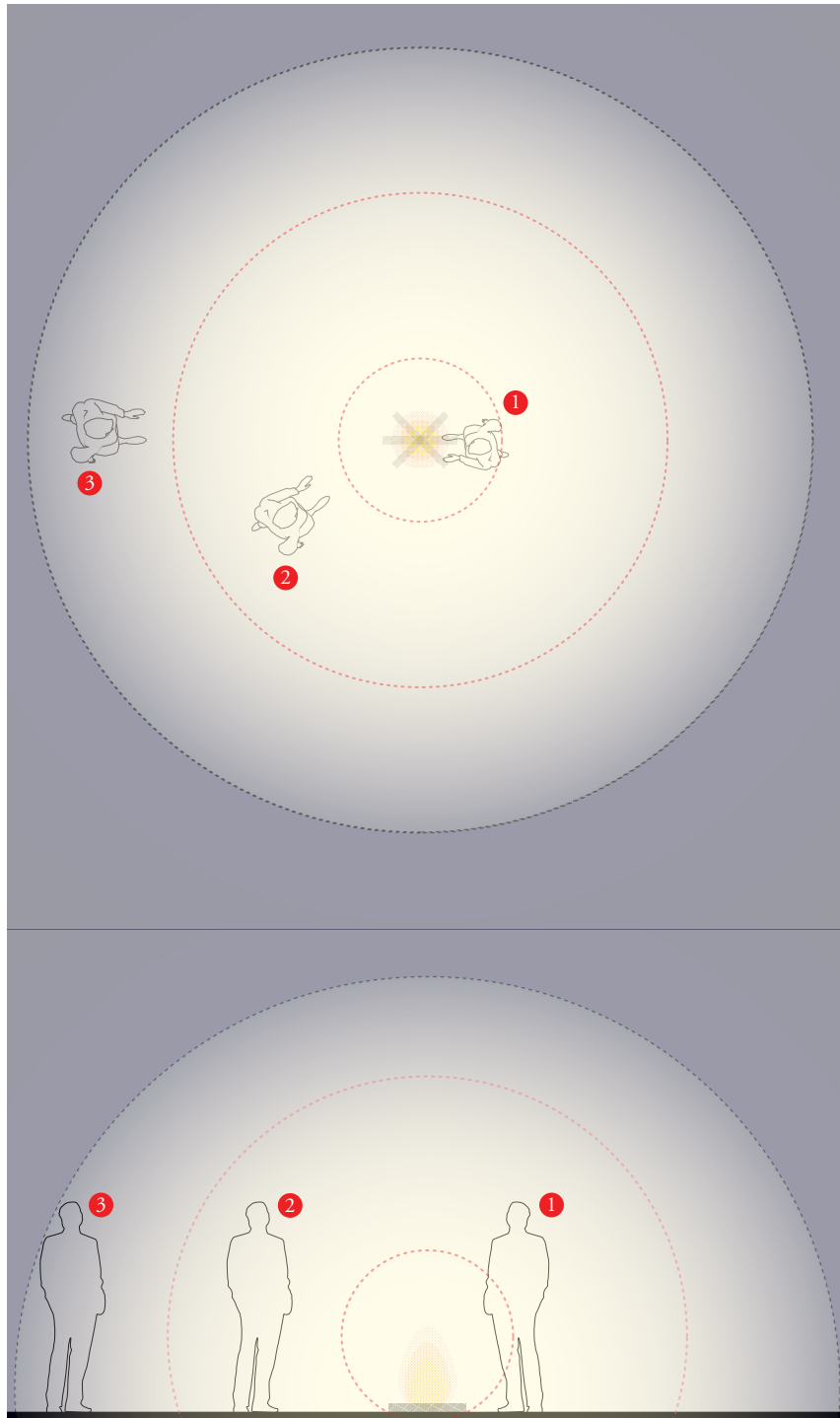
This precarious and heavily biased perception method is what drives human virtual representation of what is not seen, or what comes to be expected. It is an element that drives the empathic consciousness; the search for understanding and connection while relating to other beings. This is what allows an individual to visually imagine a place that they cannot fully see, either from previous experiences at the same place, or from other sensory cues. For example, one is told that a campfire is happening outside at the cottage. This is a place they have previously visited many times and, therefore, this experience can be imagined. It can also refer to internal changes over time. For example, if one is too hot, or sits still for too long late at night, they may experience fatigue and drowsiness, which will cause behavioral change. The outputs and degrees of change vary depending on the individual subject. These are external physiological outputs, as well as internal signals triggered by the affects of the exterior system on internal biological systems.

Exploring the Thresholds of the Camp Fire.

1. An individual stands close to the flame. The heat can be felt with strength. One must be cautious or a burn can occur. Generally a person only goes this close in order to tend to the fire.

2. This person is enjoying the warmth and light of the fire, in an optimal zone of comfort. This comfort is aided by the shirt, sweater and jacket that layer their body.

3. Another stands at a distance. Only their face can be made out as the light shines upon it. It is unclear if this person is feeling antisocial or if they just got a little too warm and wanted to cool down.



the expanded realms of the individual

Figure 2.22 Thresholds of the Camp Fire

### Long-Range (Vicinity or Locale):

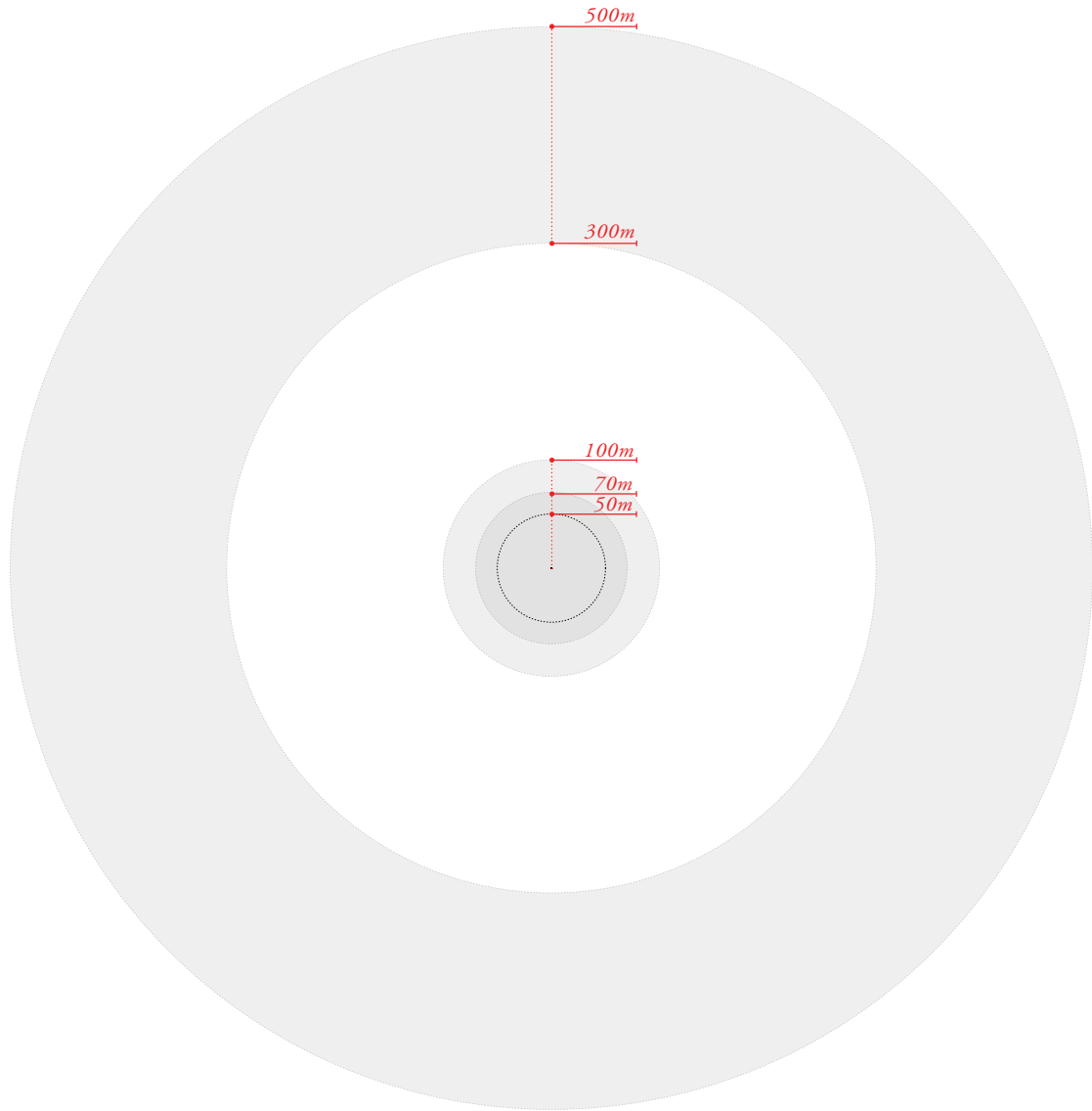
After navigating through the realm within, it is time to pan outwards to a larger, tangible but still primarily cognitive realm. This scale addresses the senses and how they allow the individual to interact in the larger environment. This type of scale identifies closely with observation, which can then translate to anticipation, which can inform action.

Sensory distances and scales are used to calibrate quantifiable ranges of information in order to better understand people and design more sensitive environments. This pertains primarily to an individual's visual range. Metrics for Long-Range analysis is as follows:

1. At 300-500m, people can be distinguished from other objects.
2. When an individual is less than 100m from another body, language and movement can be identified.
3. Once reaching a visual range of 50-70m, an approximation of gender and age can be discerned. If someone is known, they can be identified.

While these formulated ranges provide a framework for sensing boundaries, it should be noted that they do not indicate what type of responses are outlined. The sensing system of each person varies in how it reacts to and processes information. What could be perceived as the optimal condition for one person may be entirely different for another. In addition, and is the case for all provided metrics, there will be exceptions to the rule. Using the example of the campfire, when one is too far away from the fire, they may feel colder as well as removed from the visible exposure from the light produced. This creates a boundary of perceived safety. Those closer may feel safer, while those further away may feel less secure. The darkness can also provide cover from those who are looking to hide.





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Figure 2.23 Spatial Connections at a greater scale

### Short Range(Immediacy):

The immediate realm of the individual is the space where the senses are most active and easily affected. This is a series of layers immediately surrounding the body and where we perceive temperature, electrostatic, explicit comfort or trespass. The sensitivity of this boundary can change depending on the densities of surrounding materials, from passing through a crowded subway, to brushing against leaves in a forest, or swimming in the ocean.

The general metrics for this realm are as follows:

1. At distances less than 35m, language can be understood in a theatre circumstance.
2. In the approximate range of 22-25m, facial expressions and basic messages can be understood.
3. When individuals are within 7m from one another, conversations can occur. Hearing is generally effective.
4. At a distance smaller than 1 m, scent can be perceived. Touching effective within physiological range

The realm of immediacy will be defined as the distances within 3.7m, the threshold between social distance and public distance. Things that can be touched or easily initiated by the physical action of the individual can be found in this perceptual range. This is where many tools of physiological expansion can be found, such as cell phones, laptops, hammers and occupied chairs. The immediate realm is divided into three sections:

1. Intimate Distance: 0-45cm
2. Personal Distance: 45-120cm
3. Social Distance: 1.2m-3.7m<sup>[68]</sup>

The fire operates similarly to a the electrical streetlight. A gradually dissipating edge defines the area in which the central light source produces affect. This interface, which is embedded, embodied, but not rigid or 'formal', is an apt reflection of the dilated fields surrounding the human body. Traditional concepts of polar relationships like figure and ground or subject and environment are not appropriate here. The perceptual capabilities of the individual and the mechanics in which we operate within our environment has been of great historical interest. Instead, it is posited that all things

possess varying and volatile energy thresholds, completely dependent on the surrounding environment and the actions taking place within it.

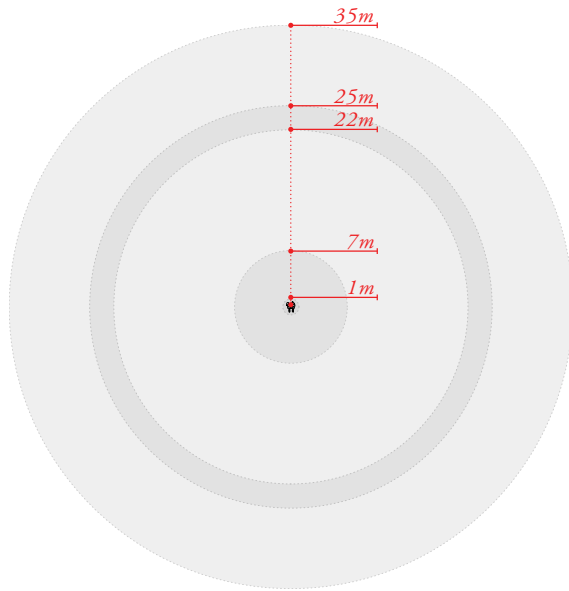


Figure 2.24 Short Range Spatial Connections

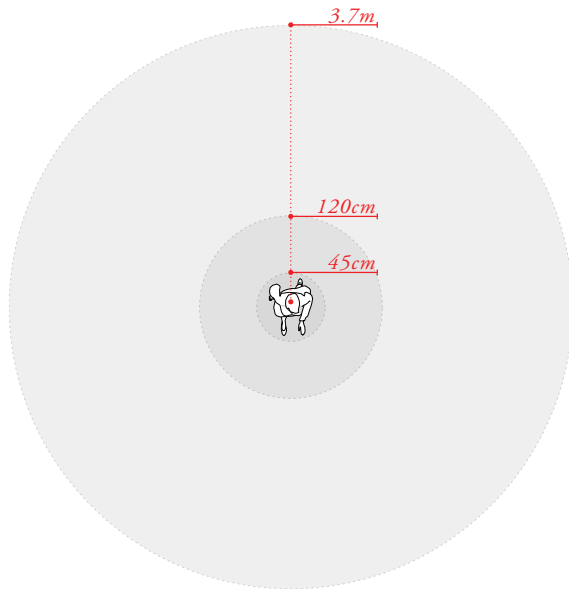
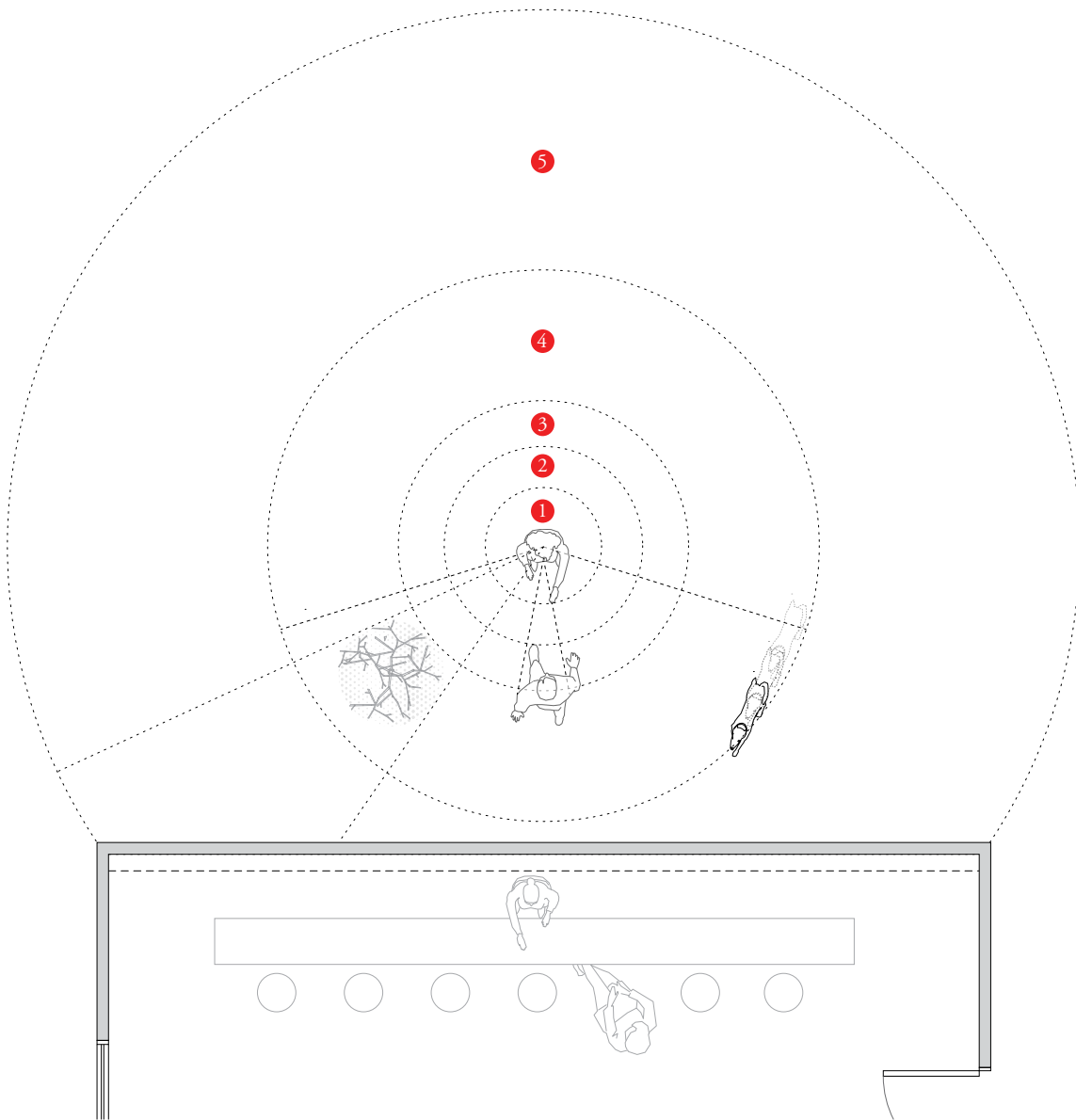


Figure 2.25 Immediate Spatial Connections

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liminal matter

Figure 2.26 Spatial Connections are Localized and Based on the constraints of elements in space

For millennia, architects have been concerned with skin-bounded body and its immediate sensory environment – with providing shelter, warmth and safety, with casting light on the surfaces that surround it, with creating conditions for conversation and music, with orchestrating the touch of hard and soft and rough and smooth materials, and with breezes and scents.<sup>[69]</sup>

This state of comfort Gibson described above has come to be known as Homeostasis. In the late 1860's Claude Bernard, a French physiognomist, applied a similar concept to the biological processes of the body. He named this understanding *Le Milieu Interieur*, which translates to “the environment within.” This term describes the human ability to maintain an internal equilibrium while the body is constantly being exposed to fluctuating exterior conditions. Bernard stated that the stability of the internal environment allows for autonomy in individuals.<sup>[70]</sup> This concept continued to be explored and over 50 years later, physiologist Walter Cannon expanded on the subject with his studies on physiological behaviours in relation to this biological self-regulation. For instance, examples of thermal regulatory indicators are shivering, rubbing oneself with their hands, removing or adding clothing layers, wiping away sweat, or even scratching an itch.<sup>[71]</sup>

The technological surge of the Industrial Revolution saw the human ability to transfer internal energy expenditures into the duties of exterior instruments such as fan and heaters. This is as an example of a cybernetic system, which involves the expropriation of machine systems in order to control and calibrate desired outputs.<sup>[72]</sup>

Reyner Banham states in *The Architecture of the Well-Tempered Environment* that architecture, which began as a means of survival, allows humans to operate beyond a state of primitive existence. Architecture, or simply, shelter, affords an individual comfort and allows people to live where extreme environmental conditions may have traditionally prevented human occupation.<sup>[73]</sup> This behavior lends an indication towards a species that uses innovation to flourish rather than simply survive. There is truth to the simple yet utopic belief that a future earth and its social armatures could be completely oriented around leisure. As Yves Klein proposes in his 2004 *Manifesto*,

The architecture of air has in our minds always been just a transitional stage, but today we present it as a means for the climatization of geographical spaces. The principle of privacy, still present in our world, has vanished in this city, which is bathed in light and completely open to the outside.

A new atmosphere of human intimacy prevails.

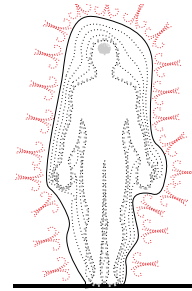
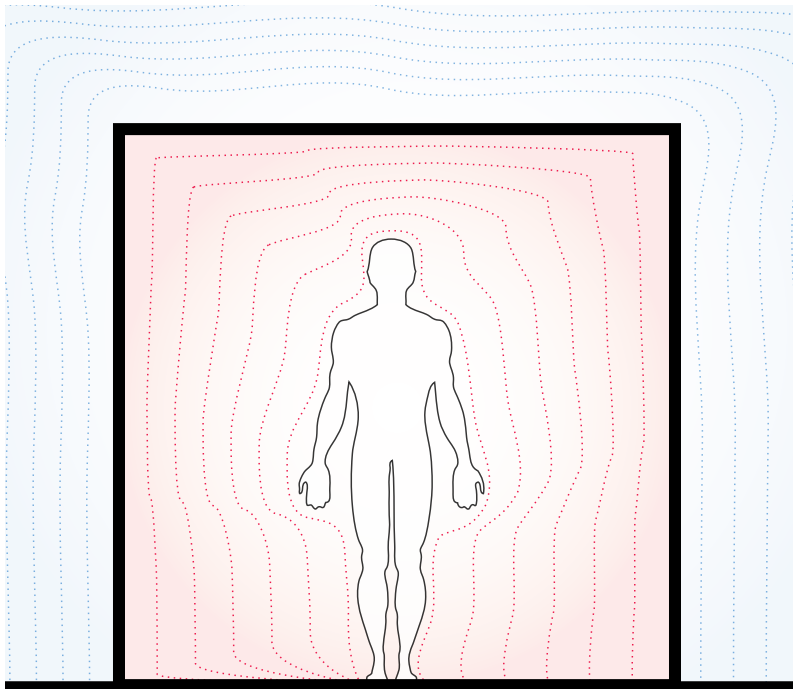
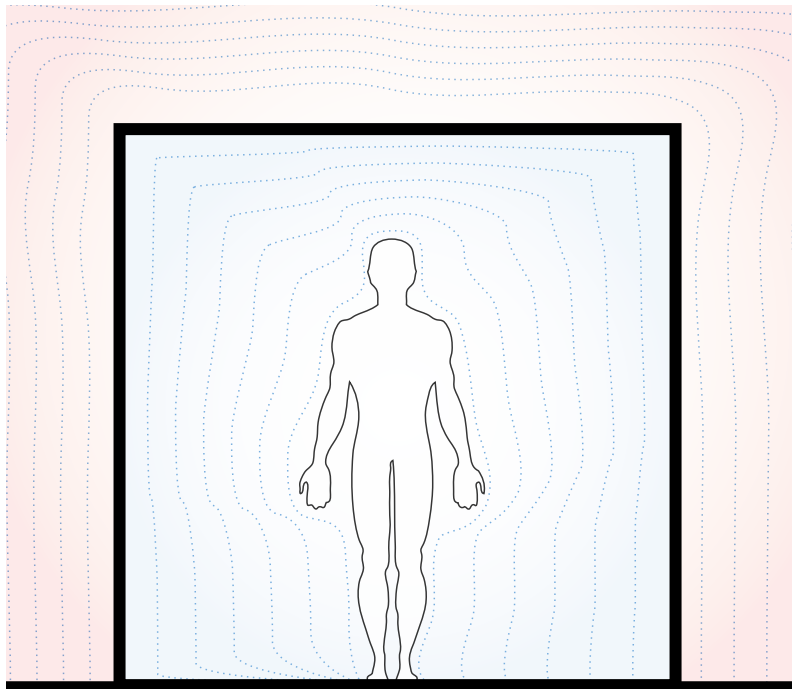


Figure 2.27 The Body in Homeostasis



liminal matter

Figure 2.28 Winter Climate Control



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Figure 2.29 Summer Climate Control

The inhabitants live in the nude.  
The primitive patriarchal structure of the family no longer exists.  
The community is perfect, free, individualistic, impersonal.  
The principal activity of the inhabitants: leisure.<sup>[74]</sup>

The thematic concept of recreation was shared by several visionary architects, such as Constant, Cedric Price, Superstudio and Archizoom.<sup>[75]</sup> These architectural visions assumed that a leisure world could be achieved through the creation of tools and structures that would help to alleviate the current trials of production and livelihood. Technical resources and social organisations were to provide elements of control and modulation of an otherwise unpredictable, and sometimes volatile physical environment.<sup>[76]</sup> As discussed in the previous chapter, the human body is constantly engaged in energy exchanges, both internally and externally. However, as architect and urban theorist Danielle Wiley elaborates on media studies professor William J. Mitchell, human cultures have a tendency towards creating comfort through synthetic conditions, which indicate a mode of living that extends beyond mere survival:

Beginning with the physical outer layer, an individual adds further skins of sunscreen, clothing as soft architecture, a carapace of walls that encloses a room, a building with a weatherproof shell, a bulwark of high tech military security that encases a homeland. This radically expanded subject is interconnected with her environment by means of networks which pierce and mediate between these skins. The subject is a connecting creature who separates, “whatever we are, we come to be that way by submitting to a fundamentally prosthetic relation between us and the external.”<sup>[77]</sup>

In terms of architecture, contemporary construction does allow for degrees of flexibility when mediating between interior and exterior conditions. While the “boundary” of a building is changeable, it is still moderately stagnant and heavily supported by equipment and furniture in order to optimize habitation:

The dynamic phenomena of heat, light, and sound determine human perceptual responses, yet our building systems are predicated on creating an unchanging field of neutrality.<sup>[78]</sup>

The HVAC systems that Banham is criticizing here are machines in architecture that act as building blocks for future innovations. While their physical infrastructures of heating and ventilation may be outdated, emerging data feedback products put out by companies such as Nest or Braun allow for finer grained energy modulation by calibrating HVAC systems to work more like motion sensors in lights, for example. This strategy is a step towards more economical energy use, and, in parallel, higher environmental comfort. Ideally,



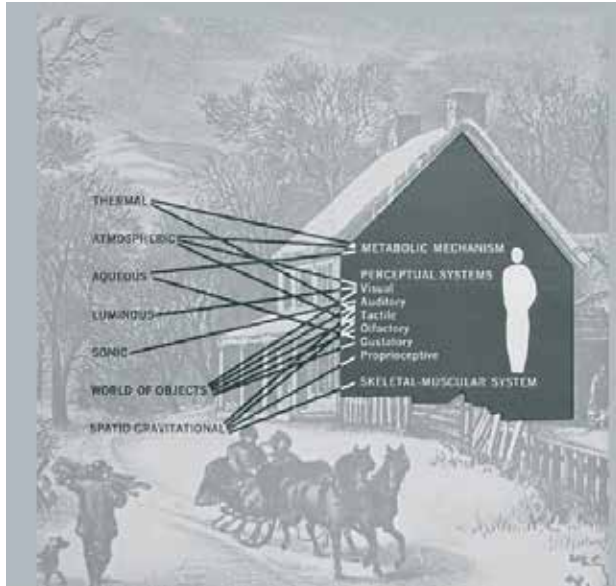


Figure 2.30 Building Envelope. Mediating Man and Nature

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instead of heating an entire three bedroom suburban house, the entire home does not need to be kept at the same temperature, let alone an entire room be warm. Consider a house that could keep the immediate surround of the body comfortable while allowing for difference in said comfort between different bodies in the same space. In this manner, a system could be further calibrated to create mediated environments and maintain homeostasis, increasing energy efficiency. This is quite different from the conventional practice of how, we design with the quite perverse preconception that “the human body is treated as a problematic perturbation that disrupts the optimum functioning of systems whose only purpose is to maintain an environment for the human body.”<sup>[79]</sup>

Conversely, a more intelligent approach may be to create micro-ecologies that suit the varying social and programmatic conditions a space can witness. Elaborating on sustainable architectural design professor Michelle Addington’s above discussion of the human body and the design environment, the performative wall is currently the most accepted form of construction and “compensates for the environmental penalties brought on by a material choice.”<sup>[80]</sup> This relationship is illustrated in the diagram

above, which establishes both the external environment and the internal body as entities that need mitigation. It is a system that removes one from the other; as long as the wall system remains unperturbed it can do its job. This entire concept originates from a time when physical, spatial separation was used as a preventative health measure during the flu epidemic.<sup>[81]</sup> The building convention that resulted was born without consideration of energy expenditure, let alone energy relationships. Subsequently, the desire to control and moderate an interior condition for reasons of comfort and health became an interest in visionary projects of modernist architecture. At a massive scale, Buckminster Fuller's design proposal to seal central Manhattan under a massive geodesic dome is an example of creating a temperature controlled environment regardless of interior or exterior built conditions.<sup>[82]</sup>

At a domestic scale, the works of Reyner Banham and Francois Dallegret critiqued the construction of North-American housing, stating that they were built improperly for proper protection between cold and warm, and instead relied heavily on energy consuming secondary technological equipment for thermal and ventilation control. In a similar reaction to the shortcomings of accepted modes of construction, Archigram produced a project titled *Suitaloon*, the architectural equivalent of the space suit.<sup>[83]</sup> Coop Himmelblau's and Haus Rucker-Co. both sought out alternative forms of environmental separation while experiencing states of higher immersion. This is executed in Wolf Prix's *Restless Sphere*, a politically charged project titled *Basel Event*, as well as the *Oases* series, an architectural parasite, or the mobile *Environmental Transformen Helmet*, a series of architectural prostheses by Haus-Rucker-Co. that explored the perceptual augmentation of space. Other examples that confronted the technological possibility of mobile, flexible, and alternative social environments can be found in the work of Hans Hollein and Ant Farm, who both experimented with inflatable spaces for nomadic purposes.<sup>[84]</sup> As architect Matt Johnson states in his essay, *The Milieu Interieur*, architectural interest in atmosphere and climatic technology seemed to dissipate in the late 70's until its re-emergence in contemporary practice. The building envelope has inherited new responsibilities towards instrumental mediation of space. These environments of flux are explored in Diller + Scofidio's *Blur Building*, a pavilion for the 2002 Swiss Expo, where filtered lake water is turned into mist and used to dematerialize the pier. The system recalibrated its output in relation to the site's climate conditions.<sup>[85]</sup> Philippe Rahm and Catherine Mosbach's *Phase Shift Park for Taiwan*, explores the use of biological(vegetative) and mechanical(synthetic) instruments in the design of an outdoor park. Together,

instruments construct varying experiential pathways that moderate the extreme environmental conditions of the city. Heat, humidity and pollution are regulated according to seasonal conditions and programmatic preferences.<sup>[86]</sup>

Sean Lally's *EOS Series* explores floating, self-powered modules that propagate visually imperceptible energetic boundaries associated with emergent social collectives in public space.<sup>[87]</sup> These projects, among others such as work by Francois Roche and Jurgen Mayer H, indicate an expanded idea of what constitutes an architectural material, and how it confronts possibilities for integration between user and environment.<sup>[88]</sup> This points to the possibility of a symbiotic architecture, an architecture that experiences elements of metabolism, fluctuation and growth. This approach to architecture is fundamentally different from the majority of its historical predecessors. As Matt Johnson states,

The subject of this architecture is no longer the Modulor, a fundamentally geometrical construct delineated from Da Vinci's Vitruvian Man. Instead, it is a cybernetic being whose body becomes a sensing mechanism for an external environment in perpetual flux, Mosbach and Rahm's Phase Shift Human.<sup>[89]</sup>

French philosopher and social scientist Bruno Latour argues that the Enlightenment period marked a profound schism in the studies of the sciences (the material) and the humanities (the symbolic). He posits that these two methods of thought and experience should merge in order to create a "non-separability of things and signs."<sup>[90]</sup> A cybernetic state in architecture would entail a seamless relationship between technology and phenomenology, and the many digital tools that allow for virtual permeation into the physical realm.<sup>[91]</sup> As mentioned earlier, the cybernetic state is a fundamental and largely unquestioned ingredient of the contemporary western lived experience. The immediate effect of virtual action within the physical realm is the most palpable manifestation of that reality. Exemplified by the many individuals who have lost their jobs due to social miscues on media feeds such as Twitter, or the business ventures that can emerge from any spot on the planet due to the crowd-sourcing website Kickstarter. The human is the mediator in control of their own individual filters of a highly connected system. In this age each person can be responsible for regulating their own climatic homeostasis, whether it be through real-time computer controlled thermostats, fitness tracking wearables, or internet communication portals. This cybernetic age is the time of the cyborg; the human and their expanded physiology.



Figure 2.31 Dome Over Manhattan, Buckminster Fuller and Shoji Sadao, 1960

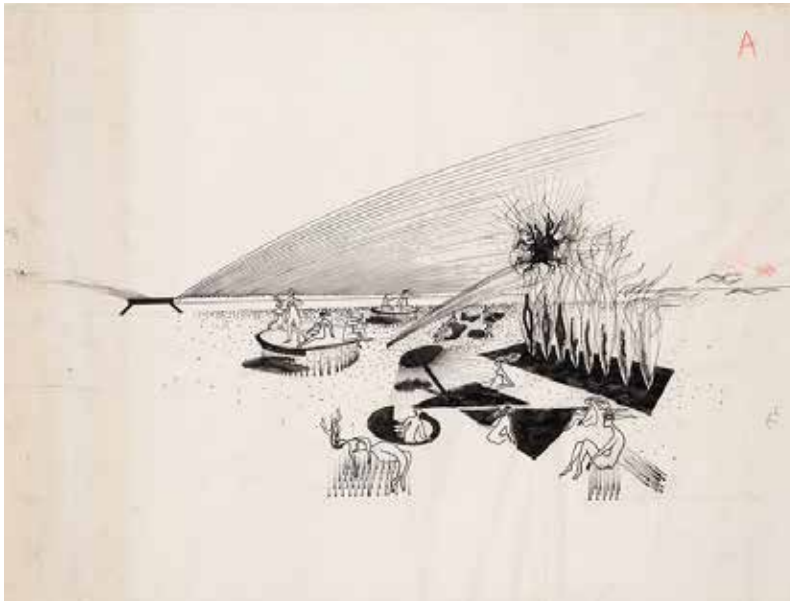


Figure 2.32 The air-conditioned city, Yves Klein and Claude Parent, 1961

liminal matter

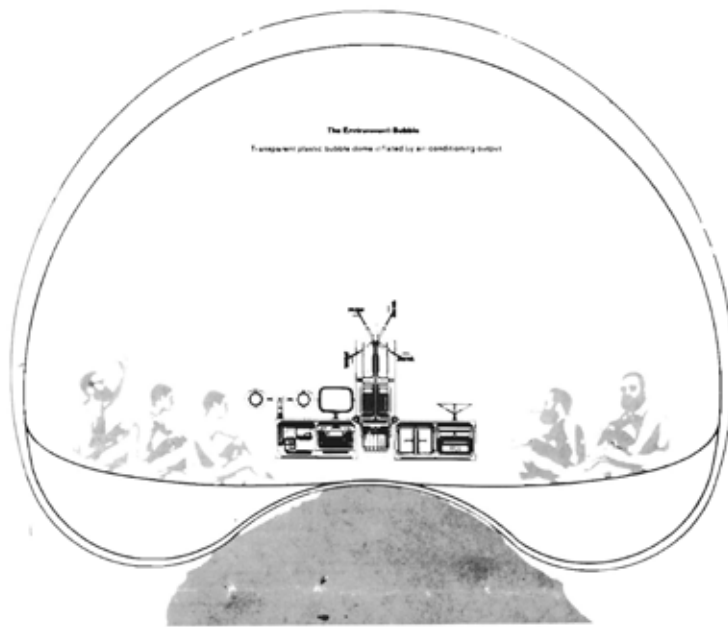


Figure 2.33 Un-House. Transportable Standard-of-Living Package, Reyner Banham and Francois Dallegret, 1965

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Figure 2.34 Suitaloon, Michael Webb, 1966



Figure 2.35 Mobile Office, Hans Hollein, 1969



Figure 2.36 Restless Sphere, Basel Event, Coop Himmelb(l)au, 1971

liminal matter



Figure 2.37 50 x 50' Pillow, Ant Farm, Installation at Saline Valley, California for Whole Earth Catalog Supplement, 1970

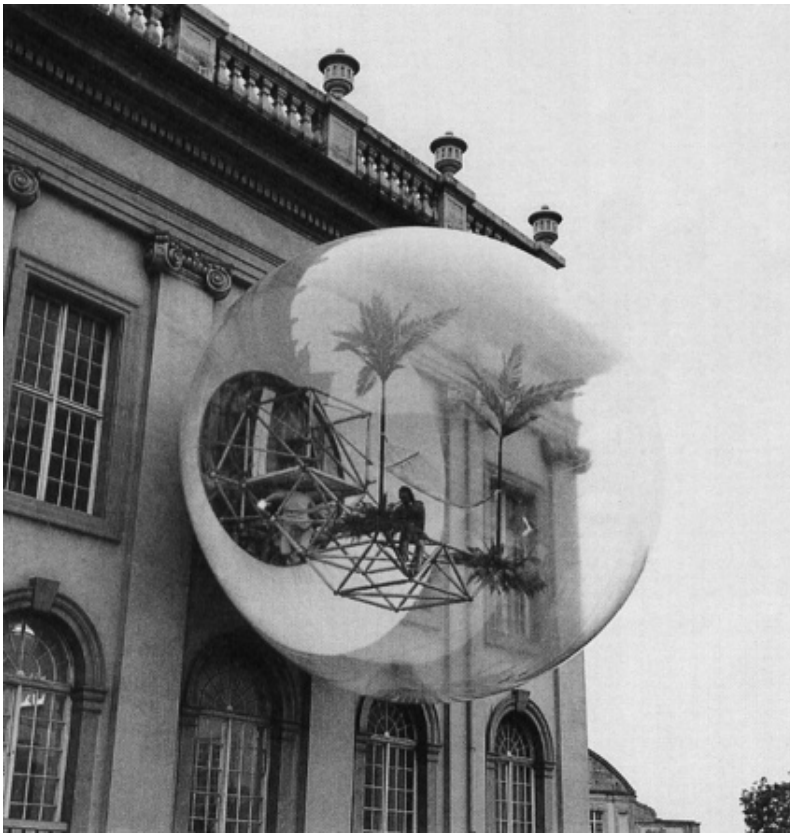


Figure 2.38 Haus-Rucker-Co, Oase No. 7, in Kassel, 1972

the expanded realms of the individual

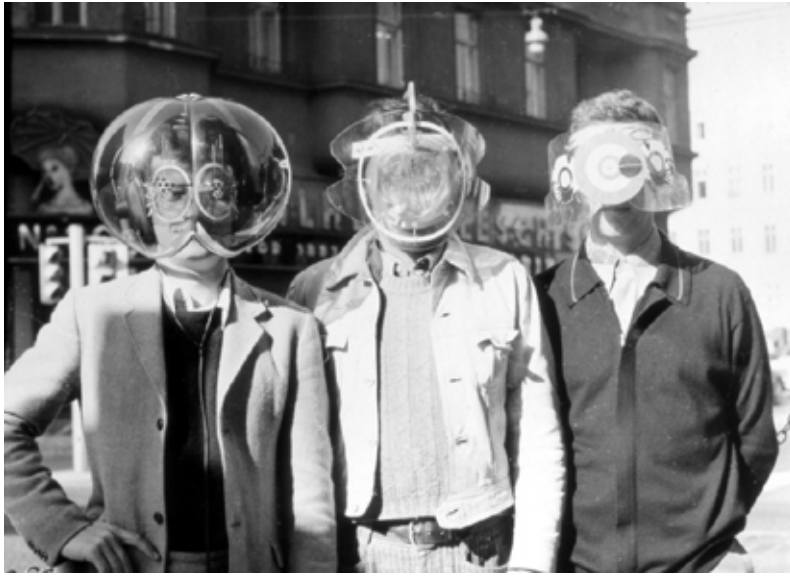


Figure 2.40 Haus-Rucker-Co, Laurids, Zamp and Pinter with Environment Transformen, 1968

liminal matter



Figure 2.39 Blur Building, Diller + Scofidio Renfro, Swiss Expo, 2002



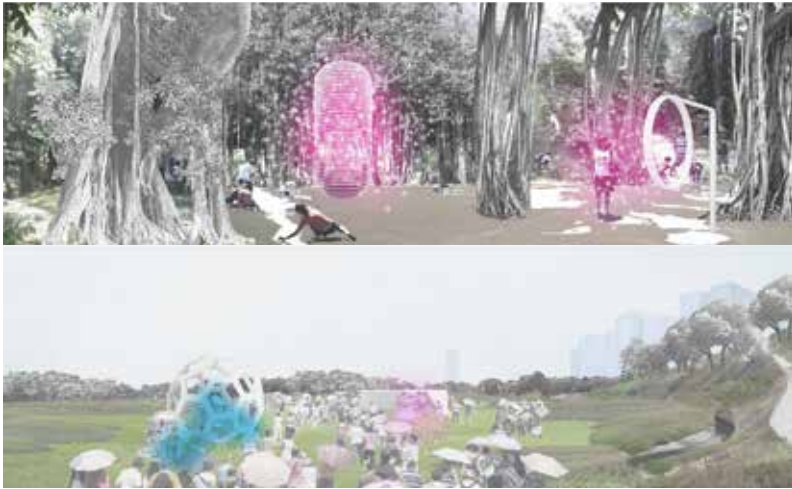


Figure 2.41 Phase Shift Park, Philippe Rahm and Catherine Mosbach, 2012



Figure 2.42 EOS Series/Untitled One, Sean Lally, 2014

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**Part Two: Understanding the Presence of Others**

the expanded realms of the individual



## 2.1 Man and Machine, The Expanded Physiology

It is not clear who makes and who is made in the relation between human and machine. It is not clear what is mind and what is body in machines that resolve into coding practices. In so far as we know ourselves in both formal discourse (for example, biology) and in daily practice [...], we find ourselves to be cyborgs, hybrids, mosaics, chimeras. Biological organisms have become biotic systems, communications devices like others. There is no fundamental, ontological separation in our formal knowledge of machine and organism, of technical and organic.<sup>[1]</sup>

The innovation of a real time network connection spurred a drastic expansion in global consciousness. This breakthrough began with the invention of the telephone as a “de-located” form of communication. The evolution of communication has involved instruments such as the wheel, the alphabet, the printing press, the train, the airplane, even the telescope, and all of the subsequent discoveries in mechanisms, chemistry, language and physics that have allowed such technologies to emerge. As William Mitchell writes, “it is not as if we became posthuman in the wireless era; since Neanderthal early-adopters first picked up sticks and stones, we have never been human.”<sup>[2]</sup>

The mechanical actions that humans are capable of having been transformed through these instruments since their inception. The human species has been creating machines to service and expedite tasks in order to supply warmth, aid in hunting, and provide shelter. Our use of technology is nothing new; in fact, technology has been affecting us since the beginning of man. The word machine descends from the Latin word *machina*,<sup>[3]</sup> which is in turn derived from the Greek *machana* meaning “contrivance, machine, engine”,<sup>[4]</sup> which is finally derived from *mekhos* meaning “means, expedient, remedy”<sup>[5]</sup>. Simply put, a machine is any device that helps you do work, from a hammer to a bicycle.<sup>[6]</sup> These tools, carrying out our daily tasks, have become inseparable from human living. While we might use them on an individual basis, they have widespread effects. Consider the arrival of “live television”, a real time portal into current happenings, which fostered a new type of awareness that went beyond contemplating an event during its aftermath. As Marshall McLuhan writes, “We shape our tools and afterwards our tools shape us”, and later, “The wheel is an extension of the foot, the book is an extension of the eye, clothing, an extension of the skin, electric circuitry, an extension of the central nervous system.”<sup>[7]</sup> Tools have expanded the human physiology, shaped the individual psychology and integrated themselves into daily functions in such a way that it has become unimaginable to live without them. This integration is evident with the mobile phone, which became even more popular upon the arrival of wireless internet, compact designs, touch screens, and reliable image, voice and text capabilities. The introduction of the word

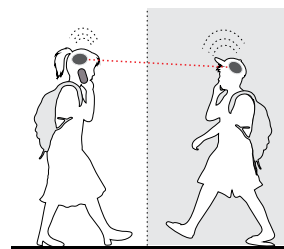


Figure 2.43 The Expanded Physiology

“Smartphone” to describe these highly compact and technologically capable devices signified the expansion of a new technological realm, fostering a population of electronomadic individuals in North American urban society.<sup>[8]</sup>

Scientists Manfred Clynes and Nathan Kline proposed the term “Cyborg” to describe the cybernetic human, or the “exogenously extended organizational complex functioning as an integrated homeostatic system, unconsciously.”<sup>[9]</sup>

Cyborg anthropologist Amber Case made the distinct suggestion that a great many, if not every person, is now inherently a cyborg as defined by Clynes and Kline.<sup>[10]</sup> In his essay *The Milieu Interieur*, Architect Matt Johnson references Harvard Professor of Architecture History and Technnology Antoine Picon’s idea that

the image of our age is not the Renaissance’s humanist subject, nor even Le Corbusier’s Modulor, but the cyborg is “not a utopian figure, [nor, I would add, a dystopian one] but the result of the full use of existing technologies.”<sup>[11]</sup>

The cyborg is now an accepted psychological and behavioural state of being. The network connection, rather than being an intermittent “interruption” of local connection, is now a constant presence; a running background noise of information. The tensions between these two communication platforms are outlined in the figure below. At it’s most extreme example, it is a constant streaming portal, debilitating the motor abilities in physical space. An example of this behaviour is illustrated in the figure on the following page.

Network connections and their separate (for the time being) infrastructure has made a platform for the second self: an individuals personality that acts and appears in the online world. In todays world, there is a responsibility to nurture both physical and the digital selves. Marshall McLuhan warns of this predicament humans have found themselves in:

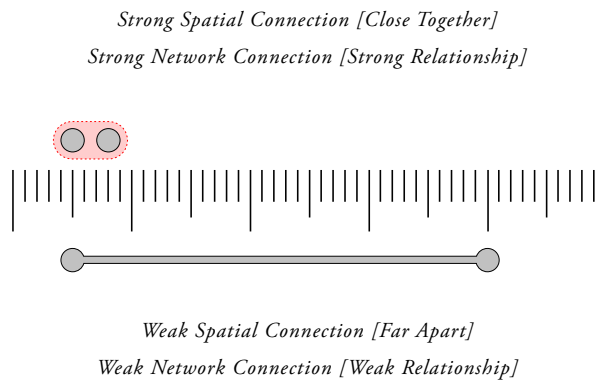


Figure 2.44 Spatial Connections vary in strength based on proximity. Network Connections vary in strength based on relationship quality.



liminal matter

Figure 2.45 A lady moves through a retail space. Her primary engagement is to her mobile device. The actions, paths and resultant experience are augmented by the sensorial and cognitive dedication to a network place. Localized and augmented territories are formed.

Today's child is growing up absurd, because he lives in two worlds, and neither of them inclines him to grow up. Growing up— that is our new work, and it is total. Mere instruction will not suffice.<sup>[12]</sup>

Donna Haraway in her essay titled *A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century* describes the potentials of such an interwoven, complex society in a more positive light, writing,

The home workplace, market, public arena, the body itself – all can be dispersed and interfaced in nearly infinite, polymorphous ways... The cyborg is a kind of disassembled and reassembled, postmodern collective and personal self.<sup>[13]</sup>

These expanded network connections have drastically modified the means in which one can communicate. Much of contemporary human interaction is founded upon the digital self, which has enabled flexibility in work schedules and locations, opened debates on current events, and allowed the sharing of personal interests and values. As a result, the personal desires experienced and the utilitarian needs of physical space are changing. Information flows and human values are being effected creating alternative spatial compositions as shown in the diagram on the following page.

The interactions between people and their environments are the social footholds of the urban city. A behaviour initially only experienced in physical space is now experienced through technologically augmented systems. A world that is incredibly captivating, but remains fleeting in its concretization, is primarily represented in the totemic artifacts that offer projections into its complex datascape. The device, its portal, and the world it leads to creates a virtual realm separate from the constructed physical reality. As much as network connections have commanded attention, they are contingent on the construction reality they are born from. Addington writes,

The imagined space escapes precise and specific characterization of the geometrically constructed surfaces of the object and yet the implication is that its very existence is determined by those surfaces.<sup>[14]</sup>

The constructs and realities of the experienced landscape are in near fluid evolution. Certain considerations have come with the accepted use of constant network access and the emergence of a second, digital self. James Corner describes the role of passive interactions that place can have on an individual when describing landscape experience. A subconscious index of place that is running and taking effect on a person even if conscious understanding or explicit recognition does not occur. The simple awareness that external stimuli is always occurring, changing and affecting the circumstances upon which may have grasped one's immediate attention:

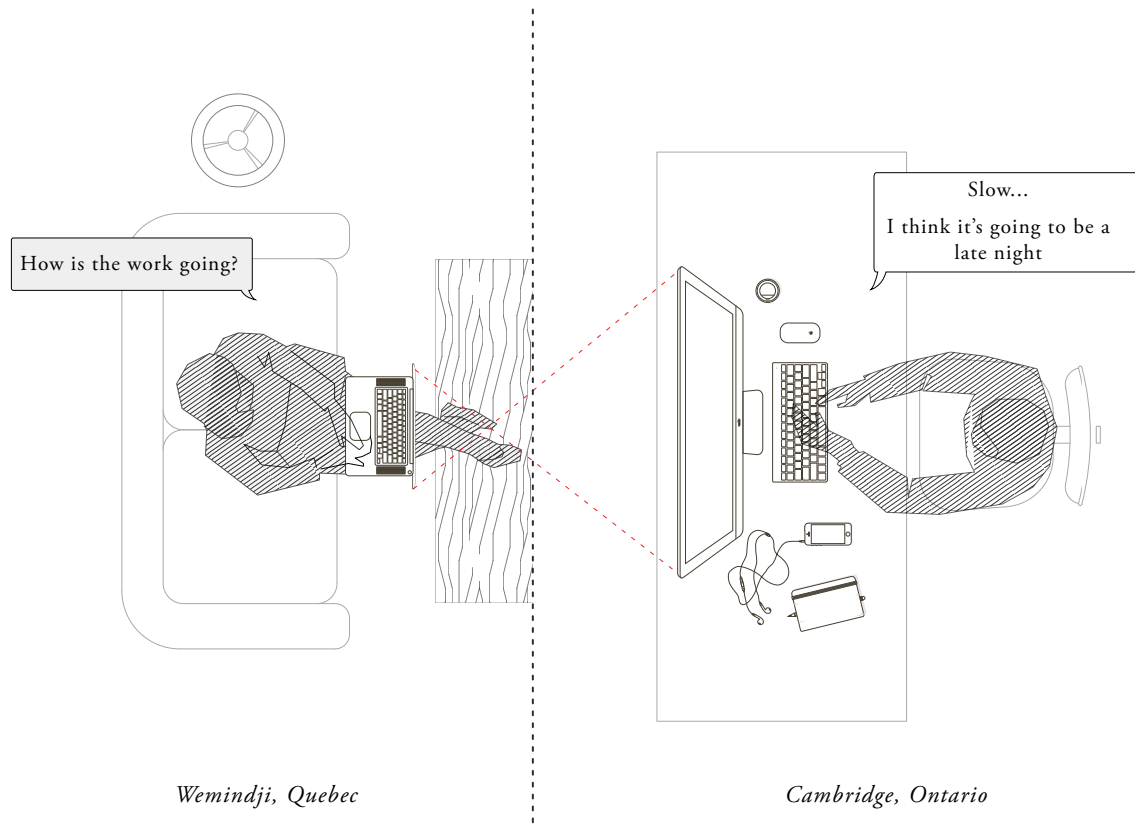


Figure 2.46 Two people are translocated, allowing the establishment of enriched relationships independent of sharing space. Each person is offered a scale distorted portal into another space, and sometimes another time.



To the degree that everyday inhabitants experience landscape, they do so in a general state of distraction, and more through habit and use than through vision alone. Their eidetic image of place is bound into a greater phenomenal range of significance than vision or contemplation affords.<sup>[15]</sup>

Corner continues by indicating how the digital world, which is a predominately visual one, has only fed a primitive pictorial impulse: “The pictorial impulse denies deeper modes of existence, interrelationship, and creativity”<sup>[16]</sup> Addington, too, writes on this impulse:

The privilege afforded to the surface emanates from an a priori belief that perception is rooted in and determined by geometry. Geometry relentlessly tethers the built environment to static artifacts.<sup>[17]</sup>

Eventually, the ubiquitous network connection will, almost seamlessly, overlap with physical space. This is indicated by current forays into comfortable, wearable, and near-imperceptible technologies designed to integrate completely with human physiology. Google Glass, Oculus Rift, and Leap Motion are all indicative of this technological fixation.

Network connections will continue to disregard and disassemble the constructs of physical place and afford convenient relationships between beings. As Ray Kurzweil posits, maybe one day there will be no visual boundaries in digital communication. Instead there will be a new epoch of the human hive mind.<sup>[18]</sup>



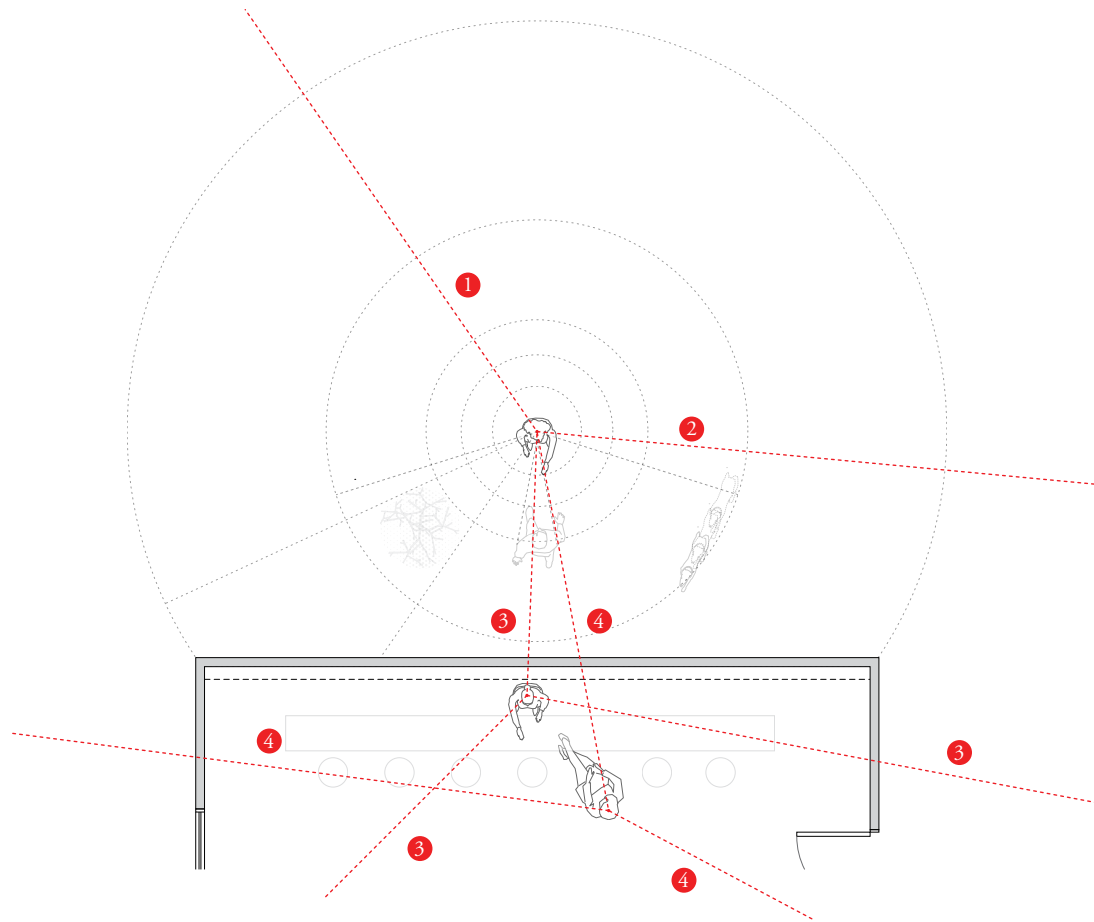
Figure 2.47 Google Glass



Figure 2.48 Oculus Rift

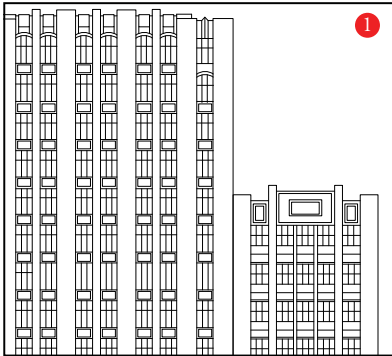


Figure 2.49 Leap Motion



liminal matter

Figure 2.50 Network Connections occurring within a physical collective. Not all people in this situation can see and hear everyone else, but these people through their physical place based communication, and their additional communication networks are all affecting one another.



In the city with @andrew\_wei  
#streetelevations #coolbuildings



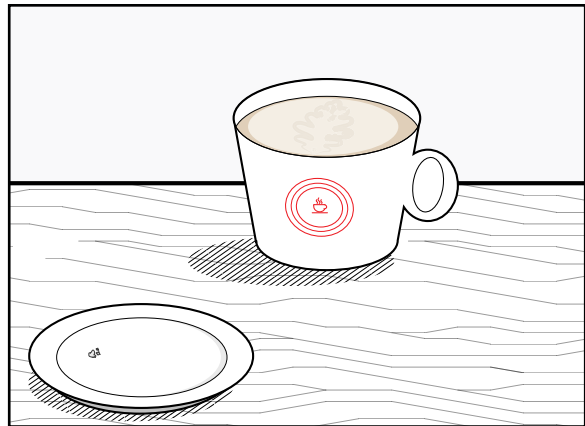
Made some new patterns for a card design job coming up with @frozenfan4lyfe. Check them out at the link: tinyurl...



The Steaming Pot is looking to hire a full-time Barista and part-time Cashier. Send us a message for details! you are following The Steaming Pot.



Latte and a yummy croissant at The Steaming Pot before meeting **Dylan Gray, Andrew Wei** and **Stephanie Leone** for a walk in the park!



the expanded realms of the individual

Upon exploring the role that current communication technologies play in creating a particular expanded physiology, a brief reflection of how these relationships form into group conditions, and a greater society is given in order to understand the role of the social individual as a member of the larger collective. By surveying texts that historically explore social organization, lessons can be found for the use of new technologies in developing the empathic collective.

Beginning with Hannah Arendt's *Human Condition*, she describes the foundation of human life as "vita activa", the life in action. Thus referring to the spirit of the individual life as one that is engaged and producing. This behavior is what forms and defines the structure of the physical environments we find ourselves operating. Additionally, human interaction is what shapes a body politic, the organization of individuals. Arendt writes a statement that is perhaps of particular relevance in the information age,

No human life, not even the life of the hermit in nature's wilderness, is possible without a world which directly or indirectly testifies to the presence of other human beings.<sup>[19]</sup>

Arendt continues, specifying that this very unique quality distinguishes humans from other species. To work in complete solitude with the intention of creating an inhabitable world is an act that causes man to transcend into a god. To labour independently without interest in creation or cultivation is purely animal. The individual is identified as homo faber, man exacting change upon the environment through action. This is an evolution from homo erectus, the simple, upright man.

Arendt's work states that action "is entirely dependant upon the constant presence of others."<sup>[20]</sup> This dependence is what influences individual decisions, with the intention of impacting a world that belongs to a greater population than the independent self. In the conscious practice of architecture, a field that quite literally forms structures and environments, it is of particular interest to make a conscientious effort to consider the different types of interactions and relationships that can occur between individuals. Exploring, analyzing, and critiquing past judgements can be an integral aspect of designing for the greater good—an action that is a practice in empathy:

Man is unable to see himself entirely unrelated to mankind, neither is he able to see mankind unrelated to life, nor life un-related to the universe.<sup>[21]</sup>

The idea that existence at its root is the desire to connect to other beings is extremely compelling. In this paradox, we are permanently alienated from one another, forever singular, like an infinite asymptote, painfully

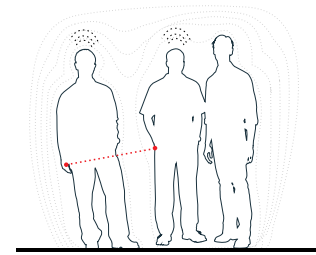


Figure 2.51 The Empathic Collective

tortured by striving to be together while enduring continuous individuality.

The desire to connect while separating is a unique human quality. Examples of this behavior can be found in our urban environments, of which our settlement patterns are a part. With the arrival of an industrial-centric society came the suburbs, and with the suburbs came isolation. This situation has been amplified by the growing impact of media. As Martin Pawley argues, the industrial shift reduced the obvious need for social contact and the new generation of media has infiltrated and reduced the realm of personal contact.<sup>[22]</sup> The lack of dependence on other people is predominantly an emergent veil caused by the current state of society. It could be argued that the connection to one another is stronger, and more imperative than ever. However, the idea that production is of higher value than people is an accepted and skewed goal of human culture.

The preceding section of this book spoke with a more empirical tone on human emotion and its relationship to individual comfort and energy exchange. This section is a deeper exploration into the fluctuations of energy and emotion as they relate to self-awareness, empathy, and accountability. The connectivity of the digital age and the ability to have a range of parallel conversations allows individuals to be in a state of constant communication with one another. A person's active conversation circle generally includes a select few people (more passive forms of communication would be those of Instagram, Twitter, or Facebook, where certain amounts of information can be left open and available for people to peruse whenever, without the owner's awareness) due to the demand and investment of time. The fact of the matter is that information is more widely available and communication more constant and prevalent than ever before. This may seem natural for most people living in contemporary Western Society; however, it should be noted that for centuries individuals lived in disconnect from vast majorities of other people. Only recently has global connectivity been possible. Previously, human interaction was dictated by geographical location, as demonstrated by the social organization of tribes, composed of families historically related by blood and close peers. In contrast, the global citizen is aware of connections and human relations occur outside of their own primary social circles or genetic ties. As a result, individuals can emerge from those circles and ties to find new socially groupings, such as support groups, based on their wants or needs, such as support groups. As more individuals identify with other 'strangers', linked together only by this common desire, collective awareness grows, and this awareness is in many ways due

"I am a node in a body-body network..."<sup>1</sup>

to the development of more sophisticated communication networks. cognitive scientist and experimental psychologist, Steven Pinker remarks that human empathy naturally defaults to local bloodlines, but that the habit of internet communication and the social climates it fosters overrides this tendency. Of course, the concept of nature versus nurture can be highly contested.<sup>[23]</sup> Jeremy Rifkin elaborates with urgency on the social changes that brought about each industrial revolution and expanded communication networks:

Throughout history new energy regimes have converged with new communication revolutions, creating ever more complex societies. More technologically advanced civilizations, in turn, have brought diverse people together, heightened empathic sensitivity, and expanded human consciousness. But these increasingly more complicated milieus require more extensive energy use and speed us toward resource depletion.<sup>[24]</sup>

As mentioned earlier, the inevitable increase of energy use while constantly innovating further, causes an exponential trajectory between technological capability and energy expenditure. This is referred to as the Law of Accelerating Returns:

An analysis of the history of technology shows that technological change is exponential, contrary to the common-sense “intuitive linear” view. The rate of paradigm shift (technical innovation) is accelerating, right now doubling every decade. The power (price-performance, speed, capacity, and bandwidth) of information technologies is growing exponentially at an even faster pace, now doubling about every year.<sup>[25]</sup>

Innovation is on pace towards incredibly powerful technologies; however, this will take a significant toll on energy. The expanding possibilities of communication have shifted these conversations, once limited, to involve entire global race. Additionally, inclinations towards empathic decision-making can effect the considerations made by the voices involved.

However, Rifkin states that many scientists would posit that energy and communications networks are what allow human beings to thrive in a state far away from a natural energetic equilibrium, as the second law of thermodynamics would suggest.<sup>[26]</sup> Pierre Teilhard de Chardin points out the inadequacies of our world’s primary decision-making bodies and the infrastructures through which our resources flow. The danger of this working method can be found in the well documented past of compartmentalizing expertise, and management flow without proper consideration of neighbouring fields of influence. This allows for particular relationships to go unnoticed and make it harder to find connections and understandings between relevant groups. This specialization without proper organization or

consideration of related specialties can have a resultant myopic behaviour:

When studied narrowly in himself by anthropologists or jurists, man is a tiny, even a shrinking, creature. His over pronounced individuality conceals from our eyes the whole to which he belongs; as we look at him our minds incline to break nature up into pieces and to forget both its deep inter-relations and its measureless horizons : we incline to all that is bad in anthropocentrism. And it is this that still leads scientists to refuse to consider man as an object of scientific scrutiny except through his body.<sup>[27]</sup>

As Teilhard explains, the system ignores the qualities that make each person an individual, turning its participants into lists and numbers. In truth, each person is impacted differently by environmental stimuli and mnemonic triggers. This idea that everything is affecting one another simultaneously, yet all things can be affected differently, is critical to the design of larger human organization. A humbling yet centering perspective on the current human condition can be found in the words of Alan Watts. Watts asserts that our conception of ourselves as an “ego in a bag of skin” is a myth.<sup>[28]</sup> The pattern-finding cognitive processes cause the mind to separate and categorized, but in reality they are processes of a greater whole. An idea that can be brought back again to the flows of energy and the laws of thermodynamics. The variation between individuals gives this great ecology its beauty and vibrancy:

The process is one of pluralization in form as well as in number. The elemental ripple of life that emerges from each individual unit does not spread outwards in a monotonous circle formed of individual units exactly like itself. It is diffracted and becomes iridescent, with an indefinite scale of variegated tonalities. The living unit is a center of irresistible multiplication, and ipso facto an equally irresistible focus of diversification.<sup>[29]</sup>

Importance should be given to individual experiences and responses not only because they are key, but also because they are the additional stepping stone in development of the empathic collective. In the collective, personal responses are significant:

The individual human subject is the encultured bodily subject. In this way the knowing and feeling subject is not the brain in the head, or even the brain plus the body, but the socially and culturally situated person, the encultured human being.<sup>[30]</sup>

The brain and the body operate on the sensing of difference or of change. This occurs through situational emplacement, but also through changes in environmental stimulus. As psychologist James Gibson states in his work, human perception emerges through the

**1 The accelerating pace of change ...**



**2 ... and exponential growth in computing power ...**

Computer technology, shown here climbing dramatically by powers of 10, is now progressing more each hour than it did in its entire first 50 years

**COMPUTER RANKINGS**  
By calculations per second per \$1,000



**Analytical engine**  
Never fully built, Charles Babbage's invention was designed to solve computational and logical problems



**Colossus**  
The electronic computer, with 1,500 vacuum tubes, helped the British track German codes during WW II



**UNIVAC I**  
The first commercially marketed computer, used to tabulate the U.S. Census, occupied 94.3 cu. ft.

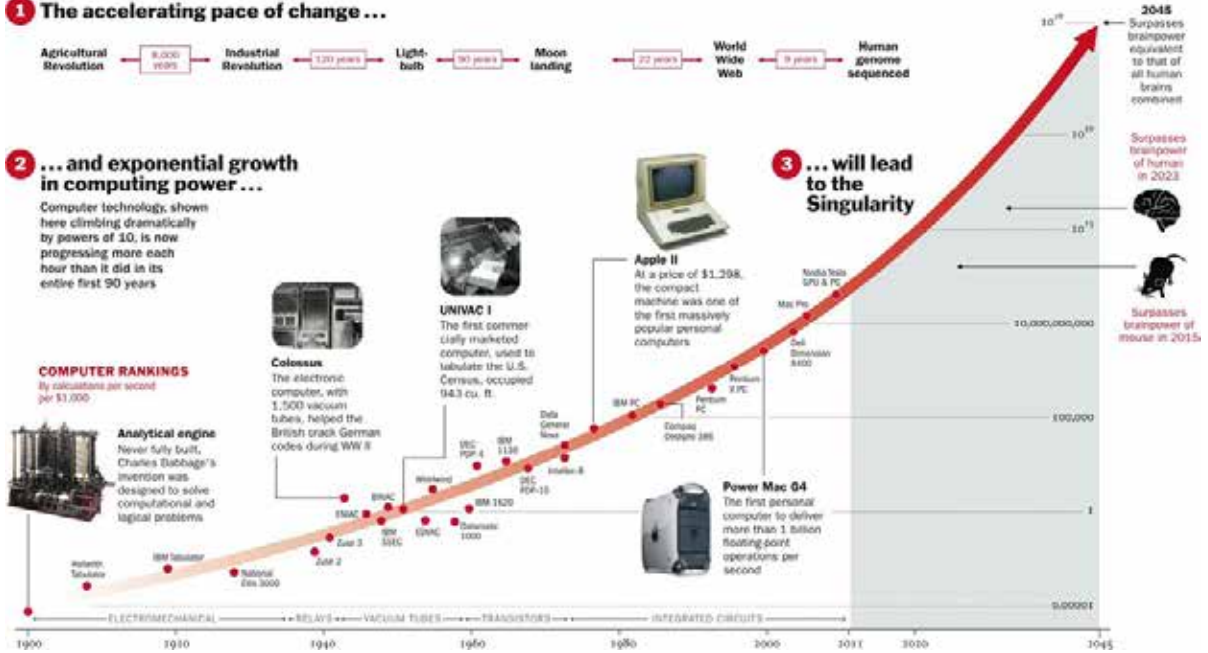


**Apple II**  
At a price of \$1,298, the compact machine was one of the first massively popular personal computers



**Power Mac G4**  
The first personal computer to deliver more than 1 billion floating point operations per second

**3 ... will lead to the Singularity**



liminal matter

Figure 2.52 The Law of Accelerating Returns



engagement of a whole body as it experiences an environmental field. The body cannot exist or survive without the energies of its external environment. Gibson explored this idea beyond its application to the physical body and considered relationships between the mental environment and the physical environment. The interconnectedness of beings drives the conception of “ecological psychology”,<sup>[31]</sup> This ecology and the complex societies that the world is now composed of indicate how survival and reproduction are not the singular goals of the human race. If this were the case, species would have remained in smaller tribes as they had in the Paleolithic period.<sup>[32]</sup> As Jeremy Rifkin suggests:

If we are by nature an affectionate species that continuously seeks to broaden and deepen our relationships and connections to others, in effect to transcend ourselves by participating in more expansive communities of meaning, then our increasingly complex social structures provide the vehicles for our journey. More complex energy-consuming civilizations allow human beings to compress time and space. As mentioned, we extend our collective central nervous systems to encompass greater swaths of existence. We do so in order to find meaning in belonging to ever richer and deeper realms of reality.<sup>[33]</sup>

Rifkin calls upon author Edith Cobb to suggest that there are greater powers at work than Darwinian self-reproduction and evolution. She writes:

[t]he need to extend the self in time and space—the need to create in order to live, to breathe, and to be—precedes, indeed, of necessity exceeds, the need for self-reproduction as a personal survival function.

<sup>[34]</sup>

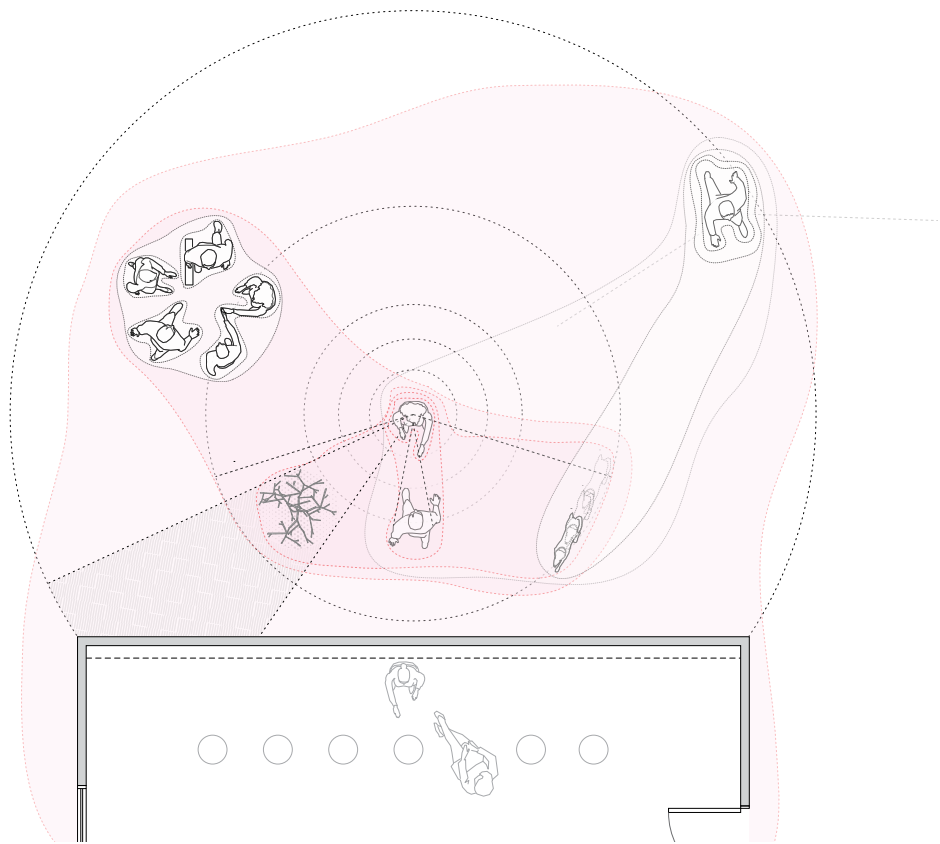
This human tendency towards connection expands our empathic consciousness. This action is inherently related to survival, but is not directly conducive to surviving. Empathy is “the awareness of the vulnerability we all share, and when expressed it becomes a celebration of our common yearning to live.”<sup>[35]</sup> Essentially, the human individual does not act simply in order to survive, but rather on the desire to survive in order to share in the experience with others. The act of reproduction is contingent on at least two species and, therefore, human connection supersedes the act of survival. By connecting or attaching oneself to at least one primary individual, this becomes the primary act of coupling, and of developing a relationship with a particular individual. This goes beyond survival and indicates an empathic consciousness.

With empathy in mind, how can technology and information networks

present themselves design emplaced relationships? What can digital information and the capabilities of compressed hardware and software technology manifest in contemporary architecture? How can altered boundaries of living be complimented by altered boundaries of constructing those spaces where living takes place? <sup>[36]</sup> Can these places foster and expand the empathic consciousness of the global human race? Similarly, Sean Lally asks:

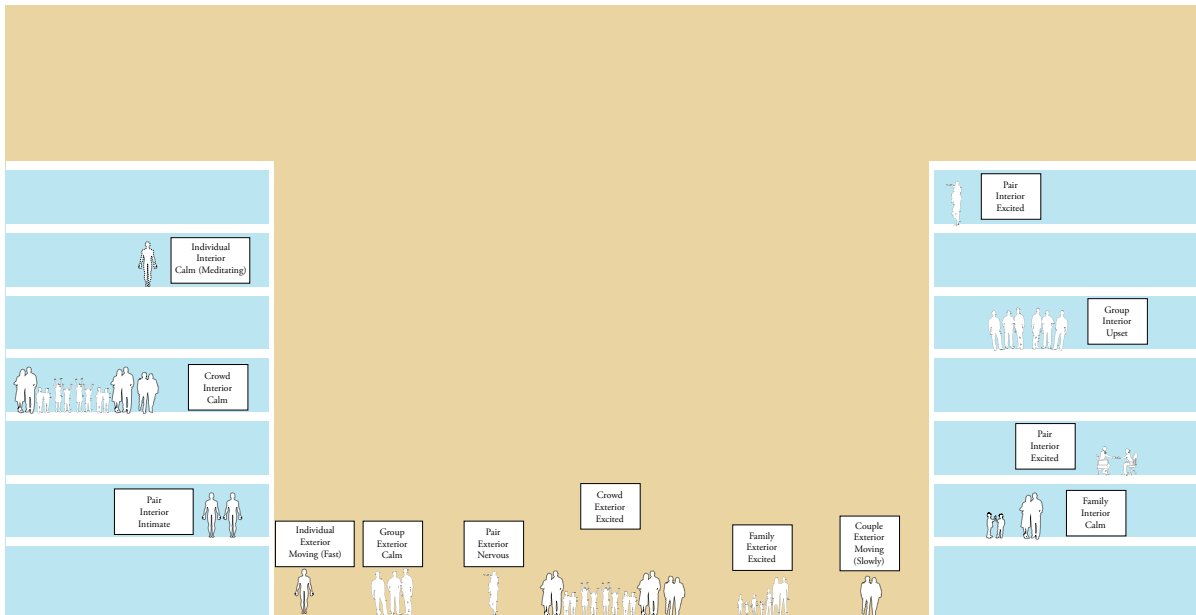
The boundaries and edges created to give architecture shape operate in an interaction between the material thus deployed and the body's ability to perceive it. How the body perceives that boundary-creating material dictates the type of influence it has on defining and maintaining a space....How can the architect design the dictating interactions... between the human body's sensory perceptions and the stimuli in our environment?<sup>[37]</sup>

New strategies for architecture can start to address the answers to these questions, namely responsive and adaptive architectures as well as diffusive building systems. These will be addressed in the following chapter.



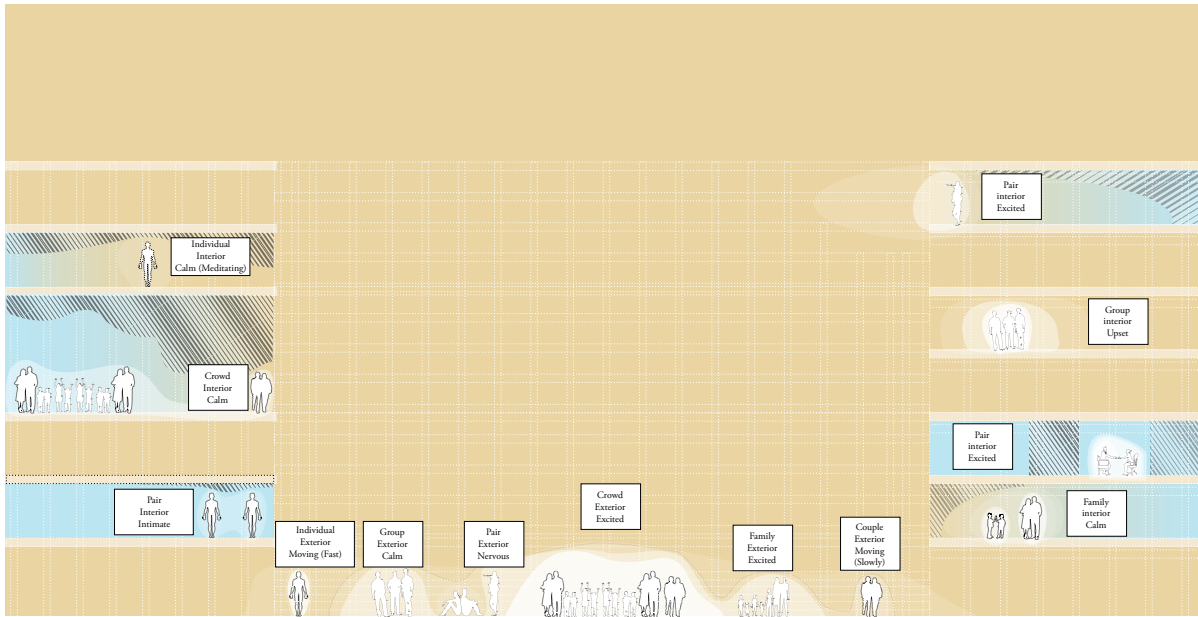
the expanded realms of the individual

Figure 2.53 Spatial Connections are Localized and Based on the constraints of elements in space



liminal matter

Figure 2.54 Rigid structures mitigate climate conditions but remain constant regardless of temperament or socio-spatial scale



the expanded realms of the individual

Figure 2.55 A Collective composed of overlapping thresholds, where particular areas between open and closed, solid and void, are exchanged for mutable poche condituons

Part Three: "The Living City"

the expanded realms of the individual



### 3.1 Empathy and Accountability in the Hybrid Collective

By the phenomenon of association, the living particle is wrenched from itself. Caught up in an aggregate greater than itself, it becomes to some extent its slave. It no longer belongs to itself.<sup>[1]</sup>

Making empathic connections between the “synthetic” and the “human” can have great impact on urban settlement, consumption and stewardship. This digital era has witnessed individuals who have spent their entire lives living in a networked society. Living Architect and sustainability innovator Dr. Rachel Armstrong describes the inevitable impacts on the material forms of the future city:

Following a generation of ‘digital natives’, the advent of cheap manufacturing platforms, the blossoming of networked knowledge-sharing communities such as TED, and Diamandis’ assertion that in the next decades we will see another 3 billion minds online, then technium facilitated disruptive change within our urban fabric is increasingly likely to occur in the coming decade.<sup>[2]</sup>

In a very real sense, connecting directly to the land and the resources it provides can be considered as understanding the materials and forms that elevate an object above commodity. This cultivates outrospection, an emotional tool in relation to the more commonly referred to, introspection. By practicing outrospection and embedding it into the environment and interfaces that we engage with daily, the relationship between people, place, and the components that comprise both of them, strengthens. A life built on outrospection is a life built on participatory and social action. It is one that embraces citizenry and refuses to take advantages of relationships in the global network.

The Faustian bargain attached to the global human community in its current state risks diminishing empathy. Awareness is increasing, but to know is different than to understand. And to attempt to understand is still a step away from acting or participating. Social engagement (passive) and interaction (active) are enriched through emplacement—staring someone in the face and having a conversation with them. Empathy is an essential component of the human condition. To dilute the human natural instinct and individual health in favour of outsourced systems where fragments of the individual can be exported is counterintuitive to human existence.<sup>[3]</sup> It is not that technology and communication networks are detrimental, but certain evolutions of being are not without discomfort.

Another pressing issue is the aspect of accountability. The idea that actions in one place do not have constant and profound impacts on people in other places is a naïve view held by many, especially for those living in service and out-sourcing based societies. Awareness may be different for those on the “other side”, whose responsibility is to meet the manufacturing quotas of



western cities. It is as if a particular threshold of consequence must be passed in order to stimulate action or modify behaviour. Reason must be paired with empathy in order to have direction. An implied design for moral progress through the embedded use of affect ought to be pursued. How can architecture act as an extension of the individual and participate in the societal shift?

Peter Eisenman postulates that this technological mediation of experience results in the augmentation of the relationship between the individual and the visible subject. The design of architecture ultimately can find itself in two categories: backdrop, or immersion. It can become a stage or a set, fading into the background, playing host to events or virtual experiences rather than being active and articulate, participating in the social milieu.

The advantage of the latter is that it,

appeals to both the somatic and the articulate: to the body, the mind, and the eye at the same time. This is something that other media do not do.<sup>[4]</sup>

Similar to Eisenman's sentiments, this architectural positioning focuses on affect rather than effect as a means of creating an enriched mind-body relationship with architecture. It is an architecture that attempts to push further, to heighten the sensitive nature of all human relationships that are rarely binary. There are many minds, many bodies, and many physical conditions influencing one another simultaneously.

Exploration of adaptive architecture and embedded responsive systems can help to create environments capable of fostering self-understanding through its embodied characteristics. This possible architecture can be imagined through the lens of Walter Benjamin's thoughts on the affect of the city and its' inhabitants. Neil Leach paraphrases Benjamin as follows,

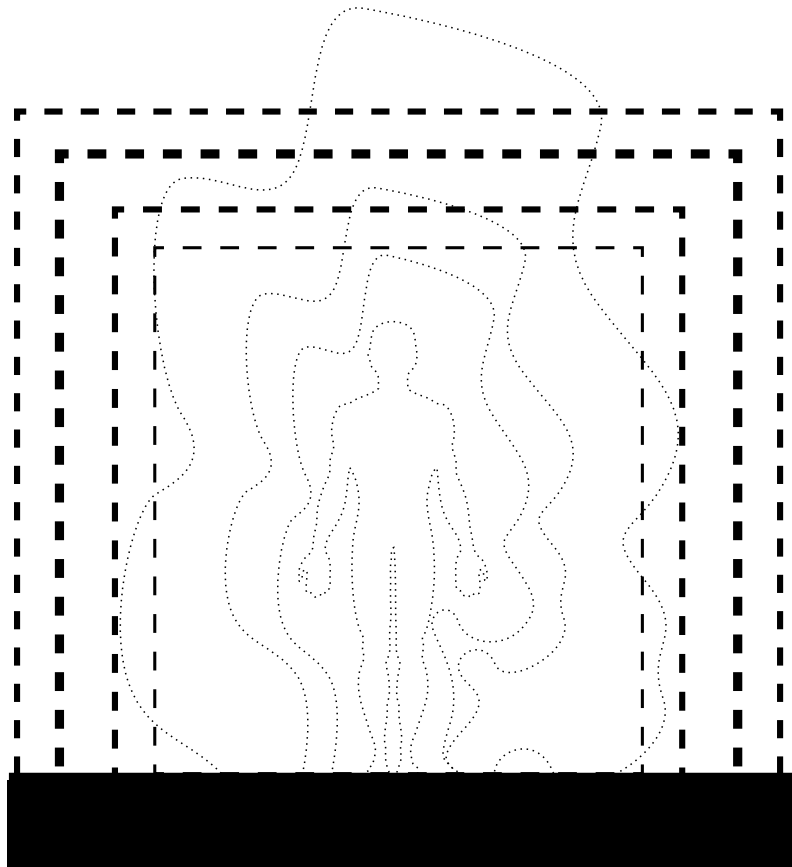
It is shock that lies at the heart of modern existence, where technology not only creates an environment fundamentally different from any previous era but also conditions human behavior and engenders a predominant mental outlook. For Benjamin, the human psyche is in essence an organic mechanism, which is constantly adapting to its physical surroundings. This adaptation has to be seen as a defensive mechanism predicated on survival. The human being, in this sense, is like a chameleon, governed by an instinctual urge to find similarities in the external environment, and, where none exist, to adapt itself to that environment. The term that Benjamin uses for this process is mimesis... This process appears to be governed by the death instinct– the urge to be at one with the environment– but is premised on survival and not on death."<sup>[5]</sup>



Figure 2.56 A Collective composed of overlapping thresholds, where particular areas between open and closed, solid and void, are exchanged for mutable poche conditions

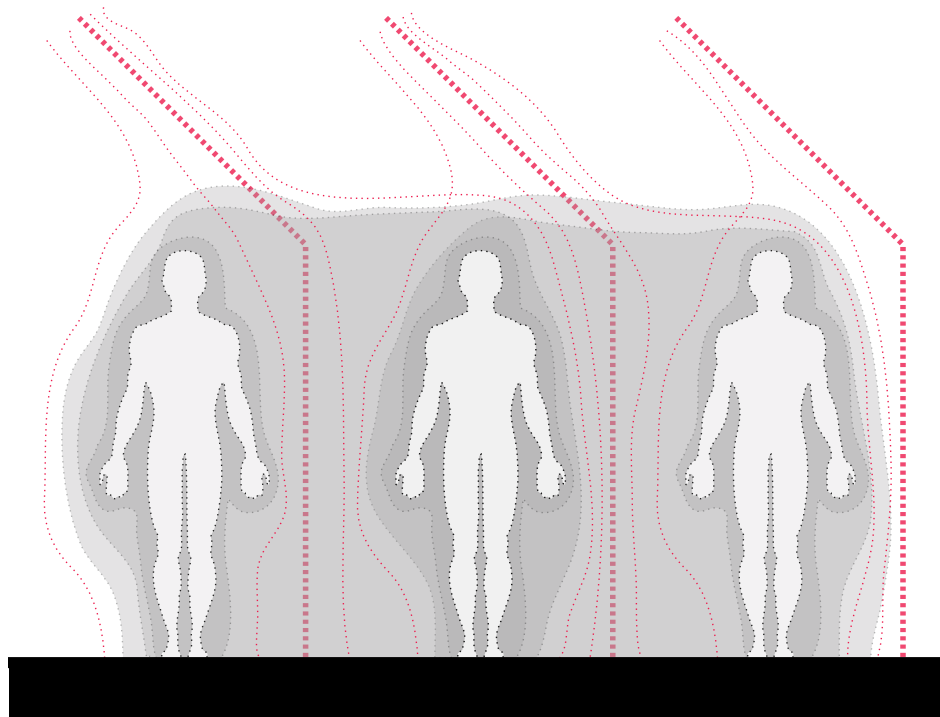
Consider an architecture that not only adapts and engages in mimetic behaviour, influenced directly by the actions of surrounding inhabitants. This allows an architecture to emerge along with its inhabitants in a symbiotic environment. One comprised of spaces that operate and develop relationships with its' external stimuli. Spaces that emerge not in the image of the human form, but rather in its' essence. A surround of mediating thresholds, caring and participating, as the collective should. An anthropomorphic environment; not explicitly in form, but in behaviour and response. This can in turn modify the existing perception of built environments and the role they play in the ongoing aspects of day-to-day living.

By developing architecture as a series of thresholds that operate similar to the perceptual bounds of the body, we are able to imagine an architecture built from a sensing environment, aware of personal comforts and responsive to cues of circumstance and climate. As Danielle Wiley states in her essay, *The Urban Square*, "Between this subject and the environment is not a line, but an active, reciprocal territory."<sup>[6]</sup>



the expanded realms of the individual

Figure 2.57 Intermingling of Human and Building Thresholds and Energies.



liminal matter

Figure 2.58 The delamination of bounds and the occupation of thresholds by the collective

The 1960s witnessed a critical moment in architectural history and theory. In this period, Archigram, Cedric Price, Louis Khan, and the “68 events”, as they came to be known, emerged—all having considerable impact on the architectural profession and pedagogy.<sup>[7]</sup> This section, named after one of Archigram’s notable works, explores visions for post-war urban public environments. Avante-garde architecture attacked modernism with a multitude of criticisms, rendering new possibilities through the drawing and event. Modernism brought with it innovations in technology: new mechanical systems and other types of apparatus built to provide “comfortable” environments within the extruded prisms of glass and steel. These systems were so alluring that energy expenditures became of secondary concern, and there was little to no awareness of the impending environmental affects.

The open cartesian plan and the obsession with the climate controlled environment became two areas of criticism in future periods of architectural thought and practice. Bold visions of the homeostatic environment—a condition intrinsically linked to the spatial boundary of the individual—were outlined in the earlier section. *The Living City* explores dynamic components and new forms of equipment at the scale of the city with an overall affect on the collective. The consideration of time and flexibility in the range of spatial explorations by these projects were not conceived purely in negative response to the innovations of the modern era, but were created with historical and theoretical consideration, interrogating quality of place and the well-being of the individual—areas that were neglected in favour of focuses on industrialization and market economy. As Alex Wall elaborates in his essay, *The Contemporary Metropolis*, Archigram’s agenda,

was not only to empower the individual but also to stage event-structures that could bring about new metropolitan dynamics. Depicted in many of Archigram’s ideas were individuals plugging into larger networks of interactive information, education and entertainment.<sup>[8]</sup>

These questions were posed in order to re-evaluate what architecture and spatial quality meant to the public, giving importance to the consumer’s voice. The individual was to be considered. The Situationists argued that:

the alienation fundamental to class society and capitalist production had permeated all areas of social life, knowledge and culture, with the consequence that people are removed and alienated not only from the

goods they produce and consume, but also from their own experiences, emotions, creativity, and desires. People are spectators of their own lives, and even the most personal gestures are experienced at one remove.<sup>[9]</sup>

The emergence of the Situationist International in 1966 and the publication of *The Society of Spectacle* published a year earlier, was (and continues to be) foundational in the discussion of urban public space, which had been in ongoing conversation preceding the Second World War.<sup>[10]</sup> The varying and speculative visions for the city in *The Society of Spectacle* indicated architecture as an important instrument in human affairs.

The concept of “the machine for living” had arguably fallen flat. Archigram in particular, looked to stimulate the technological foundations of modernism, focusing their attention towards the inhabitation of space. Architecture could no longer be approached as a standalone like the international style of modernity had done. Addressing an “‘expanded field’ of social, cultural, and technological facts”<sup>[11]</sup> was integral to Archigram’s research. Archigram’s scatty presentation disguised the radicalism of its argument about architecture. Broadly, it contended that architecture should not create fixed volumes of space to be mutely inhabited, less still shaped masses of masonry, but must provide the equipment for “living,” for “being”.<sup>[12]</sup> Archigram’s exclamation for humanized building practice can be shared with the concept of “unitary urbanism.” As described by Neil Leach, referencing the work of Sadie Plant,

a central theme in Situationist thought essentially viewing the city holistically as a combination of artistic potential and engineering resources. The city, moreover, conditioned everyday life....The Situationists saw the built environment as an integral part of determining the possibilities of lived experience. They recognized that ‘emotions, desires and experiences’ differed ‘according to the architecture of a space, and the arrangement of colours, sounds, textures and lighting with which it is created.’<sup>[13]</sup>

These visions focus on a person’s ontological experience and the significant role that not only architecture, but every ingredient of the city, has on affecting the moments that unfold in an urban centre.<sup>[14]</sup>

Leach also refers to the work of Ivan Chitchevlov whose vision for the city entitled *Formulary for a New Urbanism* focused on creating districts and zones that enabled particular emotional states, rather than program focused urban planning. Districts were given names such as the Bizarre Quarter, Happy Quarter, the Noble and the Tragic Quarter, the Sinister Quarter, and others. Chitchevlov’s vision was one that looked beyond banal

states of living into responsive and dynamic systems that can be aware of a participant's state of being. He describes "rooms more conducive to dreams than any drug, and houses where one cannot help but love"<sup>[15]</sup>, and posits:

If modern society is a spectacle, modern individuals are spectators: observers seduced by the glamorous representations of their own lives, bound up in the mediation of images, signs, and commodities.<sup>[16]</sup>

The Situationist movement used an investigative technique referred to as the *Derive*. This method was used to intentionally change a person's typical behaviour and daily routines in favour of exploration and conscious encounter, a more deliberate expansion of their knowledge of the city. The *Derive* was centered around the act of looking closer: being pulled into and participating in the city.<sup>[17]</sup>

The Situationists differed from the Surrealists in their conscious deliberation to take back the city as a site for converging experiences, rather than a place dependent on purpose and power.<sup>[18]</sup> They were interested in a city created for purpose rather than a place for citizens to be led to hollowed living.<sup>[19]</sup> The Situation itself is assembled upon a call to action for citizens to participate in the shaping of cities. As Hannah Arendt describes public space as the place of action, and George Baird refers to public space as the place of appearance, the observed and the observing come together in public space. In this sense there is no better place for the emergence of the active citizen.

The architectural explorations of Constant New Babylon are considered one of the most rigorous attempts at translating Situationists ideals into architectural propositions.<sup>[20]</sup> Constant focused on dynamic spaces and the experience of "disorientation", described as a "dynamic labyrinth," that opposed the static states and rigid systems imposed in the traditional city. This process could be considered as part of a proposed process rather than a final static outcome. Leading the inhabitant away from traditional experience would require a "reorientation" or an adaptive state, during which a metamorphosis and recalibration could provide internal adjustments. This new site liberates behaviour, but actions are reactive to the dynamics of the space. Static space is reminiscent of utility and function. Neither of which necessarily privilege the well being of the individual in regards to emotion and mental health. Rather they assist the process of economy and production. Creating a controllable and regulated society; an assembly line.<sup>[21]</sup>

The visions of living outlined, favour the "ludic" imagination, a common idea shared in the works of other event architecture such as Bernard Tschumi, whose project *Supersurface 5* is an example of a formal grid appropriated as a place for exchange, where systems can connect over a vast area, transmitting

#### LANDSCAPE

: "no longer refers to prospects of pastoral innocence but rather invokes the functioning matrix of connective tissue that organizes not only objects and spaces but also the dynamic processes and events that move through them...an active surface, structuring the conditions for new relationships and interactions among the things it supports.<sup>i</sup>

#### MOMENT

: "a fleeting, intensely euphoric sensation that appeared as a point of rupture revealing the totality towards passive and temporal."<sup>ii</sup>

#### SITUATION

active, spatio-temporal engagement.<sup>iii</sup>

UTILITAS: a way of reducing variety so change can be introduced in an orderly manner and as a way of initiating a rich and complex user illusion.<sup>iv</sup>

information and energy across its' Cartesian plane. The expected result is a space deliberately engaged in the acts of exchange that compose the urban city.<sup>[22]</sup> This visionary and event based architecture was influenced by the post-structural philosophy of Jacques Derrida, Michel Foucault, Gilles Deleuze and Julia Kristeva, among others. However, the drawback of many of these visions was their inherent radicalism. George Baird describes this as an extreme and anachronistic approach that makes the ideas inaccessible to the same public they are interested in liberating from the current social structures of the city.

At the very least, they would seem to suggest serious ultimate limitations of the frequently avant-gardist gestures common in poststructuralist architectural circles. Unless they are brilliantly strategic in their form of intervention, such gestures are likely to fail; to generate simply confusion and trauma for the public at large, rather than liberation; or even to strengthen the hegemonic social structures they ostensibly seek to challenge.<sup>[23]</sup>

The lessons that can be learned from these visions of architecture can be approached in the development of a highly calibrated, bespoke system, focused on creating singular relations with each of its' inhabitants. Interactions can cause particular spaces to emerge, creating a participating architecture, but also a facilitating one. The stress of dynamism, action, and a resultant reorientation are all notes to take away in the development of a future public environment.

#### PSYCHOGEOGRAPHY:

"Investigations aimed at establishing new ways of inhabiting the city"<sup>v</sup>

#### DERIVE

'drift', a technique of reappropriating the city as an ontological experience.<sup>vi</sup>

#### LUDIC IMAGINATION

The part of the imagination associated with play and learning. Generally spontaneous and discovery based.<sup>vii</sup>



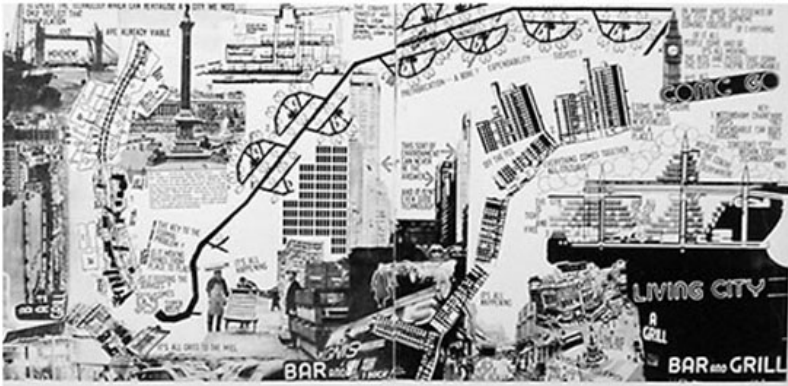


Figure 2.59 Archigram. The Living City. 1961.

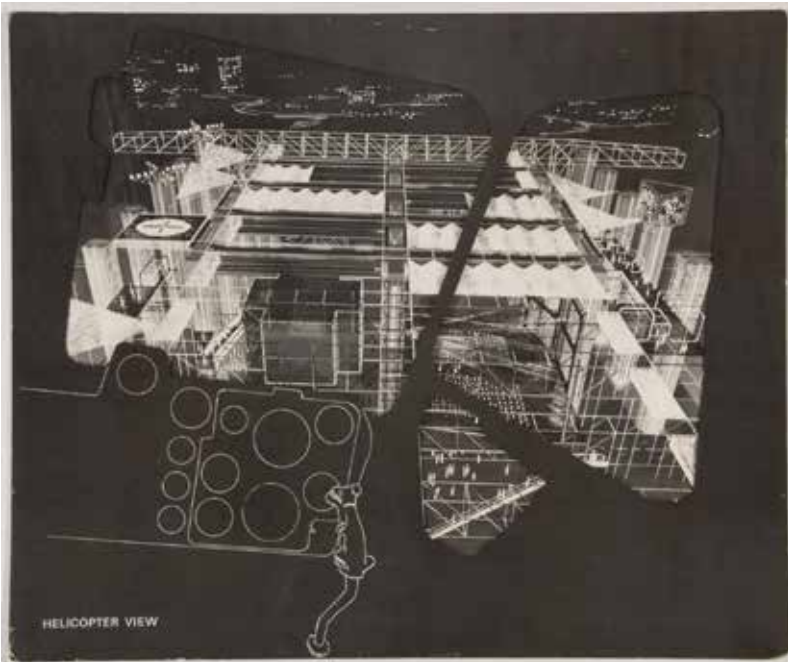


Figure 2.60 Cedric Price. Fun Palace. 1961.



Figure 2.61 New Babylon. Constant Nieuwenhuys. 1967-1972.

the expanded realms of the individual

A good agility teacher, like mine, can show her students exactly where they left their dogs and exactly what gestures, actions, and attitudes block trust. It's all quite literal. At first, the moves seem small, insignificant; the timing too demanding, too hard; the consistency too strict, the teacher too demanding. Then, dog and human figure out, if only for a minute, how to get on together, how to move with sheer joy and skill over a hard course, how to communicate, how to be honest. The goal is the oxymoron of disciplined spontaneity. Both dog and handler have to be able to take the initiative and to respond obediently to the other. The task is to become coherent enough in an incoherent world to engage in a joint dance of being that breeds respect and response in the flesh, in the run, on the course. And then to remember how to live like that at every scale, with all the partners.<sup>[24]</sup>

Philosopher Donna Haraway's reflections on her relationship with her canine pet offer interesting parallels to the relationships a responsive system might provide. As technology continues to develop, it is increasingly possible to imagine an architectural species that is inquisitive, emotes, listens and responds. The capabilities of developing such co-operative human-environment relationships is right on the horizon and is a concept that has been imagined in science fiction for decades in examples such as the psychotropic houses of Vermilion Sands in J.G Ballard's *Thousand Dreams of Stellavista*.<sup>[25]</sup> Embedded in this paradigm shift is a changing human perspective of matter and built form:

By re-framing our understanding of matter we may be able to get a whole lot more from it, and understand it not as a dead thing to be controlled or consumed by machines, but as a partner in co-evolving our cities and future. Indeed, our very survival depends on the re-invigoration of matter.<sup>[26]</sup> Buildings are, for the most part, current observers within urban systems and predominantly static. Adaptive architectural systems engaging in the human-landscape coupling outlined by Donna Haraway, may provide a solution to these tensions by exploring the boundaries between environment, building, technology, and human experience. She elaborates,

Art and engineering are natural sibling practices for engaging companion species. Thus, human-landscape couplings fit snugly within the category of companion species...the history of the land is living; and that history is composed of the polyform relatings of people, animals, soil, water, and rocks.<sup>[27]</sup>

In these "relatings", a renewed and dynamic relationship between humanity and the built environment can be found.<sup>[28]</sup> Such close relationships can elevate the positioning of responsive, physical forms and postures from a perceived medium for possible gimmick and entertainment to a place that is sincere and understanding while simultaneously fostering a greater self-understanding:

The appearance of the mechanical in structures that move (sometimes fitfully) and nervous systems that breathe (sometimes convulsively) should be a reminder not, of the supposed authority of biomorphic forms, but rather of nature's inclusiveness. For humanity never was divorced from nature nor were any of its creations. We must, finally, learn to think without this opposition, recognizing that... we have always been part of nature.<sup>[29]</sup>

Architectural explorations of “reflexivity, dynamism, and the cybernetics of personal perception”<sup>[30]</sup> provide possible methods for the visualization, quantification and instrumentalization of qualitative effects and conditions as navigable design materials. This latent potential is embedded in the tenuous nature of a bounding edge condition, the areas in constant flux dependent upon external situations. These are the tensions of the spaces inhabited and are the spaces where interrelation is discerned.<sup>[31]</sup> For the sake of this relationship to be imagined with the same richness, it is important to know that objects can carry similar perceptual bounds as well. The planet itself has a series of atmospheric layers that determine changes in a surrounding environment. All electrical devices carry an electromagnetic field. Consider the passing of static from one body to another, or the transfer of thermal energy, transmission of radiant energy. These are the kinds of exchanges that allow for communication to exist and companionship to emerge. The sensing and actuating systems of adaptive architectural environments can shed light on how these relationships can actually work.

Responsive architecture, an evolving field in spatial design—first introduced by architect and MIT Media Lab founder Nicholas Negroponte—involves embedded technologies that allow for environmental sensing and reciprocal actuation.<sup>[32]</sup> It offers alternative possibilities for future architecture and allows for companion relationships to form between an individual and their surrounding environment.

Environmental sensing is performed by a catalogue of electrical hardware responsible for detecting the varying energies of an environment, whether it be audio wavelengths, infrared light, or carbon monoxide, for example. These sensing systems then can be programmed with particular reactions through a process referred to as actuation. This can manifest, for instance, in mechanical motion, the change or activation of light systems, or the opening and closing of valves.

Complex systems can formulate responses that evolve based on continuously garnered information. This “data” can also be pulled from network information, allowing systems to parse through existing databases or to use social networks as a means of learning and understanding programmed situations in order to hone curiosity and facilitate learning. This behaviour

is modeled after a primary human aspect of living: the innate ability to learn.

Companion learning species can formulate basic relationships with individuals through the practice of simple social learning mechanisms such as mimicry and affirmation. Conventionally, one observes behaviour and then copies it in a similar situation. With this, a response to particular signals is formulated. This observational behaviour can be programmed into a computational system and is referred to a learning machine. Consider the following example: if a system senses the raising of a figures' arm in front of them, it can be programmed to raise an appendage in return. The rate, duration and repetition can be programmed and dependent on the nature of how the figure approached the system.

There is also the capacity for a single learning component would be dependent on creating a system that would have their action affirmed by. In a sense, this type of collective system is acting similarly to human behaviour, which operates through a process of trial and error.

This type of learning is what humans use to translate “non-trivial” behaviour to “trivial” behaviour. These terms, developed by Heinz Von Foerster, are cited by Steph A. Gage in his essay, *The Wonder of Trivial Machines*, in which Gage uses them as a tool for understanding human learning and architecture. The definition of the “trivial machine” is divided into two parts:

1. An explanation of external reality, which works every time.
2. A thing with predictable behaviour in the external reality.<sup>[33]</sup>

This suggests all machines that are man-made and available for purchase, such as home appliances, hobby toys, or power tools, are trivial. These machines are all predictable in their nature and generally are intended to be understood as quickly as possible. This is why humans and the machines created in their image progress from non-trivial beings to trivial beings. Conversely, a non-trivial machine operates in precisely the opposite way, by constantly producing seemingly random outputs, operating on an internal system hidden from the external environment. For example, a responsive architecture with individual learning components that operate as a collective, continually responding to data inputs that are constantly updated, would be categorized as non-trivial. The observer learns, but the architecture is learning as well. In this sense, both machine and man are observed and observing: both engage in an act of understanding, and, subsequently, the shaping of each others behaviors arises from a place of empathy.

In his essay, Gage points to 17th century poet Henry Wootton to discuss the

Vitruvian edict that every work of architecture should maintain the qualities of “Firmness, Commodity, and Delight.”<sup>[34]</sup> This can be more plainly stated as structural stability and durability, its usefulness and delight. However, each of these are understood based on their relevant context. As Dr. Gage states,

When we ascribe the quality of commodity to the same object, we extend the description of the environment to include our understanding of the behaviour of people. When we go further and ascribe the quality of delight to an object, we can only do this in terms of our own understanding of the object or in terms of our understanding of the understanding of others.<sup>[35]</sup>

These fundamental elements still apply to diffusive, adaptive architectures. As Gage paraphrases famed cybernetician and psychologist Gordon Pask:

All buildings are embodiments of a mesh of interlinked concepts or interlinked topics. These concepts cannot successfully exist in isolation, and describe physically interdependent systems. To this extent, a building in gestation is an autogenetic entity fulfilling many of the criteria of a living system.<sup>[36]</sup>

By nature of how they work, responsive systems are a constant conversation between things. While architecture in its traditional sense is able to provide this non-trivial wonder and delight through the choreography of many external phenomena acting upon its surfaces. For example, the play of light along a wall, combined with dust and cold and frost, is a combination of activating agents that experience of place unfolds from. Von Foerster describes this as an inverted trivial machine. The sense of wonder the observer feels in the experience of a building is dependent on the subjective processes of how they identify patterns in the architecture and the previous knowledge and experience they bring to the experience. As Gage writes, summarizing the work of cybernetician Ranulph Glanville, this “learning can lead to an epiphany of understanding—and this can lead to a sense of wonder.”<sup>[37]</sup> The advantage of an adaptive system is that it would operate similarly to the observer, bringing to an interaction its own previous experience. In this circumstance, there is a symbiotic process of learning and understanding between the participant and the architecture, such that there is less clarity between who is the observer and who is the observed. Glanville argues, “if the constructed construct [architecture] leads to introspection, then the wonder never ceases”, which corresponds to Gordon Pask’s speculations on creating a balanced but attractive physical environment, capable of continuously producing wonder and, hopefully, introspection:

An aesthetically potent environment should have the following attributes:

- a) It must offer sufficient variety to provide the potentially controllable

novelty required by a man. (However, it must not swamp him with variety-- if it did, the environment would merely be unintelligible.)

b) It must contain forms that a man can interpret or learn to interpret at various levels of abstraction.

c) It must provide cues or tacitly stated instructions to guide the learning and abstractive process

d) It may, in addition, respond to a man, engage him in conversation, and adapt its characteristics to the prevailing mode of discourse.<sup>[38]</sup>

Element “d” and its call for architecture to be able to converse is a quality that may be more difficult to find in architectural constructs. It requires the architecture to not only participate in conversation but to do so willingly, to engage and take interest. It is not that architecture or other forms of art practice are unable to foster internal conversation. However, adaptive architectures provide one such possible way of foregrounding the element of an active environment. Andrew Pickering describes in *The Cybernetic Brain: Sketches of Another Future*, that potential in cybernetics is the overt action attached. Pickering speaks about the typical object/machine and says that:

rather than effacing or concealing the engagement, as conventional art objects do. Cybernetics thus invites (rather than requires) a certain stance or strategy in the world of the arts that conventional aesthetics does not<sup>[39]</sup>

However, the advantages of cybernetics, such as their ability to converse and their ability to learn, are speculative. Pask argues for the advantage of working towards developing responsive systems, but also recognizes how the claims for its successes are hypothetical:

The chief merit of externalization...seems to be that external discourse correlates with an ambiguity of role. If I look at a picture, I am biased to be a viewer, though in a sense I can and do repaint my internal representation. If I play with a reactive and adaptive environment, I can alternate the roles of painter and viewer at will. Whether there is virtue in this, I do not know.<sup>[40]</sup>

Irregardless, Pask explored the potential of these relationships in his cybernetic machines, *Musicolour* and *The Colloquy of Mobiles*. These machines are a working application of the aforementioned elements needed for creating an environment with aesthetic potential.<sup>[41]</sup>

An example of how intelligent machine agents similar to Pask's can be achieved through simple behavioural traits is explained by the Braitenberg Vehicles, a series of hypothetical “machines” conceived by cyberneticist Valentino Braitenberg.<sup>[42]</sup> As Braitenberg states,

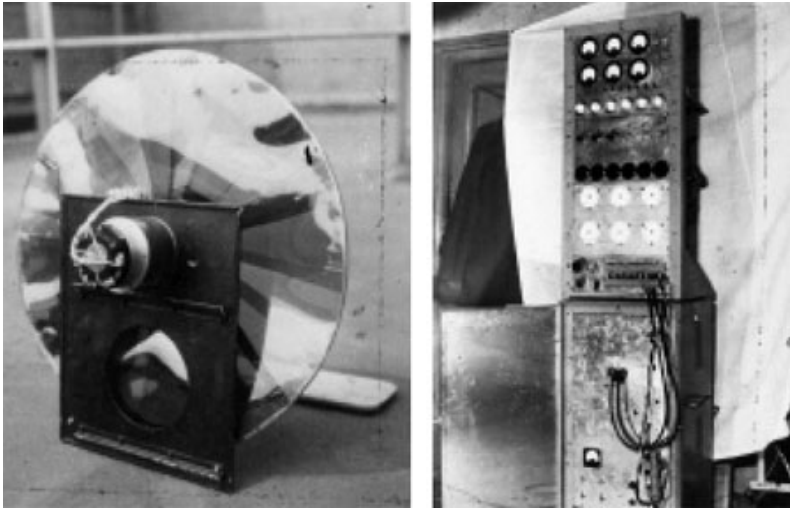


Figure 2.62 Musicolour. Gordon Pask. 1953-1957. A device created as an attempt to output light coordination with the reception of sound. An interactive light display. It also had an element of learning built in. As an example if the machine registered an overly repetitive tune it would prompt the musicians to vary their performance. This element was what differentiated this cybernetic machine from a typical coordinated light show.

the expanded realms of the individual

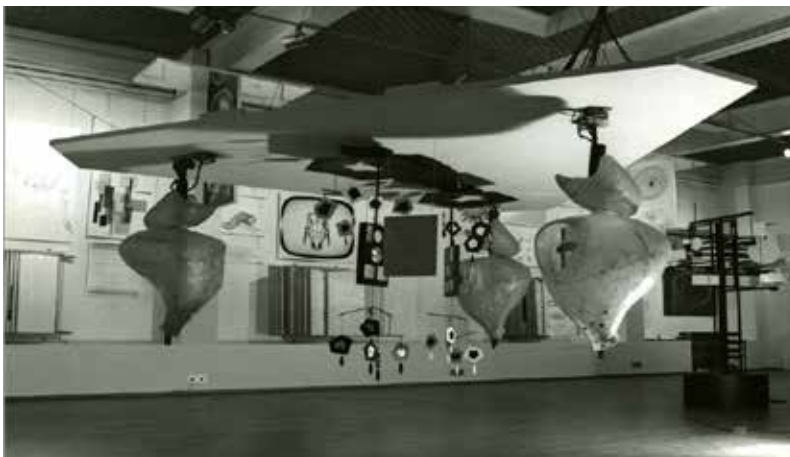


Figure 2.63 Colloquy of Mobiles. Gordon Pask. 1968. A social system of rotating and inter-communicating mobiles, which could be interacted with by observers using light and mirrors.

Interest arises, rather, when we look at these machines or vehicles as if they were animals in a natural environment. We will be tempted, then, to use psychological language in describing their behaviour. And yet we know very well that there is nothing in these vehicles that we have not put in ourselves.<sup>[43]</sup>

His vehicles were used to illustrate the role of external stimuli in dictating a machines behaviour, based on sensing (energy input) and actuation (resulting energy output) in simple interactions. They are designed to enact emotions that are similar to animal behaviours in a simpler, mechanized manner. This hypothetical experiment exposes the manner in which humans understand new experiences. These experiences invoke the use of coherent analogous forms of language that relate these machines to the individual being. this allows for a means of communication and understanding of the multitude of effects that can be produced when external influences on the individual agent can cause a great variability in the possible outcomes of machine behaviour.<sup>[44]</sup>

### Vehicle 1: Getting Around

This vehicle is the simplest. The machine has one sensor and one motor and is able to travel in the one direction (the one in which the machine is facing). The sensor determines temperature. The warmer the space, the faster the vehicle will move—and it will slow down when reaching cooler regions. The location of this machine is affected by the surface quality and its coefficient of friction. This variable is influenced the size of the vehicle and the power of the motor. The machine is continually “overcome” by its environment and regardless of where it will desire to go, it will move haplessly, in “restless” manner. Even in this simple machine its restless motion, it is still moving, and movement is a sign of life.<sup>[45]</sup>



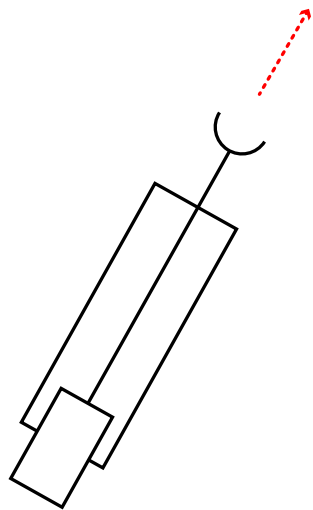


Figure 2.64 Vehicle I. Sensor is depicted as a half circle. Motor is placed on the other end as a rectangular box.

## Vehicle 2 : Fear and Aggression

Vehicle 2 is essentially identical to vehicle one, except that it has two sensors: one on either side of its “front” and two motors, also on either side and in parallel to the sensors. It could be understood as an ancestral descendent of Vehicle 1. This machine still operates under the same rule set. Increased temperature, increased motion.

The difference is that there are three possible outcomes for how the sensor set communicates to the motor set:

- a) each sensor to the motor on the same side
- b) each sensor to the motor on the opposite side
- c) both sensors to both motors<sup>[46]</sup>

Vehicle 2c is essentially a repetition of vehicle 1. However, the difference in connections between a) and b) would produce drastically different motions. Both will be considered.

Both 2a and 2b will accelerate out of the zones that excite it or that it “dislikes”, in an effort to reach a state of lower concentration and inevitably “calm down”. Yet, the manner in which each vehicle expresses that dislike is different. This is revealed when the two sensors no longer experience an equilibrium of concentration. In vehicle 2a, the sensor closest to an off-centre source will become more excited than the sensor that is further away. This will cause the motor on the same side to accelerate more than the opposite motor. The vehicle will appear to “dislike” its environment and in a motion resembling fear. In vehicle 2b, the machine will end up moving towards the source at a fast pace. Instead of dislike, the vehicle displays aggression. <sup>[47]</sup>

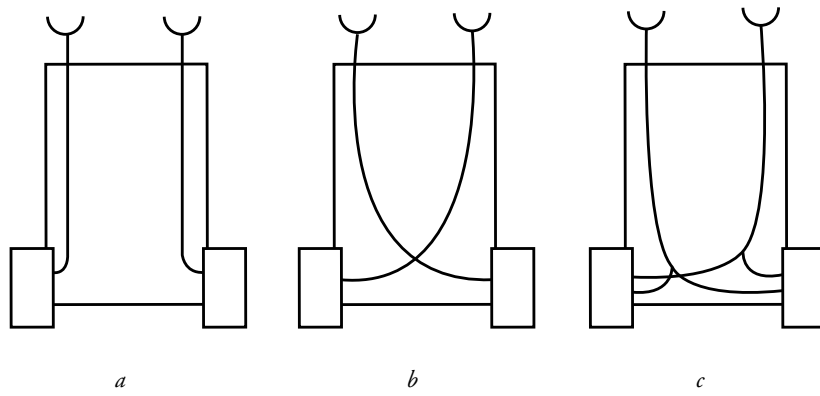


Figure 2.65 Vehicle II. One additional motor and one additional sensor are added to the machine. Circuit variations are indicated.

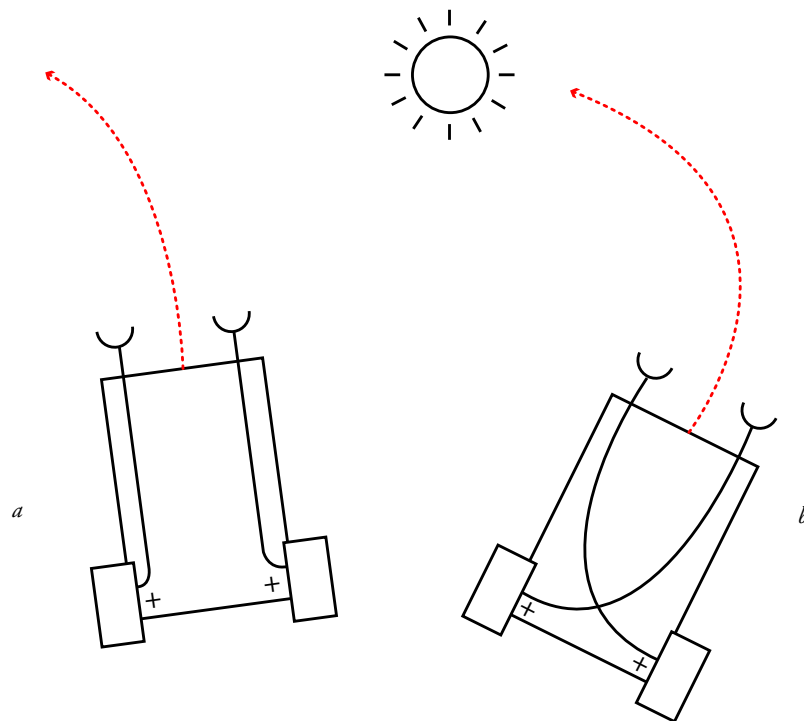


Figure 2.66 Vehicle IIa and IIb. The varying responses based on different wiring connections.

### Vehicle 3: Love

The last vehicle that was made to mimick love. Vehicles 1 and 2 respond in a manner of “dislike” whereas Vehicle 3 acts on the basis of attraction and is considered to be a more “evolved” machine. In this vehicle, response to stimuli is inversed: it will slow down in, and thus prefer, brighter areas.

Vehicle 3a, which has straight connections, will change course, slow down, and head directly toward the source. Vehicle 3b will slow down, but due to the flipped connections, it will not remain near the source for long as the fading recognition of the stimuli will cause it to speed up and look again for another source. These vehicles both demonstrate an interest and liking towards the source. The difference between the vehicles is in the duration of that love. Vehicle 3a enacts a more permanent love, whereas Vehicle 3b is more of an explorer, enjoying what it takes in but quickly moving on to other possibilities, searching for a potentially stronger source.

The final iteration, Vehicle 3c, combines the behaviours of the previous vehicles. Braitenberg describes this vehicle as follows:

We give it not just one pair of sensors but four pairs, tuned to different qualities of the environment, say light, temperature, oxygen concentration, and amount of organic matter. Now we connect the first pair to the motors with uncrossed excitatory connections, as in Vehicle 2a, the second pair with crossed excitatory connections, as in Vehicle 2b, and the third and fourth pairs with inhibitory connections, crossed and uncrossed, as in vehicles 3b and 3a.<sup>[48]</sup>

Even though the mechanisms of the vehicle are quite simple, they create complex behaviour. Observing this behaviour without prior knowledge of its wiring, the “rules” by which it operates are not immediately apparent. Braitenberg describes its curious behaviour:

This is now a vehicle with really interesting behavior. It dislikes high temperature, turns away from hot places, and at the same time seems to dislike light bulbs with even greater passion, since it turns toward them and destroys them. On the other hand it definitely seems to prefer a well-oxygenated environment and one containing many organic molecules, since it spends much of its time in such places. But it is in the habit of moving elsewhere when the supply of either organic matter or (especially) oxygen is low. You cannot help admitting that Vehicle 3c has a system of Values, and come to think of it, Knowledge, since some of the habits it has, like destroying light bulbs, may look quite knowledgeable, as if the vehicle knows that light bulbs tend to heat up the environment and consequently make it uncomfortable to live in. It also looks

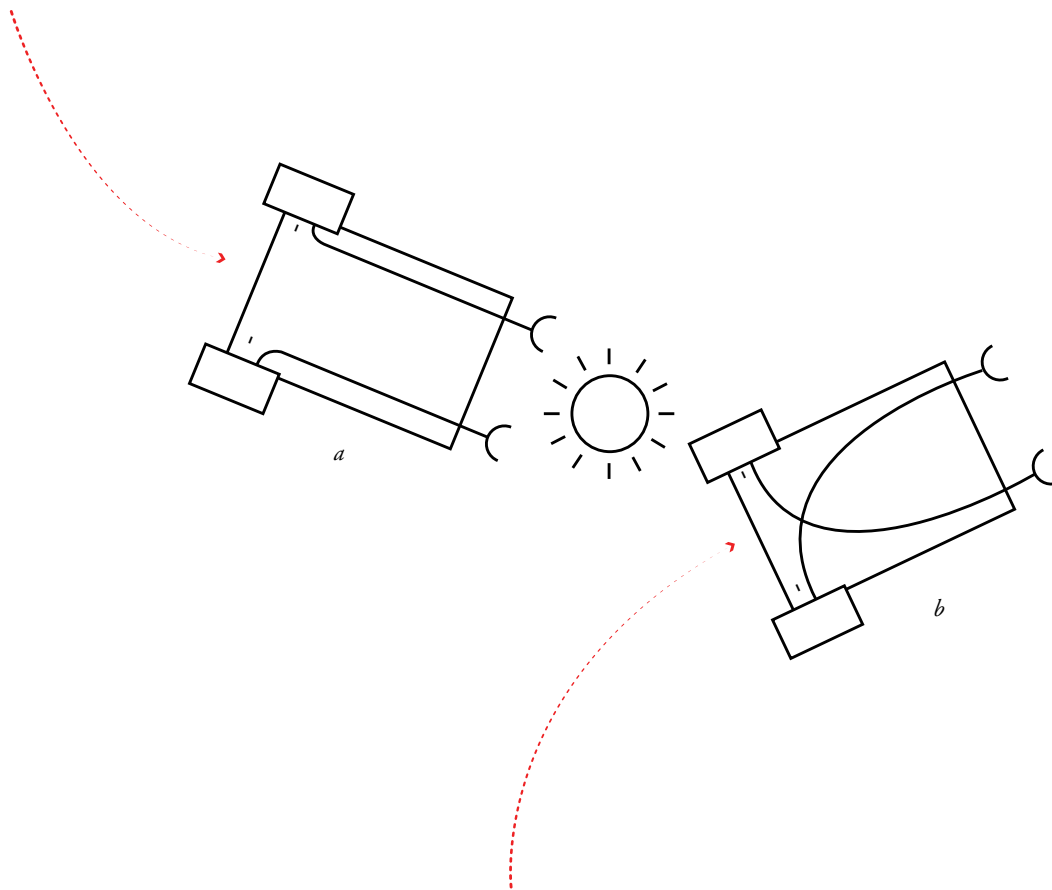
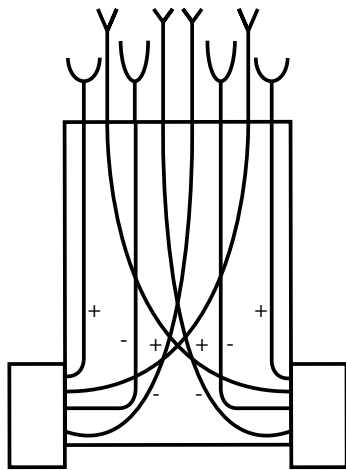


Figure 2.67 Vehicle IIIa and IIIb. The stimuli now causes the vehicle to slow, creating a new set of perceived emotions.



liminal matter

Figure 2.68 A multisensorial vehicle.

as if it knows about the possibility of making energy out of oxygen and organic matter because it prefers places where these two commodities are available.<sup>[49]</sup>

Before concluding this exploration, it is important to summarize the lessons of this study. First, using the example of vehicle 3c, it is easy to create the illusion of behavioural characteristics, such as knowledge, upon machines or objects that are fundamentally unable to garner such traits. Humans will use previous knowledge, such as analogous behaviours they have witnessed before, and project them onto observed behaviours in order to better comprehend them. Second, Vehicle 3c as a singular vehicle represents only one variation. Imagine a collective of 3c Vehicles, all with different permutations of connections, and imagine the possible sophistication and variety in their behaviours. And lastly, none of these systems are analog. They all possess varying sensing, meaning that the “characteristics” of vehicles can vary greatly depending on the sensitivity of each sensor. A collective of 3c vehicles will exhibit many varied behaviours and patterns when each vehicle is slightly different for the last—some possessing stronger scent capabilities and others being more affected by light, for example. With simple actuation and sensing, the number of possible behaviours and emotions that can be portrayed is quite large. Subsequently, they can begin to trigger the empathic sentiments in human observers who will inevitably project emotional and cognitive processes on the vehicles.<sup>[50]</sup>

By applying these concepts of embodied behaviours to the speculative design work contained in this book, a near-living architecture is explored. In a mystical sense, professor of architecture and digital theory and Architecture Dean at the University of Greenwich, Neil Spiller, speaks about this approach to architecture as the modus operandi of the “alchemic” architect. As referenced in his essay in *Hylozoic Ground*, Neil Spiller speaks about ancient alchemy as a way of perceiving the world as infinitely transmutable and cyclically distillable. Alchemy is the art of metamorphosing materials, both spiritual and actual. It involves processes of solution, distillation, condensation, heating, cooling and a host of additional, cyclical processes.<sup>[51]</sup> Alchemy aims to evolve the basest materials, or prima material, into higher forms:

It is familiar to all men, both young and old, is found in the country, in the village, in the town, in all things created by God; yet it is despised by all. Rich and poor handle it every day...No one prizes it, though, next to the human soul, it is the most precious thing upon the earth and has the power to pull down kings and princes. Nevertheless it is esteemed the vilest and meanest of earthly things.<sup>[52]</sup>

It could be said that the Alchemic Architect is in pursuit of prima

material. However, these fundamental materials may not be visible to the eye or eye physically material. Instead, they may be closer to ‘materials’ of quantitative love and understanding. In this sense, the material is not the end product, but it is, in fact, *prima*: it is the driver of what began the process in the first place. Perhaps the search is fuelled by desire and wonder, in pursuit of uncertain realm still beyond scientific explanation, an unknown choreography of microscopic electrical impulses that drive the most triumphant and horrific acts of man this world has ever seen.

That this kind of “material” journey could result in a kind of transcendental or mystical revealing is largely a speculation. However, this search for understanding is at the core of alchemic search, the development of human relationships, and a near-living architecture. If the alchemists of the past could see today’s creation, they would be in wonder of the “magic” they possessed.

To summarize, there are four fundamental characteristics that comprise a near-living architecture. Anthropologist and cyberneticist Gregory Bateson outlines what he refers to as the mental capabilities of a living system,

1. The system shall operate with and upon differences.
2. The system shall consist of closed loops or networks of pathways along which differences and transforms of differences shall be transmitted. (What is transmitted on a neuron is not an impulse, it is news of a difference).
3. Many events within the system shall be energized by the respondent part rather than by impact from the triggering part.
4. The system shall show self-correctiveness in the direction of homeostasis and/or in the direction of runaway. Self-correctiveness implies trial and error.<sup>[53]</sup>

It is within this difference that beings relate to one another and the “magic” processes of energy flows manifest in a synthetic system. By breathing a mind-ecology into a mechanical system, it comes “alive.” In the possibilities for the design of future public environments, words borrowed by Rachel Armstrong from artist and critic Jack Burnham, taken from his book *Beyond Modern Sculpture* can be considered:

if materials are lively, then specific qualities relevant to heterogeneity, entanglement and vibrancy need to be incorporated into a practical design approach—to underpin the evolution of our cities. Notable qualities when considering engagement with vibrant materials are:

Scales of interaction—while bottom up forces cater for the environment, human concerns are frequently met through top-down notions of control. The optimum design approach is to select at which scale the participating actants meaningfully intersect.



Context—matter presents various conditions under which its actants participate more than others.

Time—matter works with directionality on different time scales to human experience.<sup>[54]</sup>

To conclude, Armstrong also refers to the work of political theorist Jane Bennett and her phrase “vibrant matter”. Bennett was drawing inspiration from French philosopher Bruno Latour’s notion of “actants”—bodies that can exert influence and effects on their surroundings and that may or may not be human or alive.<sup>[55]</sup> And this is the goal of a near-living and adaptive architecture: to create an environment that can exert active influence and effects on its surroundings.

A series of built explorations into such systems are outlined in the following section. Most of them are quite immature in their material quality and the sophistication of their mental ecology; however, they serve as a physical exercise of the theories covered, while also beginning to implement tactile and architectonic methods for working through the range of design considerations that come with tectonic systems, material fabrics, electronic hardware and computational software.

**Case Study 1: Future Public Environments Design Charette**

This project was carried out over a one-day period at Waterloo Architecture with Jordan Geiger and students from the Situated Technologies Research Lab at the University of Buffalo. The project sought to create a responsive, embodied system through the development of an inflatable wall activated through the appropriation of an X-Box Kinect. The intention was to imagine a public environment where “pillows” would inflate as an act of saying hello when individuals activated particular sensing zones, calling out to the passerby in a simple act of engagement.

The final design did not produce the desired effect; however, one pillow was able to activate upon the sensing of a passerby. In addition, the pillow, once inflated, had to naturally deflate as the valve system did not allow for the air reversal. These snags were due to the time limitation, the inevitable learning curve of working with inflatable materials, as well as a lack of the sensing technologies required in order to actuate desired results.

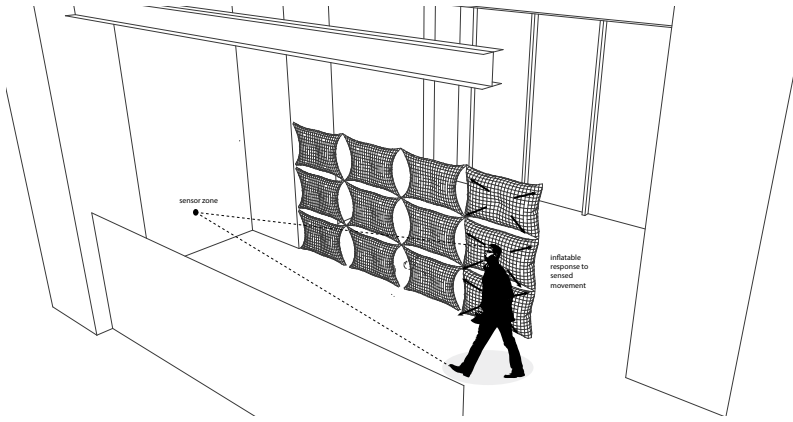


Figure 2.69 Inflatable Pillow Sensing Concept



Figure 2.70 Inflatable Pillow Mock Up

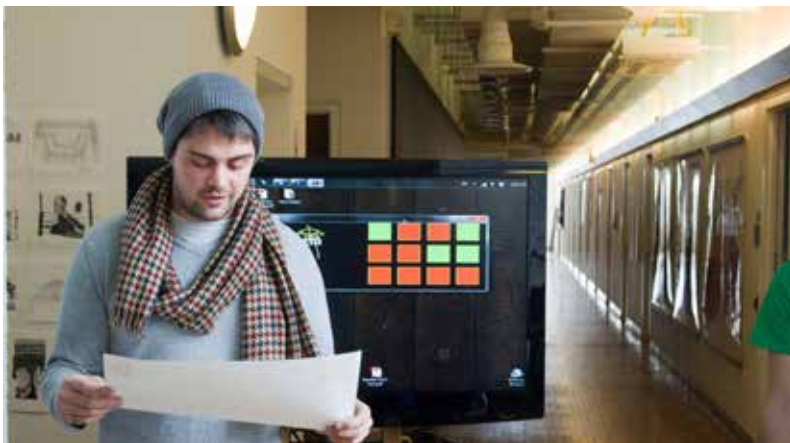


Figure 2.71 Inflatable Pillow Sensing Interface

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Figure 2.72 Active Inflatable Pillow

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## Case Study 2: Field Guide

Completed for the Gladstone Hotel's exhibition Grow Op.

The house has grown into a knowledgeable witness. It has been party to early seductions, it has watched homework being written, it has observed swaddled babies freshly arrived from hospital, it has been surprised in the middle of the night by whispered conferences in the kitchen. It has experienced winter evenings when its windows were as cold as bags of frozen peas and midsummer dusks when its brick walls held the warmth of newly baked bread.<sup>[56]</sup>

*Field Guide* is a responsive soffit condition that, in its current iteration, does not go much beyond its theatrical performance as a formal, parasitic architecture. However, the piece does reflect the possibilities of “auras” within architecture. Infrared sensors that recognize proximities are a central part of this system, whose responses make apparent the energetic boundaries of its participants. The thermal radiation emanating from our bodies is noticed by the sensors within a certain range, before there is any direct contact between the participant and the apparatus. Once presence is sensed, the soffit retracts upwards, towards the existing ceiling. This reaction is similar to that of an individual who has been surprised by the sudden intrusion of another individual entering their “personal space”: another invisible boundary that denotes a person's comfort zone.

In *Field Guide*, this threshold is given shape. The space between the human hand and built form becomes the area of action within the piece. Tension in the soffit will ease and relax as the piece becomes unaware of the location of people below. As the piece “recoils”, a very direct connection between human and surrounding environment is created. It is the air between the two there the “interactive” cause and effect takes place. Thus, participants are able to understand or anticipate which elements will potentially be affected by their actions. Direct changes based on the speed and duration of a person's interaction allows for varying degrees of response from *Field Guide*. This installation is a preliminary step in exploring the roles interactive systems can play in activating the perceptual bounds of our body. *Field Guide* operates within the realm soft, “invisible” energy systems, defining a highly articulated spatial environment.

The design does not particularly allow for accidental contact to be made. There is no opportunity to incidentally brush against or touch the soffit. Interactions occur through the invisible boundary of thermal sensing.

Relating this installation back to the discussion of Trivial and Non-Trivial machines by Stephen A. Gage, there is a moment of wonder and delight experienced by the passersby. Many people who walked by did not

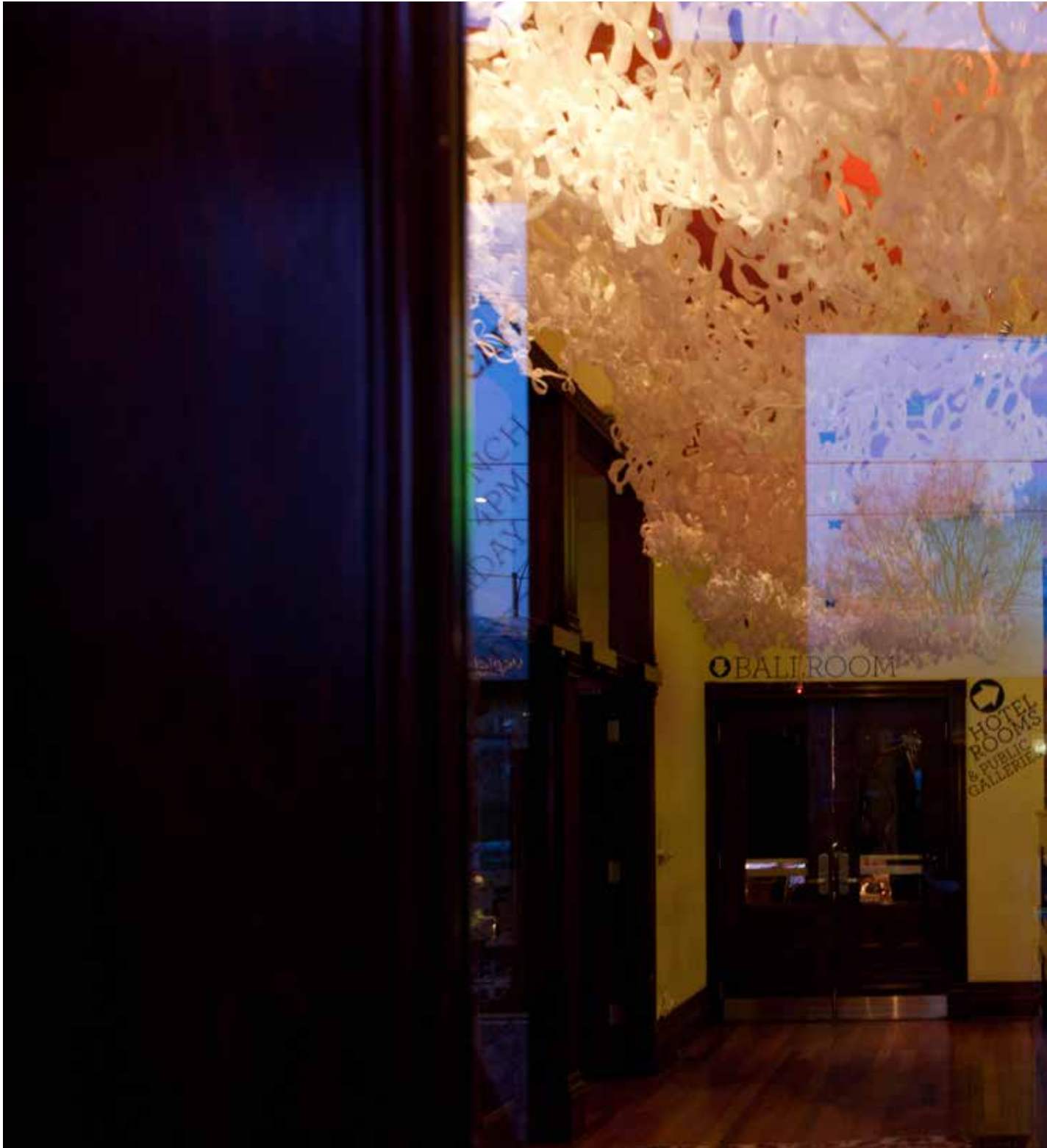
immediately discern how the responsive system came to be sensing them. This could be the result of motor actuation arms located in positions above the surface and somewhat out of view, close to but not in the same position as the sensor. Therefore the response caused by an individuals' presence is not immediately witnessed or understood. Oftentimes, individuals would be standing under a sensor and see the reaction occurring around or in front of them, rather than immediately above.

The duration of which the motor arm is activated is directly proportional to the duration of which the sensor is activated. Higher paced circulation only caused subtle shivers within the sculpture whereas staying activity caused more exaggerated motion within the piece. The location of the piece allowed for vibrant types of circulation. Individuals entering the gallery spaces upstairs or going into the conference room at the end of the hall moved at a faster pace than individuals who were waiting to meet others or were checking out at the hotel desk. A common relationship that developed was the collective experience of individuals loitering or staying in the lobby space. These participants witnessed the responses of the system instigated by people who walked through quicker, unaware of the reaction they caused. These individuals would then explore the piece, having subtle hints of where the sensing areas were located based on the led activation associated with a lively sensor.

The active discovery by individuals in this search filled them with a sense of delight. This same activity was enjoyed by observers who were able to see this interaction taking place. Some remained curious observers, others were enticed to engage and interact with the piece themselves.

Similar to the fearful behaviours described in the Braitenburgs vehicle experiments, the sensor activation caused the fabric surface to move away from the individual once activated. The gentle, smooth motions of the surface and its' inability to actively leave the space both paint the piece as "nervous" or "shy". Rather than actively engaging the participants that pass, it augments the lobby space and creates an alternative experience for the collective of observers and often unknowing participants.

Although different sensing systems are used in both case studies, the Xbox Kinect in the inflatable system and the Sharp Sensors in Field Guide both use similar technology by tracking infrared wavelengths. These systems both gauge thermal temperature and radiation. When the pieces are engaged, the energy exchanges explored in section 1.3 are giving shape and expression. Again, these exchanges drive the relationships between beings and their environment. Michelle







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Figure 2.73 Field Guide at the Gladstone Hotel

Addington articulates these ephemeral boundaries in her essay *Architecture of Contingency* with the assistance of Gary Settles' *Schlieren Thermal Image*:

The boundary emerges whenever the conditions of the environment develop a minute difference in temperature, pressure, density, internal energy, or composition. A human body walking through a room will create numerous shifts in conditions: the temperature difference between the human skin and the surrounding air will produce an exchange of heat between the body and the air; this exchange of heat will create a density difference; the density difference will produce convective movement of air; moving air will affect the humidity immediately adjacent to the body, thereby setting up a mass transfer of moisture from the body to its surroundings.<sup>[57]</sup>

In this manner, the interaction produces a tangible manifestation of these systems and boundaries, which fluctuate but are also measurable and exist outside of the realm of surface and structure. As Sean Lally states, what is designated as "space" is shifting:

These surfaces and structures, envelopes and skins, were considered to be the material pieces of architecture (yet are no longer the only elements that are definable and measurable), allowing space to be the 'stuff' that's left over between them --- or, more simply stated, space is whatever form is not.<sup>[58]</sup>

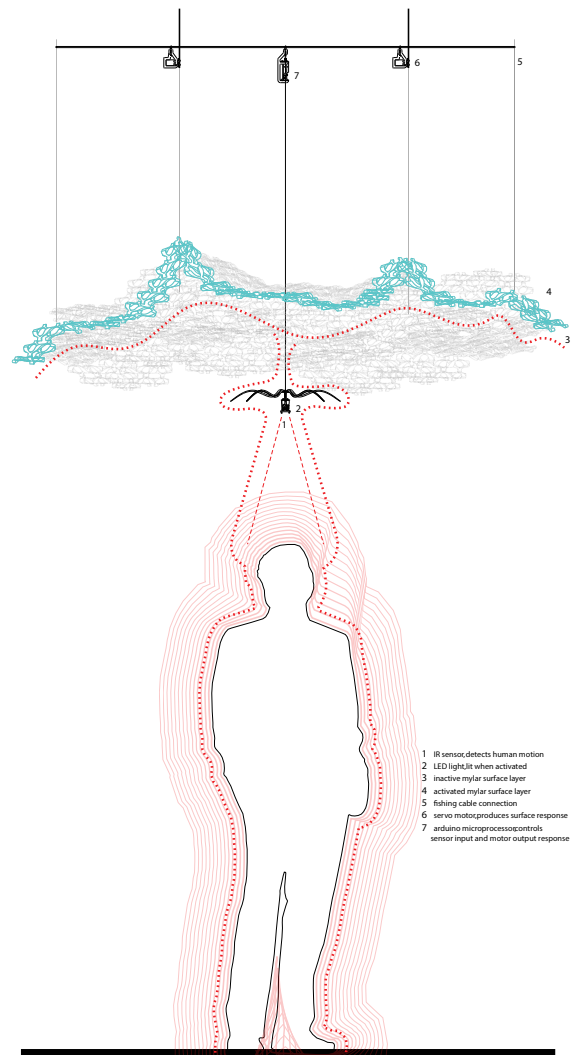
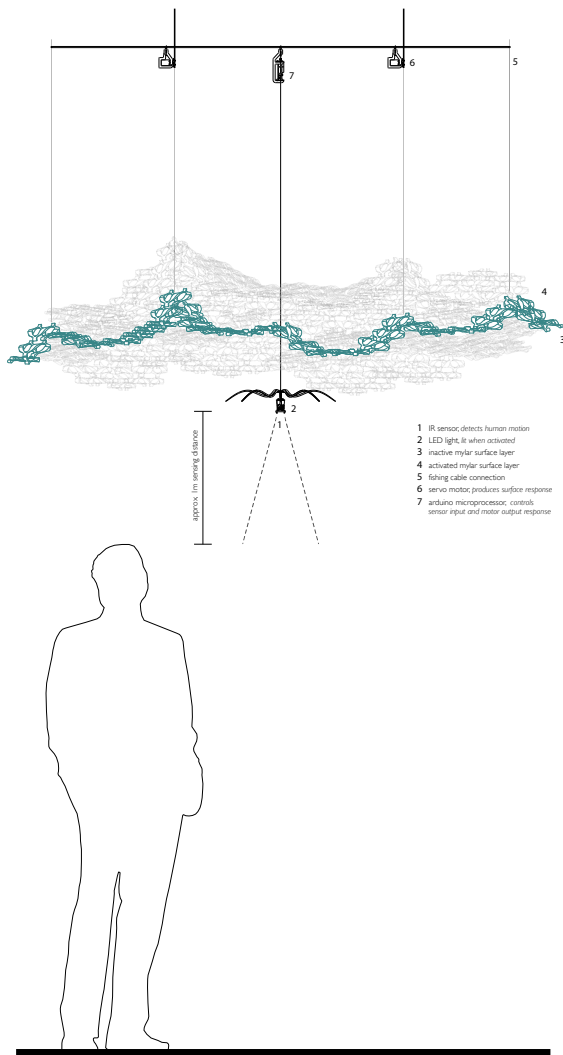


Figure 2.74 Schlieren Thermal Image, Gary Settles.



Figure 2.75 Infrared Imaging

liminal matter

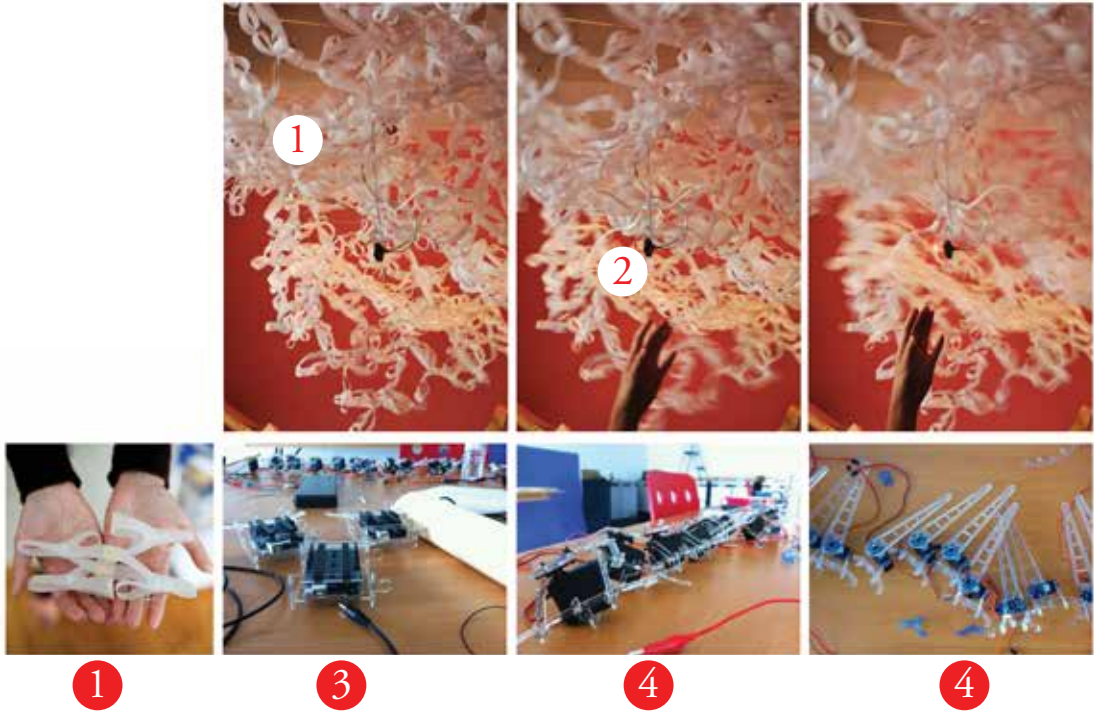


the expanded realms of the individual

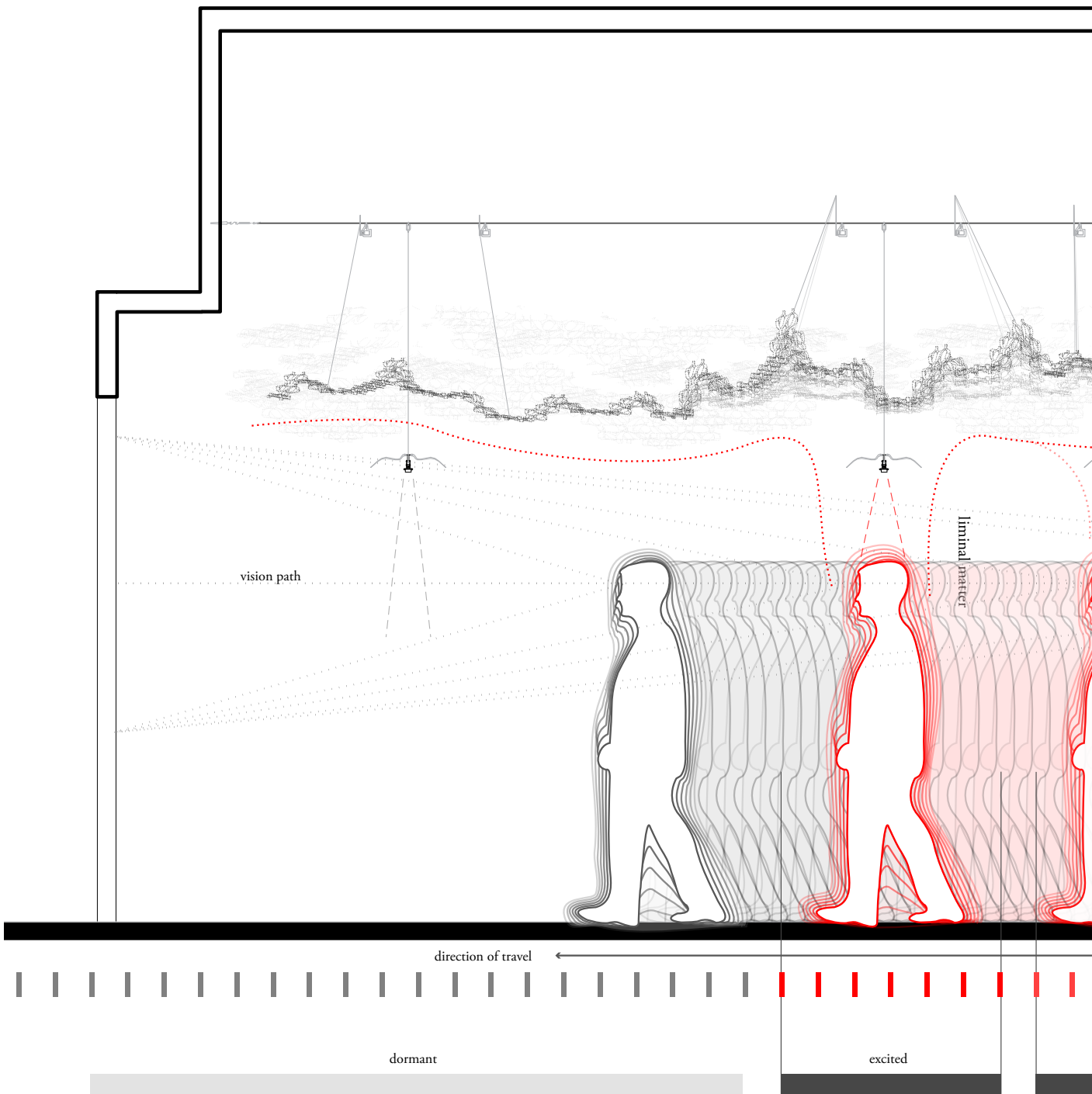
Figure 2.76 Field Guide IR Sensing Activation.

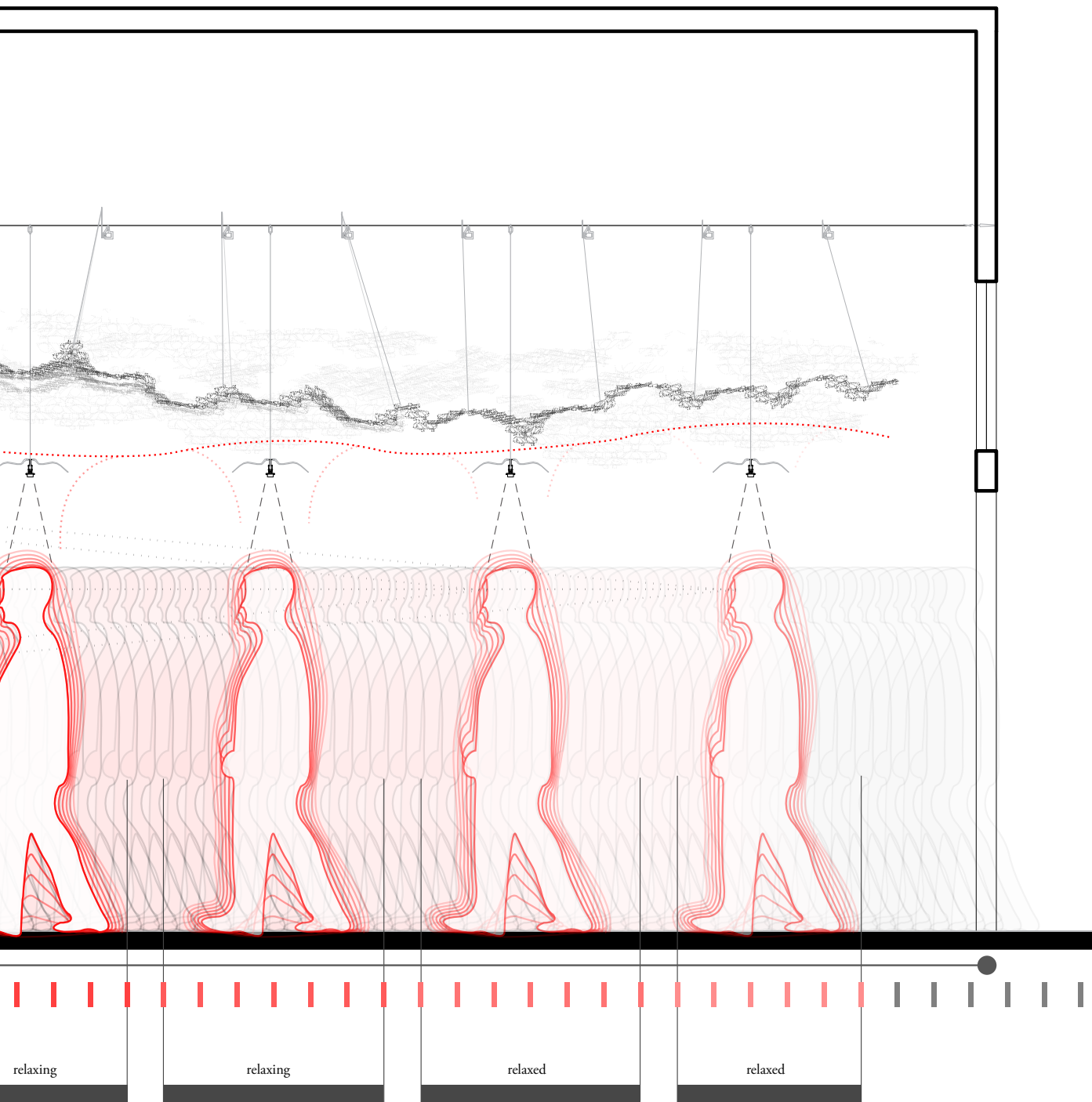


Figure 2.77 (left)  
 Field Guide Canopy Above  
 Figure 2.78 (above right)  
 1. Articulated Surface  
 (laser-cut mylar textile)  
 2. IR Sensor + LED  
 (motion-activated)  
 digital input (LED output)  
 3. Arduino Boards  
 (programmable microprocessor)  
 4. Servo Motors  
 (180 degree arm rotation)  
 digital output  
 Figure 2.79 (right)  
 Hand Activating Surface



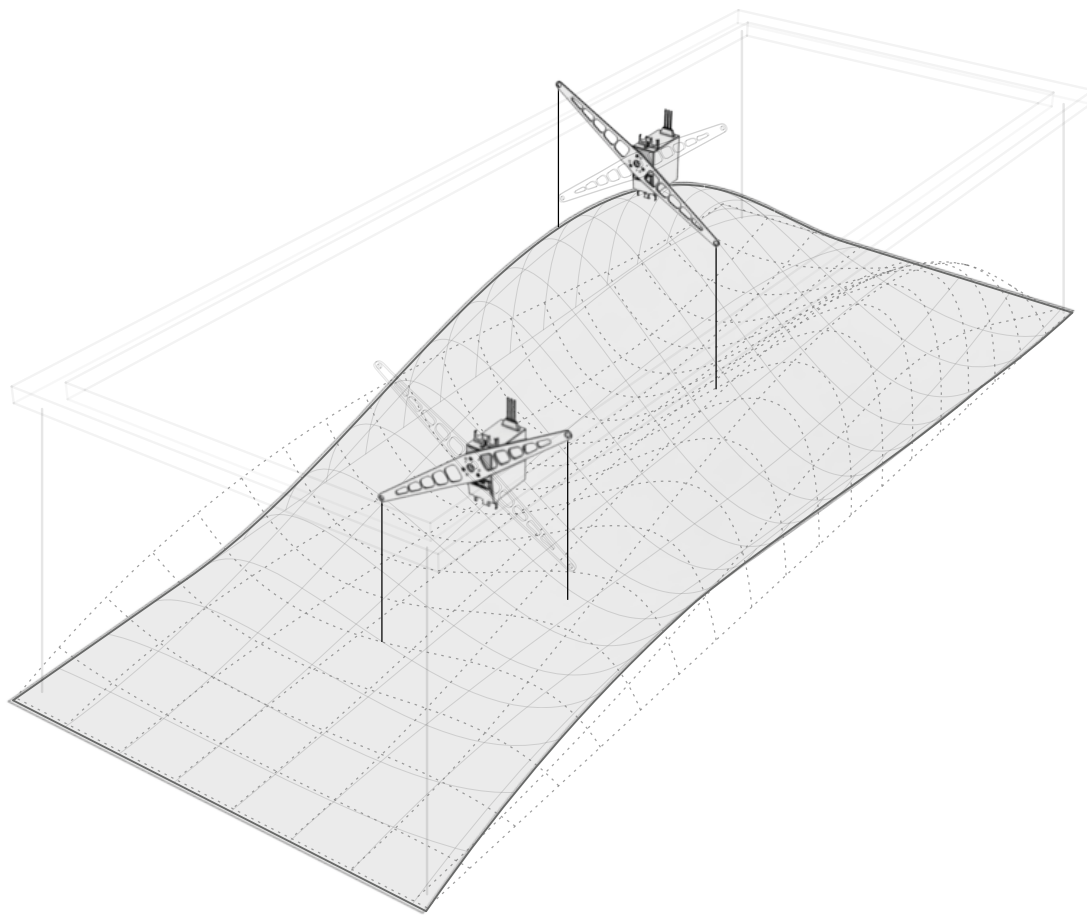
the expanded realms of the individual





the expanded realms of the individual

Figure 2.80 Field Guide Interaction Along the Pedestrian Circulation Path



liminal matter

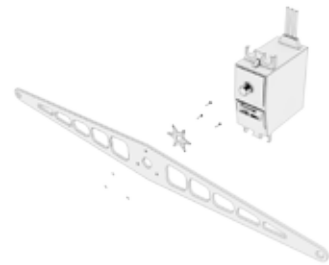
Figure 2.81 Wavelength Concept Drawing



### Case Study 3: Wavelength

The third case study is a kinetic piece constructed for the 2014 Projects Review Exhibition at Design at Riverside in Cambridge, Ontario. This piece removed the sensing systems in order to focus on the articulated motion of a series of precariously fastened lightweight layers of fabric. Improving the craft of the mechanics and developing a higher level of organization within the code were the main objectives in order to create perceived fluidity in material form. The goal was to invoke wonder through a more sophisticated motion than the previous Field Guide.

Though not cybernetic in nature, it has potential to remain a “non-trivial” machine, invoking a sense of wonder for an extended period of time. These motions, developed from the interferences created from the sine waves, imply a restless yet engaging behaviour. As the ranges of motion change from placid to tumultuous, the piece seems restrained by the very structure that supports it. This seemingly chaotic cycle can evoke a wide range of emotions in the observers. Observed behaviours as reported by onlookers included anxiety, trepidation, fear, and concern.



the expanded realms of the individual

Figure 2.82 Motor Arm Assembly Diagram.



liminal matter



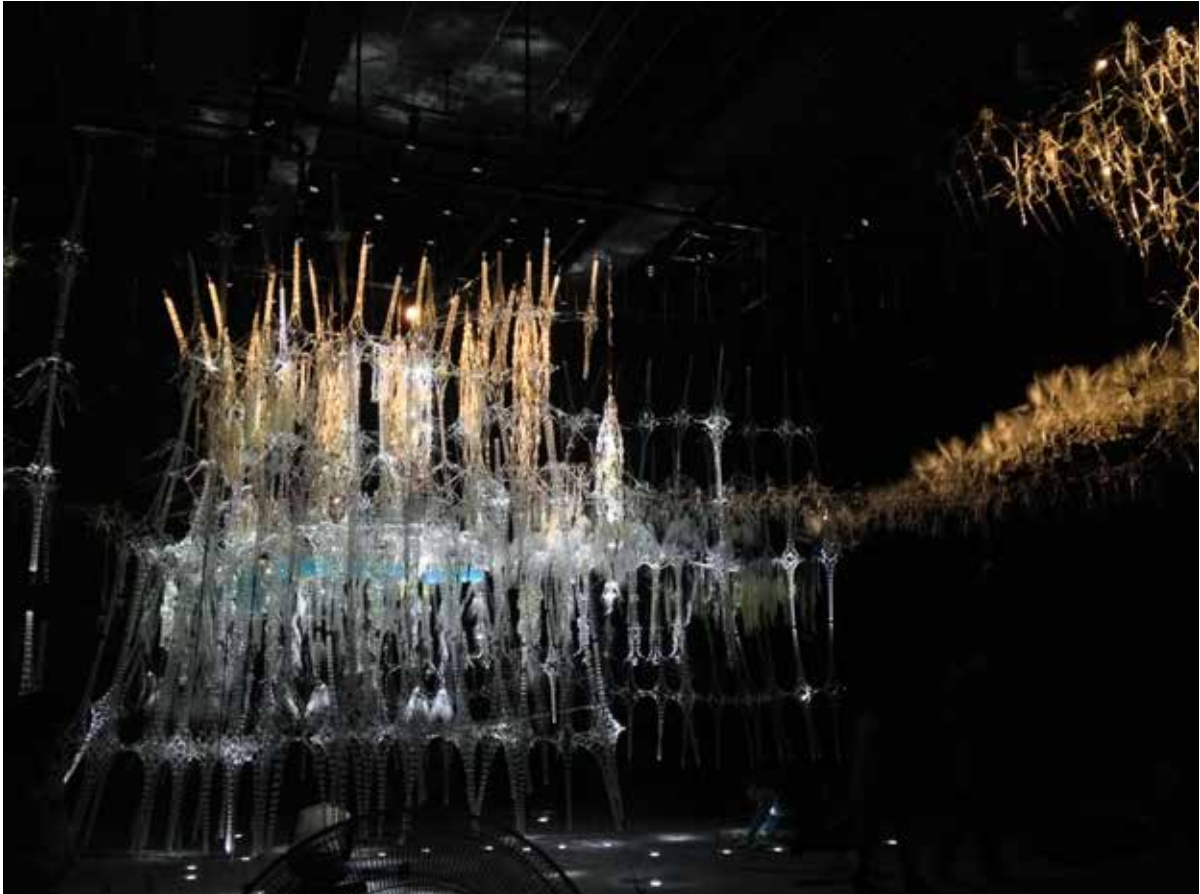
the expanded realms of the individual

Figure 2.83 Wavelength Gallery Images

#### **Case Study 4: Epiphyte Chamber**

The final case study pertains to work experience garnered by assisting in the design coordination and assembly of Philip Beesley's Epiphyte Chamber as part of the Hylozoic Series, launched at MMCA Seoul in South Korea.

Getting hands-on experience on a full-scale and immersive installation possessing multiple and diffuse responsive systems created a deeper understanding for the design of such spaces in the context of urban public space. This understanding was a helpful prerequisite to the designs in the upcoming Synthesis portion of this book. The installation embodies many of the qualities that have been explored throughout this thesis, while also providing insight into the crafting of ephemeral, yet resilient systems embodying human mimesis. The project, like most of the Hylozoic Series, explores a sensitive architecture that imagines intimate environments for varying group sizes and temperaments.



the expanded realms of the individual

Figure 2.84 Epiphyte Chamber in Progress

This series of case studies helped to formulate the speculative design of a future public environment for Toronto's Dundas Square. What if layers of a building were to expand and operate similarly to both the organs of the human body and the layers that cloak bodies for insulation and modesty? Could these layers be removed when unneeded, and could spaces change mood and quality of an environment in relevance to current situations? What if the built environments became more resilient by removing their rigidity? And what if this environmental control layer could also perform as a steward for constantly fluctuating emotional conditions, allowing architecture to elevate beyond built form and operates within the places we carry out our lives? How can a future public environment embody senses of wonder and desire in an effort to create an empathic architecture? The possibility for an architecture to respond positively to all of these questions is explored in the following section of this book, entitled Synthesis.

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## Synthesis





liminal matter

Delirious Dundas Square

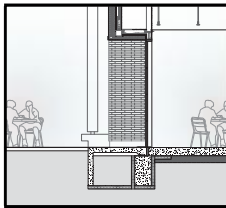
## Section Contents

Synthesis

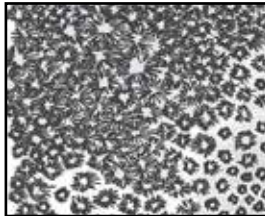
**Part I**  
Site



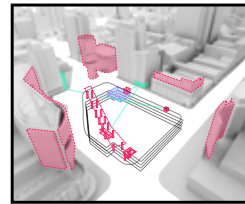
**Part II**  
Design Considerations



5.1  
Strategies for the  
Design of Public Life

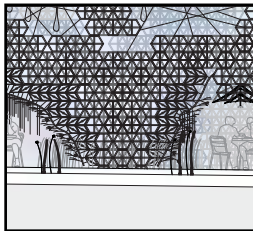


5.2  
Organizational  
Geometry



5.3  
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Strategies

**Part III**  
Synthesis



**Part IV**  
Conclusion

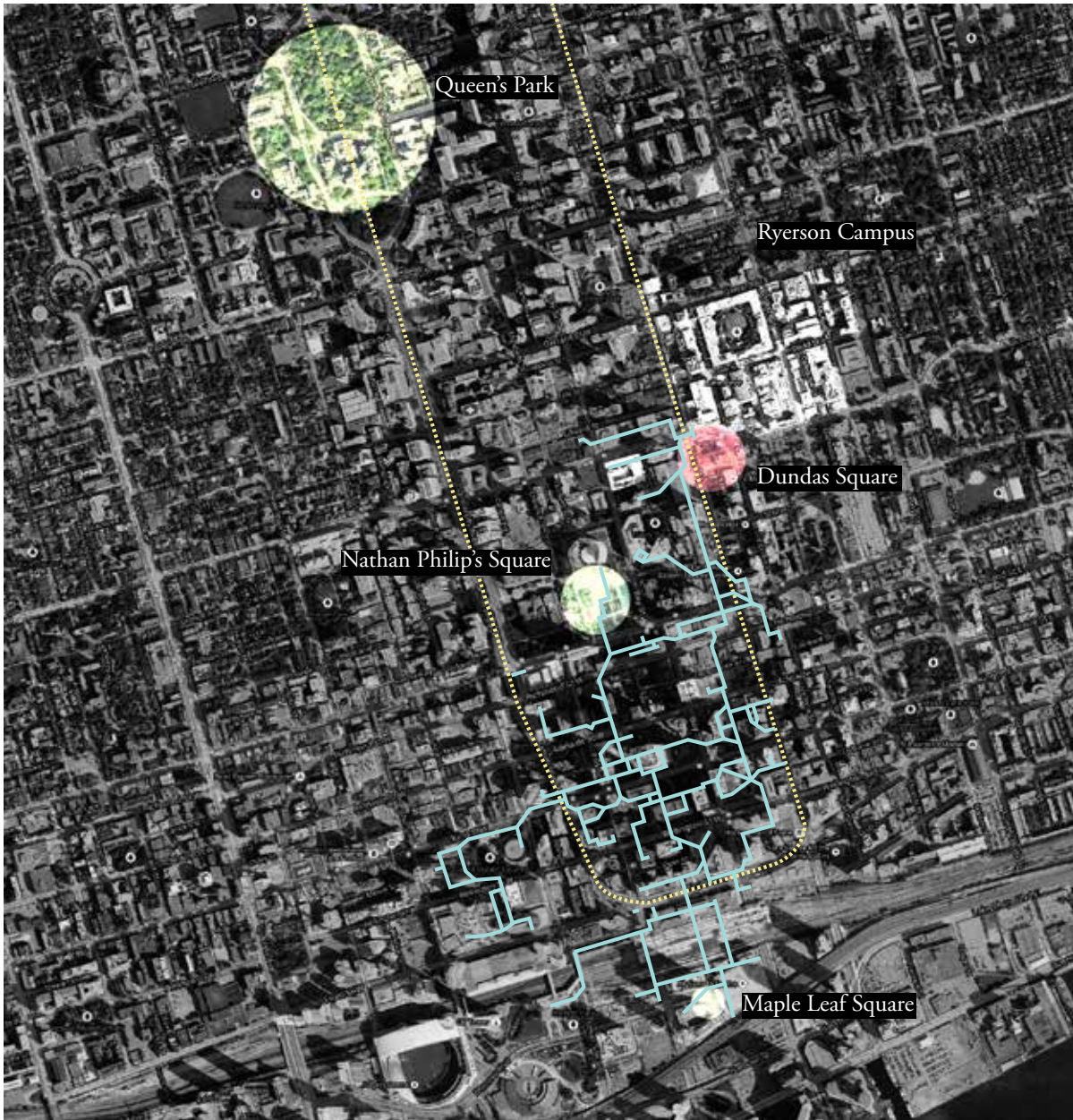


**Part One: Site**



liminal matter

Figure 3.1 Downtown Toronto



- Underground PATH system
- Yonge-University Subway Line

Figure 3.2 Public Spaces and Major Public Transportation



liminal matter

Figure 3.3 Existing Dundas Square.

Dundas Square was the first “public” space created in the “new” city of Toronto.<sup>[1]</sup> The open design competition was announced in 1998 as part of a plan to revitalize downtown Yonge street, an area that had become impoverished over time.<sup>[2]</sup> The intersection of Yonge and Dundas saw over 1,000 arrests in 1998 alone<sup>[3]</sup> and the city hoped that the new square could set a precedent for future public spaces in Toronto while simultaneously “cleaning up” the area.<sup>[4]</sup> Dundas Square is situated in the “Entertainment Precinct” of Downtown Toronto, stitching together the Ryerson campus buildings to the North and the “Theatre Precinct” to the South.<sup>[5]</sup>

It has been the largest establishment of public space in the past two decades, with the renovation of Nathan Philips Square being the most recent design improvement to public space in Toronto.<sup>[6]</sup> Spearheaded by Councilor Kyle Rae,<sup>[7]</sup> the space was treated as Toronto’s response to New York’s Time Square, or London’s Picadilly Circus.<sup>[8]</sup> The winning design was selected for its simplicity, described as a place that fed off the energy of the commercial core around it and acted as a flexible counter-form to the spectacle-oriented design planned for the square’s perimeter.<sup>[9]</sup>

The purpose of this counter-form was to create an open space, almost form-less in a sense, that would create a moment of relief along the very dense North-South corridor of Yonge Street. As described by Lisa Rochon,

To willfully cut an urban void in the unremarkable commercial strip of Yonge Street was brave and deliberate. A public space, charged like the 21st century, carried great promise. And recasting the city was on everybody’s minds.<sup>[10]</sup>

The site is quite large with the intention of feeling spacious, acting as an outdoor event location for thousands of people based on a scheduled program. A substantial canopy flanks the north side of the square in order to provide protection from the sun and rain. This area contains a ticket booth for local events as well as the main entrance to the subway station.<sup>[11]</sup> Additional built forms include the raised stage, sitting atop the access corner for underground parking, the tall event lights along the south edge of the square and the small security booth pressed tightly against the east edge of the stage.<sup>[12]</sup> During off-peak hours or un-programmed times, pedestrians have access to movable seating. The square’s surface treatment extends across Dundas Square St.(south laneway) in order to connect the square more clearly to its edges and allow for public occupation when required.<sup>[13]</sup>

The original competition brief states that the space must support the activity generated by the surrounding developments, most notably The Eaton Centre,



Figure 3.4 Dundas Square Plan

“Imagining Nothingness is: Pompeii— a city built with the absolute minimum of walls and roofs... The Manhattan Grid— there a century before there was a ‘there’ there... Central Park— a void that provoked the cliffs that now define it... Broadacre City... The Guggenheim... Hilberseimer’s ‘Mid-West’ with its cast plains of zero-degree architecture... The Berlin Wall... They all reveal that emptiness in the metropolis is not empty, that each void can be used for programs whose insertion into the existing texture is a procrustean effort leading to mutilation of both activity and texture.”<sup>11</sup>

“The spectacle is not a collection of images, but a social relationship between people, mediated by images.”<sup>12</sup>



immediately conjoining the public space to the commercial area that surrounds it. In addition to this request for a focus on retail, the brief states the importance of easy circulation flow between the space and the surrounding activities.<sup>[14]</sup>

The edge conditions, not included in the Brown + Storey design proposition, are met with over 76,000 square feet of advertising space for digital broadcast media as well as traditional posted billboards. In 1999, a year after the competition, plans were put in place begin the Eaton Centre's transformation and construct new buildings along the surrounding streets. As described by Pamela Young for *The Globe and Mail*,

Shabby is out and flashy is on its way in at Toronto's hectic Yonge-and-Dundas intersection. The immense Eaton Centre shopping mall is jazzing up its Yonge Street facade by adding outward-facing and restaurants -- and one massive, Times Square-style advertising wall. To the north, there soon will be more signage for the likes of Pepsi and Nike. Lots more of it. Goodbye to the bargain stores and frowzy fast-food joints; hello to a 30-cinema entertainment complex, a big, shiny communications tower and other assorted megadevelopments.<sup>[15]</sup>

The site is often compared to New York's Times Square for its similarities in having high concentration retail nested within a city theatre precinct. In 2002, Dundas Square officially opened. Today, the intersection at the Northeast corner experiences a daily circulation of almost 140,000 people.

<sup>[16]</sup> In a study completed by Gehl Architects, it was found that Yonge street receives approximately 1080 pedestrians in an hour, and the square has on average about 80 people for the same amount of time. When Yonge Street and the Square were both included in the study, it was found that staying traffic only accounts for approximately 11% of the total pedestrian flow that visits the site. Gehl compares this number to that of successful streets in Copenhagen and finds that the staying traffic in these areas sit closer to 30%.<sup>[17]</sup>

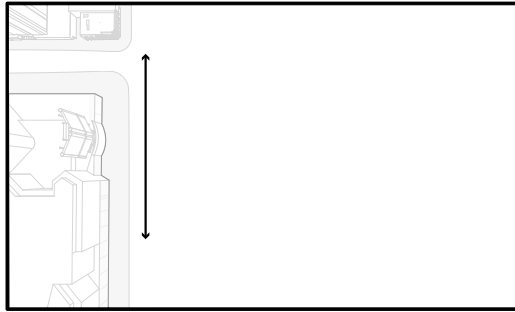


Figure 3.5 Yonge Street Major Axis

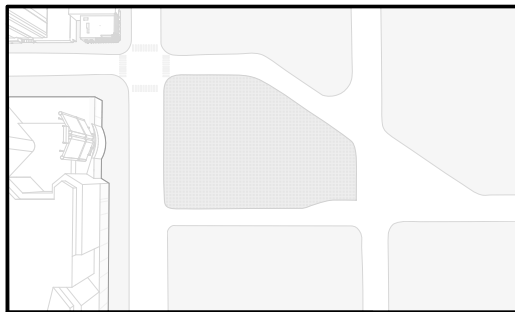


Figure 3.6 Create a Room Off Yonge

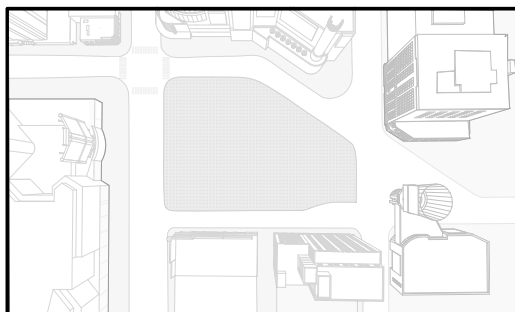


Figure 3.7 Close the Walls of the Room

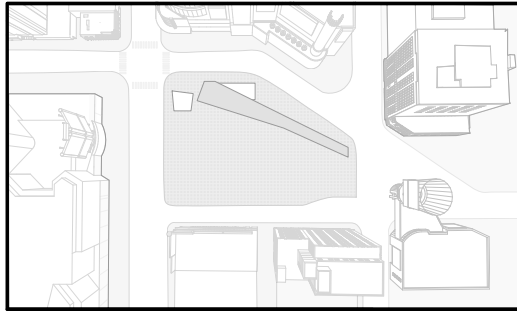


Figure 3.8 North Edge Pavilion

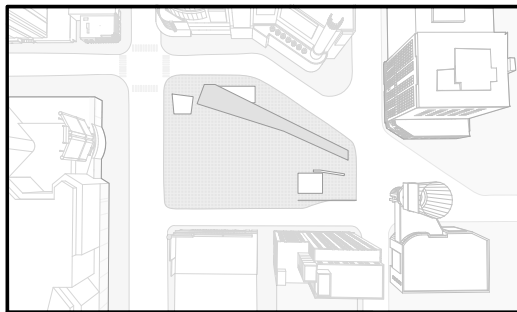


Figure 3.9 Lift West, Place Stage

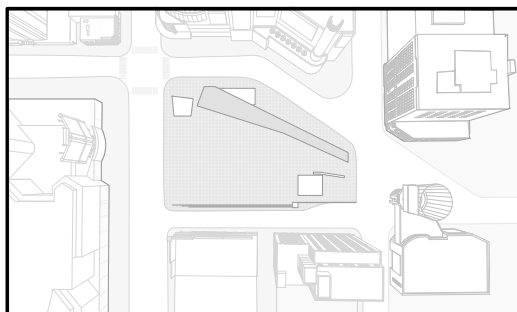


Figure 3.10 Security, Slope Down

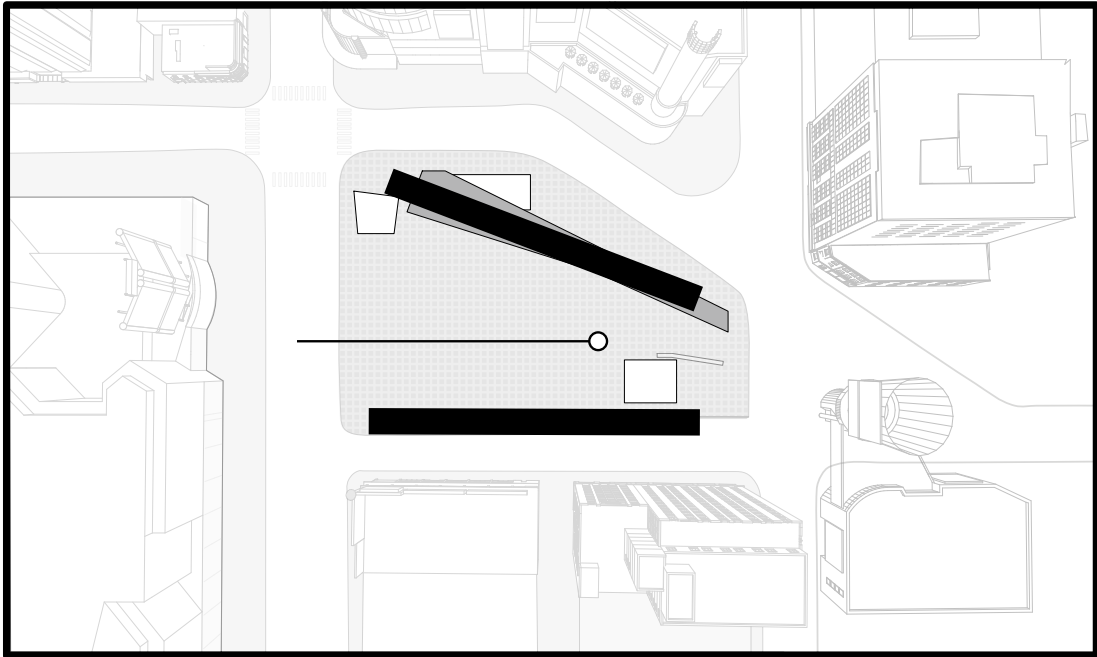


Figure 3.11 The Proscenium

Together, the architectural composition and the stage location create a proscenium within the city. The square is a theatre, created for large events. The space often plays host to free concerts and other corporate sponsored events.

PROSCENIUM

: A theatre arrangement where the audience views of the stage are from the front. This differs from a Theatre-in-the-Round and a Thrust arrangement.<sup>iii</sup>

THEATRE-IN-THE-ROUND

: A theatre arrangement where the audience has views of the stage from every side.<sup>iv</sup>

THRUST

: A theatre arrangement where the front and sides are all viewable by the stage.<sup>v</sup>

**Part Two: Design Considerations**

The explorations of the preceding section along with the site information of the previous chapter are to be considered in the speculative design for a future public space. Before the design can be articulated with regards to the methods and formal strategies outlined in the previous section, it is important to outline a few design strategies first. These are categorized by:

1. Strategies for Designing for Public life
2. Organizational Geometry
3. Program Strategies

Each of these will then be used to inform spatial considerations in creating a potential future adaptive environment.

In addition to environmental atmospheres, there are interpersonal atmospheres—cultural, social, family, workplace, etc....specific atmospheres on the scale of cultural or national entities. Genius Loci, ‘the spirit of place’, is a similarly ephemeral, unfocused, and non-material experiential character closely related to atmosphere; we could well speak of the atmosphere of a place, which gives it its unique perceptual and memorable character and identity.<sup>[18]</sup>

It is with the consideration of these interpersonal atmospheres that the alternative vision for Dundas Square has been developed. In order to aid with the characterization of ‘the spirit of place’, Jan Gehl’s five studies for how people interact in public life are considered. The following list is influenced by these studies.

1. The aim of the new design is to increase the number of people who use the space for daily activities. The intention is to increase the duration of interaction in public space and to consider varying times of day, weather fluctuation, and greater seasonal patterns to influence these activities while always promoting on-street pedestrian use, providing an area where people are willing to appear.

2. The proposed design will identify particular zones within the space in order to designate loose behavioral areas. These behavioural areas generally apply to particular types of program that can be found on site, such as commercial/retail, or patio/dining.

3. Create a space that feels safe, intimate and welcoming, allowing groups of all ages and demographics to feel comfortable and to experience different aspects of the site. Varying types of seating features accommodate different sizes of groups and ergonomic proclivities. The decentralization of systems allowed difference to thrive while using overarching material and structural systems to create a sense of inclusion and equality.

4. Similar to Gehl’s approach, categories of activity are divided simply into walking, standing, sitting and playing. These relate back to other metrics such as those outlined in point 2. These activities are divided into two broader groups: necessary action and optional behaviour.

5. Lastly, the duration of activities identifies particular interactions. While Dundas Square has a high amount of through traffic, the proposition aims to create a “slow” space and increase the amount of staying traffic.<sup>[19]</sup>

In the creation of public space, it is necessary to consider the importance of placemaking. Approaching a design in this manner allows the community to become the expert. Placemaking fosters the strength of local partnerships and place based connections, treating them as essential elements to the



creation of a successful public space that contributes to the overall well being of the city's people. Public spaces provide grounds for collaboration and shared goal between governments, community groups and non-profit organizations. While leaving room for these kinds of systems, this proposal also attempts to give a voice to each person who visits the site, through their participation. By imagining a time influenced place, partially conceived as an open framework, the actions of its inhabitants immediately create impact on the site. This type of system can foster a local culture that acts as an archive of space use. The celebration of local culture is what sociologist Manuel Castells considers a major challenge for urbanism in the information age. In his book *The Network Society, A Cross-Cultural Perspective* he elaborates,

the major challenge for urbanism in the information age is to restore the culture of cities. This requires a socio-spatial treatment of urban forms...capable of connecting local life, individuals, communes, and instrumental global flows through the sharing of public places.<sup>[20]</sup>

This can create local cultures within a city itself. Though emplaced, these cultures do not affix themselves to larger geopolitical boundaries, but rather contribute to an emergent character of place in a region at a much smaller and potentially more intimate scale.<sup>[21]</sup>

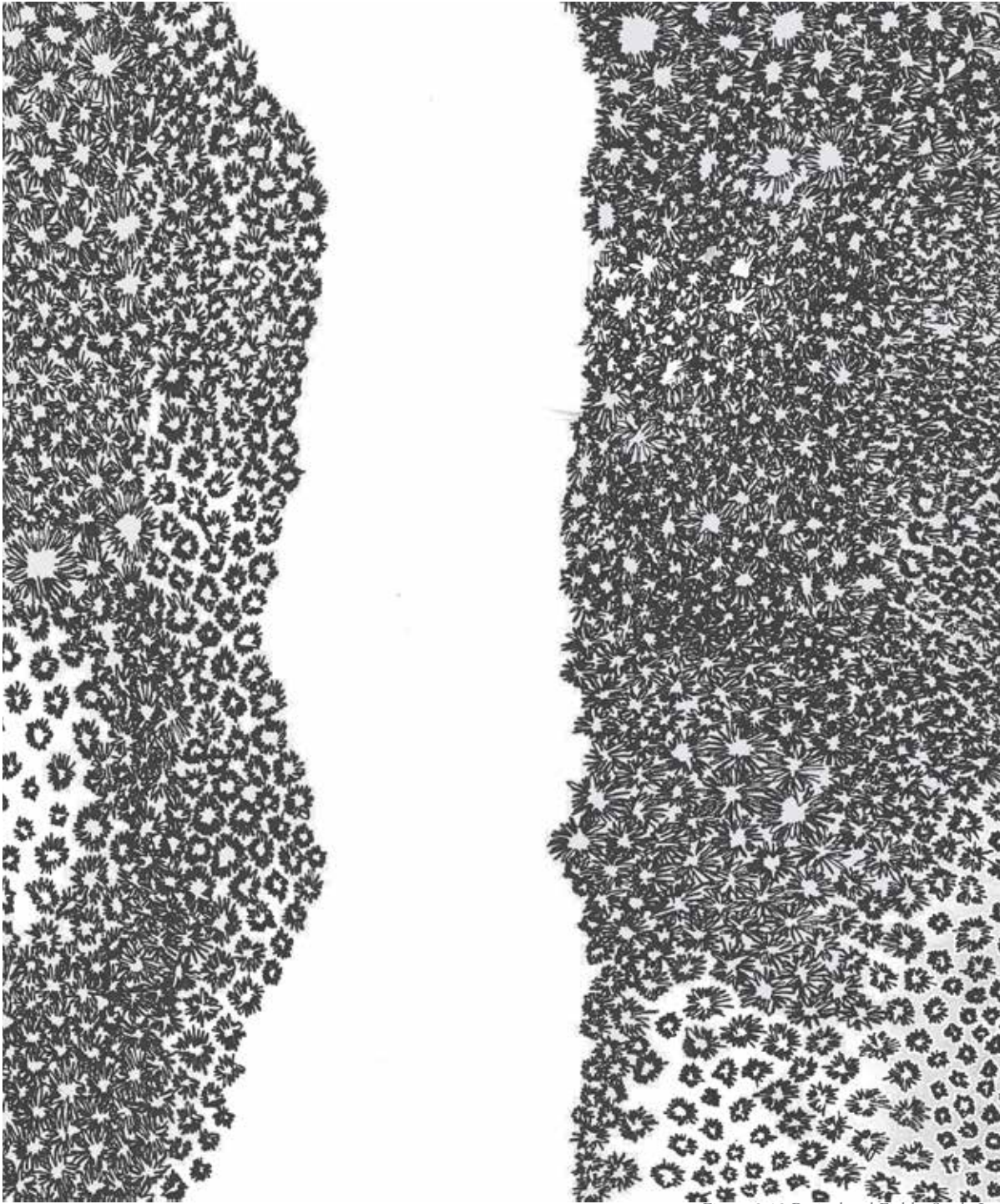


Figure 3.12 Reticulated Fields. Study 1.

Synthesis

Organizational geometry plays an important role in the articulation of a responsive empathic environment. The ways in which design can be formulated, regardless of the materials and structures that they are composed of, aid in the perspective of the stories they tell. Before exploring the biological influences of Conrad Waddington's *Epigenetic Landscape* and filamentary structures, or the architectural precedents of the works of the Dutch Structuralists and Team 10, the intended architecture can be described by the choreography between hands as an analogy for the interactions of entire physical bodies. When two fists meet, closed and unfamiliar, the duration of contact is generally brief. It is an action that signifies informality and casual circumstance. This could be equated to the current relationship between humans and the built environment. The evolution of these relationships can be compared to the act of shaking hands. Although somewhat formal in nature, it has an increased duration and a degree of intimacy. The way that people use artifacts and furniture to make a house into their home is an example of how this relationship can form between people and their spaces. The sign of collection and making of home can mean the attachment is stronger to place in both sentiment and planned length of stay. In comparison, consider a hotel room and the bedroom of a house where a person has lived for over fifty years. The differences in these spaces are palpable and easily understood. Lastly, and to illustrate the relationship that the proposal is attempting to create, is the highly intimate and prolonged act of intertwining fingers, of holding hands. This relationship may be harder to find in between the individual and the external environment, but can be found more commonly between people. The act of brushing past another person on the street. The act of hugging or being squished in a crowd of people while cheering on a favourite sports team. A performance piece by artist Marina Abramovic personally experienced at the MOMA retrospective, *The Artist is Present* in New York, originally titled *Imponderabilia* gives a perspective on an exaggerated circumstance of this kind of spatial behaviour. Before entering the main spaces of the exhibition, each visitor is provided with a space to enter between two facing naked bodies. This performance, among others of the same period by Abramovic explore the extreme intimacy the body can forge with architectural elements, and how it can impact the collective. An integral component of the work was the immersion of the audience, to delineate the territories of observer and observed. Abramovic reflects on these pieces herself and speaks to removing the role of artist and public as separate entities, explaining how she wanted the work to move away from even the voyeuristic of passive engagement to a role where the public became an active agent,



Figure 3.13  
Fists Meeting  
Duration: Brief  
Intimacy: Low



Figure 3.14  
Handshake  
Duration: Moderate  
Intimacy: Moderate



Figure 3.15  
Entwined Fingers  
Duration: Extended  
Intimacy: High

the public is performing. I was thinking that it is not just enough that I am performing and the public is a kind of voyeur, passive, somewhere in the dark, looking at me. The public has to take this historical step and really become one with the object and get much more life-experience for themselves.<sup>[22]</sup>

What Abramovic is explicit about in the evolution of her work is the deliberate intention to create “experiences” that will challenge and change the audience as a critical self-reflective practice.<sup>[23]</sup>

This notion of presence as it leads to heightened awareness and how the body can feel embraced by an interaction is a means for creating personal experience. An immersive responsive architecture could be capable of inciting curiosity in its participants, which in turn could help to create localized behavioural change. Could this be used to employ within architecture an “empathic agency”? How does one organize an architecture whose goal is to act similarly to the intertwining of fingers?

In 1957, Conrad Waddington published the book *Strategy of the Genes* in which he coined the term “epigenetic landscape”. An abstract concept in the field of biology and genetics, in particular, it managed to reach and influence the realm of spatial design. Conceptual overlapping occurred in the observations of organisation, a fundamental component of an organism, as grounds for a particular perspective on architecture and urban design.<sup>[24]</sup>

Applied to design, the epigenetic landscape pertains to relationships between form and field, and the exchange processes that can occur at a multitude of scales and result in a myriad of possibilities.

The epigenetic landscape is represented as an undulating topographical surface, tilting in a chronological fashion to denote progression. The representation of time passing is evident when imagining a ball, placed at the higher end of the surface, with the final state of the ball remaining unpredictable.<sup>[25]</sup>

This representation of a biological system was used to describe the developmental history of an egg,

The path followed by the ball, as it rolls down towards the spectator, corresponds to the developmental history of a particular part of the egg. There is first an alternative, towards the right or the left. Along the former path, a second alternative is offered; along the path to the left, the main channel continues leftwards, but there is an alternative path which, however, can only be reached over a threshold.<sup>[26]</sup>

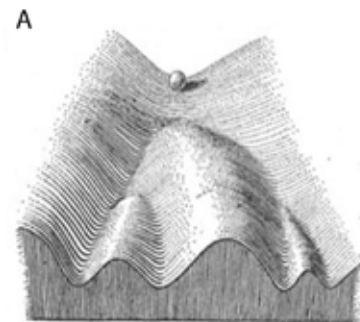


Figure 3.16 Epigenetic Landscape. Top of the Surface.

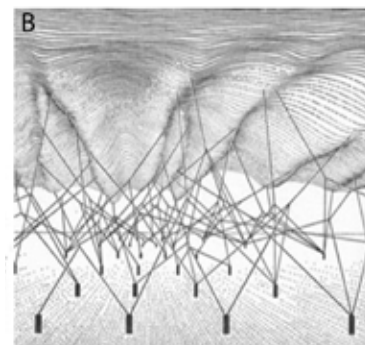


Figure 3.17 Epigenetic Landscape. Underside of Surface.



Synthesis

Figure 3.18 Marina Abramovic,  
Imponderabilia

Thus, the epigenetic landscape is far from deterministic; on the contrary, it actually absorbs and renders all contingency creative.<sup>[27]</sup> While the aforementioned description speaks about the experience of the ball as it rolls atop this landscape, an accompanying depiction of the working structure underneath frames the possibilities more clearly. Waddington considers the situation at the human scale, allowing one to imagine this surface as a canopy suspended high above one's head, the far end sloping down to the ground in the distance. This surface is fixed with "guy ropes" which are held in to place with pegs placed firmly in the ground.<sup>[28]</sup> An expression of a complex network of interactions underlying the canopy, the guy-ropes are tethered not only to random points on the overhead surface but also to points on other guy-ropes and to pegs in the lower surface, which represent only semi-stabilized forms, thus multiplying exponentially the nonlinearities flowing through the system.<sup>[29]</sup> Sanford Kwinter describes this geometrical concept as one the most powerful depictions of the relationships between phenomenal forms and the morphogenetics fields where they occur. A context for architectural form and its inhabitants can be paralleled to what Kwinter describes as,

the rivulets and modulations correspond to built-in tendencies, or default scenarios, that would condition the evolution of forms in the hypothetical absence of supplementar forces acting over time.<sup>[30]</sup>

Tendencies of the architectural structures and forms can and do condition the evolution of the phenoms(people) that exist within their field.

This depiction, in addition to other scientific methods of thought such as the *Christaller Model*, point to ideas on how the development of landscape, infrastructure, public space and private dwelling can be choreographed together as an important strategy for increasing the overall health and well being of urban populations.<sup>[31]</sup> These models address the "larger dichotomy of nature versus culture" and move away from the "rational thought" linked to modernist planning in favour of a more sensitive and comprehensive approach to urban planning that is not hinged upon "market forces". As Karin Jaschke states in the essay *City is House and House is City: Aldo van Eyck, Piet Blom and the Architecture of Homecoming*, many modernist architects and planners skipped the relationship between the individual dwelling and public space, and with this the relationships between interior and exterior were also called into question. The distinction to be made was not exterior as "nature" or the man-made facsimiles of it, but rather the accessibility of the urban realm of appearance. There was a failed connection between the "domestic" and the "metropolitan", which could have been in part related to the separation of

FIELD:  
"describes a space of propagation, of effects. It contains no matter or material points, rather functions, vectors and speeds. It describes local relations of difference within fields of celerity, transmission or of careering points, in a word, what Minkowski called the world."<sup>vi</sup>

"...a pathway of change which is equilibrated in the sense that the system tends to return to it after disturbance. One would have expected that such a notion was commonplace of the kinetics or cybernetics of polyphasic systems."<sup>vii</sup>

the work and roles of architect and urban planner. However, there are some exceptions to this. Whether or not projects such as the *Unite D'habitation* have succeeded in embracing that relationship is another question altogether.<sup>[32]</sup>

Where many modern projects emphasize the spatial continuance or visual transparency created to pass through the building envelope, Team 10 was exploring the psychological and emotional transitions between the isolated individual and the much larger urban crowd.<sup>[33]</sup>

Different efforts to resist these greater forces will be exemplified with a chronology of work, beginning with the traction gained by the Team 10 debates that emerged out of CIAM. Rooted in these debates were trajectories of thought for both the Dutch Structuralists and the Japanese Metabolists. These movements recognized issues found in Modernism beyond architecture and towards its sociological infiltration. The varying criticisms expressed in the meetings developed an astute analysis of the modern urban environments, taking shape through assorted mediums.

The Team 10 debates hinged themselves on the conception of non-hierarchical and non-linear methods of thinking. Peter Smithson's *Play Brubeck* ideogram, a web of human relations, embodies these concepts that emerged in work of Team 10. The *Play Brubeck* ideogram gains richness when imagined as an organisational strategy.<sup>[34]</sup> The diagram discusses spaces whose elements exist and thrive in the tensions between "mutual relationships", spaces that are intentionally designed in order to catapult the imagination and create journeys or possibilities. This organizational strategy is evident in the work completed by Team 10, in particular, Aldo Van Eyck. His *Amsterdam Orphanage* and the *Sonsbeek Pavilion* both attempt to embody this strategy. The expression of a non-hierarchical point of view allows for bottom-up organizations to emerge. Another Dutch Structuralist, Herman Hertzberger, created architectures that employed an atomic or cellular approach, an aggregation of units situated around the individual that, when aggregated together, form larger connective structures. This organization was made to reflect an idea that the public realm proceeded from individual acts. Through the accumulation of acts, a collective emerged.<sup>[35]</sup> It implied that architecture was responsible for taking into account the sophisticated complexity of urban social groupings.<sup>[36]</sup> The motto of *By Us For Us* exhibited in the diagram on the following page was meant to express the celebration of the human element.

As referred to earlier, Aldo Van Eyck's *Amsterdam Orphanage* was an example of a building program whose smaller, human-scale modules

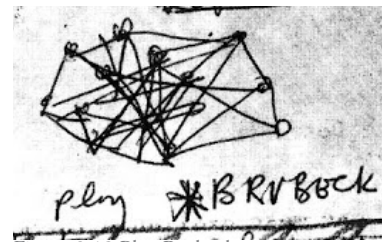


Figure 3.19 Play Brubeck

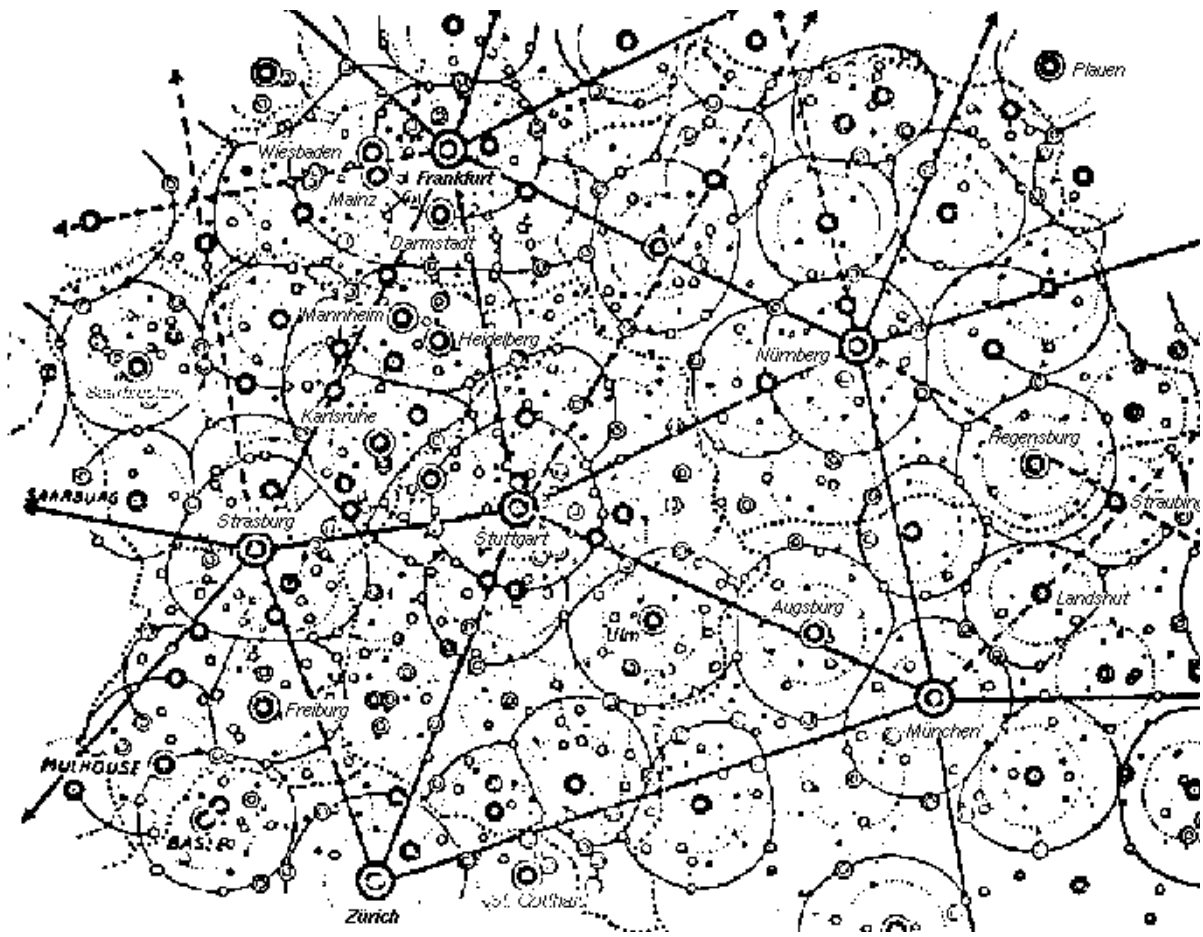
CULTURE: "the result of a particular and creative process and could therefore be described in terms borrowed from the arts...A culture was seen as a delineated entity, its outline and constitutive elements determined by its structural order, a structural order that might be more, or less cohesive."<sup>viii</sup>

"To me, any type of architecture, no matter what its function, is a house. I only design houses, not architecture... They always maintain some sort of

interesting relationship with true existence and life. Architecture is a heavy word. If "house" is the initial prototype of all kinds of architecture, and a house is turned into architecture, it means that people have attached more meaning to it than can be expressed."<sup>ix</sup>

CENTRAL PLACE THEORY:  
A geographical theory that investigates the number, size and location of human settlements in an urban system. The theory asserts that settlements function as 'central places' providing services to surrounding areas.<sup>x</sup>





liminal matter

Figure 3.20 Central Place Theory, Christaller Model

were united with the design consideration of difference where in between spaces disrupted the rhythm of an aggregate of similar components. This project in particular took shape with two sized modules: smaller private residential spaces, and larger open community ones.<sup>[37]</sup>

The *Sonsbeek Pavilion* by Van Eyck is an appropriate case study for consideration of thresholds as a psychological mediator of space. Writing on the temporary project at the Kroller-Muller Sculpture Garden, Van Eyck writes in 1956:

We are not breathing in, nor are we exclusively breathing out. This is why it would be so beneficial if the relation of interior space and exterior space, between individual and common space inside and outside, between the open and the closed) directed towards the inside and outside could be the built mirror of human nature, so that man can identify with it. These are formal realities because they are mental realities. Moreover they are not polar but ambivalent realities.

The dwelling and its extension into the exterior, the city and its extension into the interior, that's what we have to achieve!<sup>[38]</sup>

The Sonsbeek pavilion is composed of six parallel concrete block walls with regular height and spacing. These walls have semicircular voids placed along them, where the wall seems to be bent around the emerging room. The varying scales of these spaces became a spatial metric. Not only did this strategy create varying dimensional circumstances in the pavilion, it also created spaces that framed movement as viewers visited and moved through the corridors.

Another influential aspect of Van Eyck's work and that of the Dutch Structuralists is the design of large scaled projects as an amalgam of smaller elements and clusters. This organization would create a range of social circumstances and densities between the public and domestic spheres. In designing at a more intimate and human scale, a technique they called "spatial ambivalence", these spaces helped their participants to feel safety in an urban condition. As Jaschke describes, Van Eyck was sensitive to the varying scales at which human experience occurs,

The built environment, in the view of Blom and van Eyck, had to match the human mind's complex and fundamentally non-dualistic structure. Where such a structural homology existed in consciously or sub-consciously perceptible ways, inhabitants would feel 'at home' in their environment...<sup>[39]</sup>

It is clear that the role of the Cartesian grid—an iconic modern concept—was strong. Although these projects hinged upon this method of organization, it identified a transition of the grid being utilized as a projected field as opposed to the specific determination of form and



Figure 3.21 By Us For Us

“Instead, there appear to be driver nodes that exist beyond the active hubs and are capable of exerting influence on dense, homogenous complex networks. This explains why external influence can be exerted on very robust complex networks, resulting in a system that can't be completely controlled, but is incompletely influenced. Control—working with dynamic matter engages with an established tradition of design practices in which, like in gardening and cooking, the designer is a co-author of a process.”<sup>xi</sup>



Figure 3.22 Centraal Beheer Office Building, Apeldoorn, The Netherlands, 1972

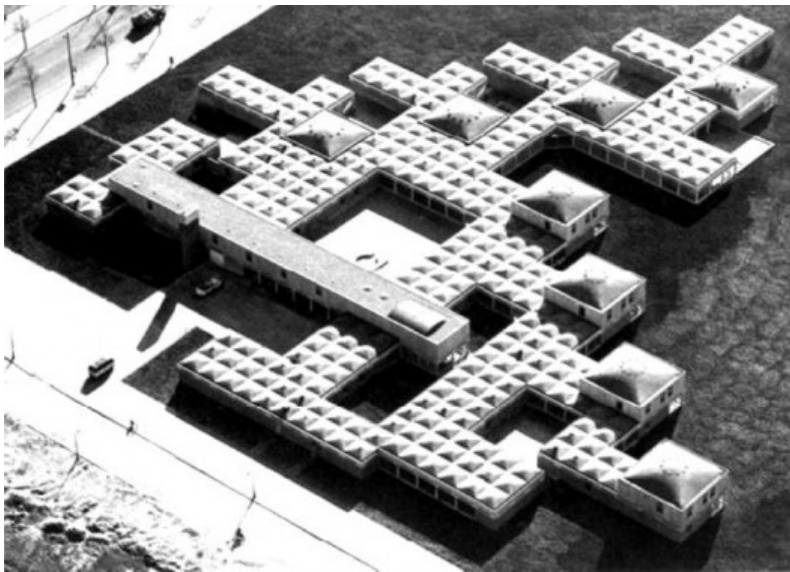


Figure 3.23 Amsterdam Orphanage, Aldo Van Eyck (year, location?)

liminal matter

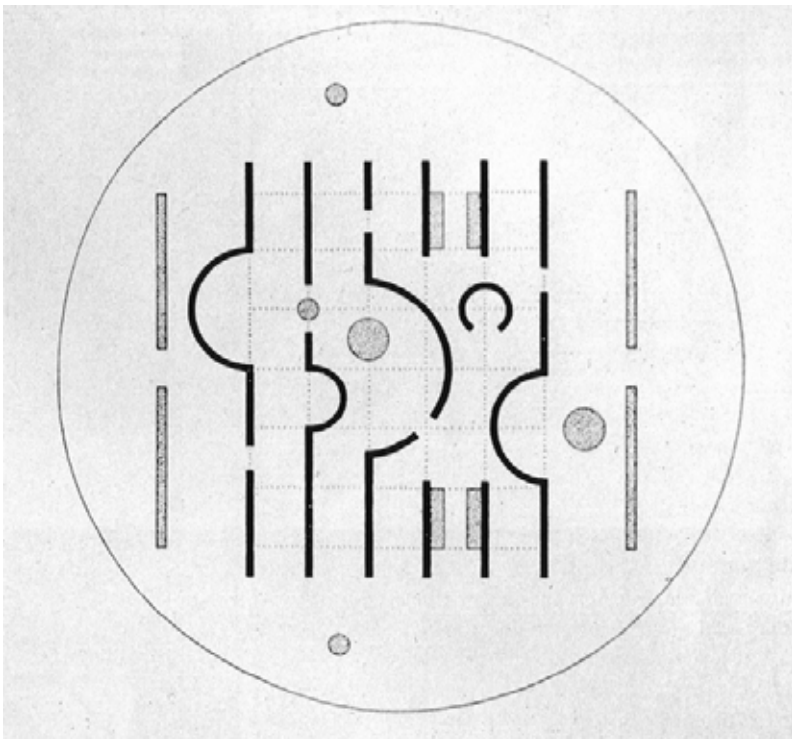


Figure 3.24 Sonsbeek Pavilion,  
Figure 3.25 Plan Drawing, Sonsbeek  
Pavilion

structure. The outcomes for architecture are outlined by George Baird:

The difference between surface as a component of urban infrastructure and its' role in traditional architecture, is the design as a process of preparing a site for future possibilities. A strategic staging for what could be; privileging a means rather than an ends.<sup>[40]</sup>

“the village hall must be more like an open square than a building, and, inversely, the village square must be less a square than a building.”<sup>xii</sup>

By imagining the grid as an implied field, it becomes a starting point for structural order. However, its ordinate spacing in difference—the deliberate separation of entities, that is still of concern. Carey Wolfe comments on the role of spacing,

‘space’ doesn’t just refer to a multi-dimensional, virtual perceptual field shared by different observers; it also refers to the fundamental logic of ‘spacing’ by which any ‘difference that makes a difference’...may come into being....it is a matter of spacing— in this case, the spacing of two elements, which cannot simply occupy the same place at the same time, between which the abstract relation emerges.<sup>[41]</sup>

By freeing these systems from an obvious grid, tensions release in favour of a fluctuating architecture whose bounds depend more greatly on the actions of its inhabitants than its structural ordinance. Returning to Michelle Addington’s *Architecture of Contingency*, deconstructed spaces designed with individual in mind can be related back to the energetic bounds earlier that drive the physiological processes of the inhabitants being considered, as described earlier:

The static surfaces of the envelope may demarcate the ownership of property or the territory of a domain...boundaries of discontinuity. When speaking about phenomena rather than objects, the boundaries of consequence are all continuous. In physics, a boundary is a region in which change occurs: heat is exchanged, pressure is equalized, molecules are combined. A boundary is a zone of action, where the laws of physics are manifest at their most fundamental and potent level. Unlike the static boundary of the building envelope, the energy boundary does not exist to create discontinuities; rather, it emerges to resolve them.<sup>[42]</sup>

The architectural environments form an extracellular matrix, an organizational geometry that embraces action occurring in its thresholds. The formal quality can be described as a viscous soup rather than a particular geometric structure. These environmental elements are palpable within dynamic systems in the perceived differentiation between occupied and unoccupied space, or through the imagined boundary as no longer a solid impassable line, but a negotiable space that directs the relationships between separate systems, such as the individual scale of hand and sensor or the body-environment scale of an individual passing through a threshold. The proposed design follows an emergent and symbiotic approach. Conrad Waddington’s dynamic system

provides insights for organizational geometries, while the works of Aldo Van Eyck and Team 10 offers architectural concretization. The scaffolds of the proposed system will contain primary building blocks deliberately designed at the scale of the individual, while creating varying apertures of occupiable space in order to satisfy varying social structures, events and temperaments. Public space is imagined as a diffuse environment composed of an amalgam of spaces occupying a filamentary structure of clusters, mediating social zones designated by bubble like voids that emerge throughout Dundas Square. In conclusion, this imagined field is embraces the transitional systems of Stan Allen's field conditions. A system, as Sanford Kwinter describes,

that transitions from "the one toward the many, from individuals to collectives, from objects to fields." Stan Allen has identified this organizational shift within the understanding of the shift in our terrestrial makeup; digital emerging from the physical. This shift keys in on the importance of architecture to "reflect the complex and dynamic behaviours of architecture's users, and speculate on new methodologies to model program and space."<sup>[43]</sup>

"In the aftermath of the 1980s building boom, the potential and significant field of action today is less the design of monuments and master plans than the careful modification and articulation of the urban surface."<sup>xiii</sup>

"All grids are fields, but not all fields are grids. On of the potentials of the field is to redefine the relationship between figure and ground."<sup>xiv</sup>

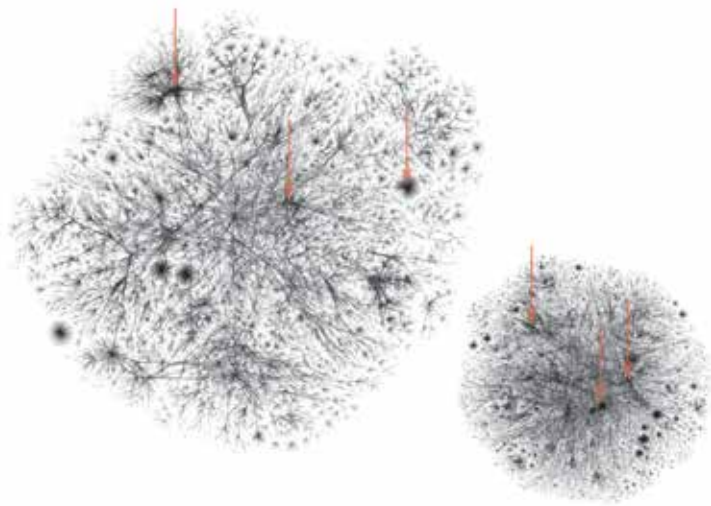


Figure 3.26 Filimantery Structures

In order to determine how to implement the organizational strategies discussed in the section previous to this particular site, initial design moves as outlined

Before discussing alternative strategies, a few instances of site-suturing will occur. The existing program of ticket booth, security pavilion and tour guide pavilion are removed from their existing locations and are inserted into the vacant urban edges in an effort to create a stronger border condition, particularly to the south and east of the site. In addition to the removal of the smaller program pavilions, all the billboards and print media is removed from the site in favour of digital advertising and augmented reality systems. With this shift, the olympic torch building, which is most notably a media board armature, will also be removed. The intention is to influence this portion of the site with a hybrid student centre for the several local universities to collaborate and create a public working space that promotes interactivity with the public. This space can support the square as a venue for academic events such as symposia, convocations, keynote speakers, maker faires or student led workshops.

The Metropolis building along the north edge will have the ground floor transit location more prominently displayed.

Washrooms and Green Room stay below the surface, in the unadjusted parking garage.

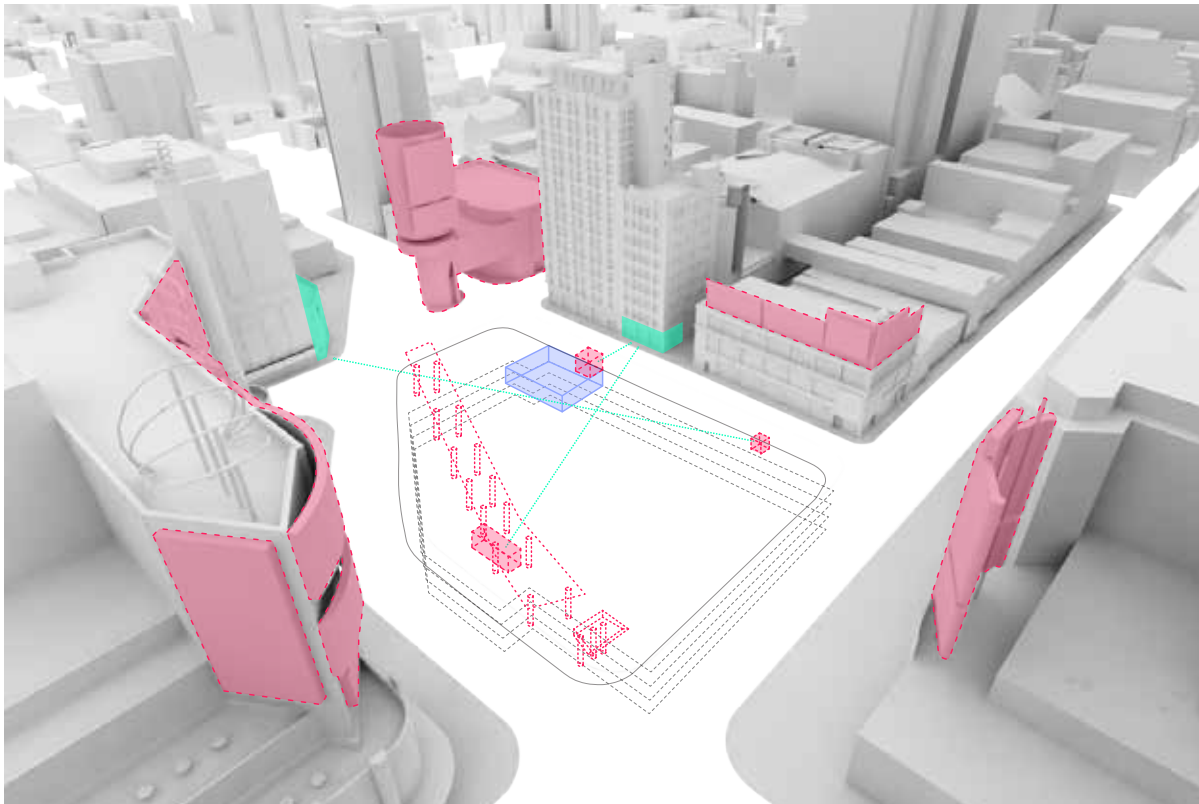
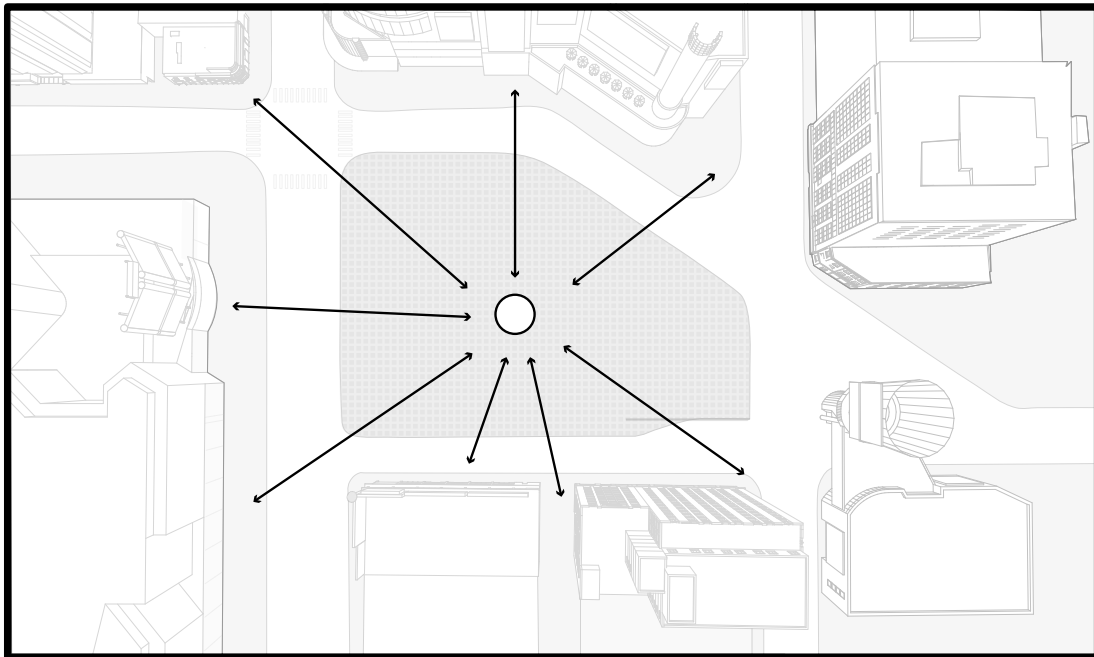


Figure 3.27 Site Adjustments

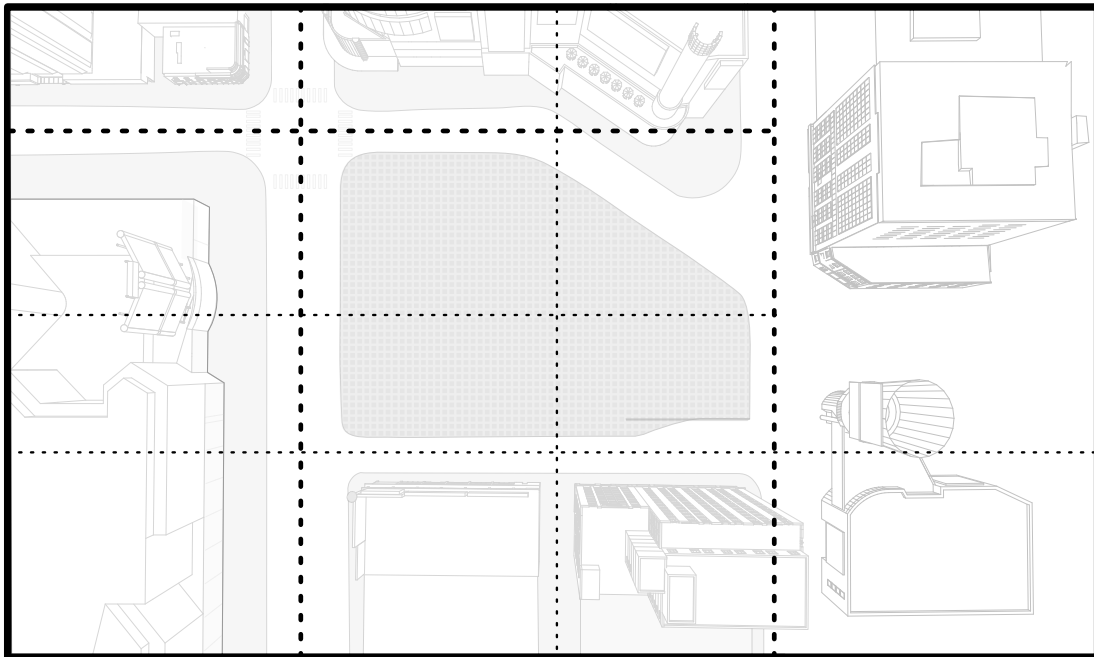




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Figure 3.28 Theatre-in-the-Round

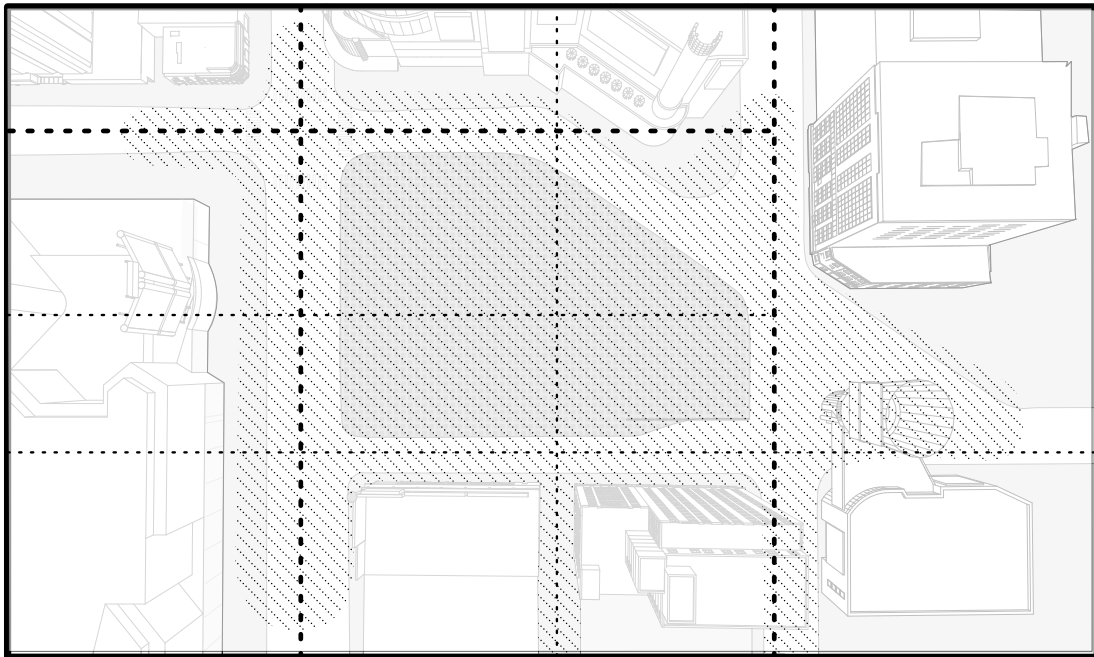
As discussed in the original site description, there is an implied Proscenium theatre formation in the existing design of the Dundas Square. This fictional proposition for a future alternative begins by imagining the space as a theatre-in-the-round. An immersive environment that fosters an inclusive relationship between all sides and circulation flows upon the site.



liminal matter

Figure 3.29 Imagining Site Axes

Before imagining more complex and small scale relationships within the site, the project takes notice of the existing city grid that relentlessly governs the entire metropolitan downtown and therefore becomes an underlying element of the urban fabric. The taper that deviates from the common road grid form at this site is a unique condition, sometimes found in tartan grid plans. The implications of recognizing the existing grid is not for formal purposes but to recognize the flows of traffic where visitors can emerge without falling to primarily favour the Yonge street corridor. The central north south grid line introduces a pedestrian based set of axes.



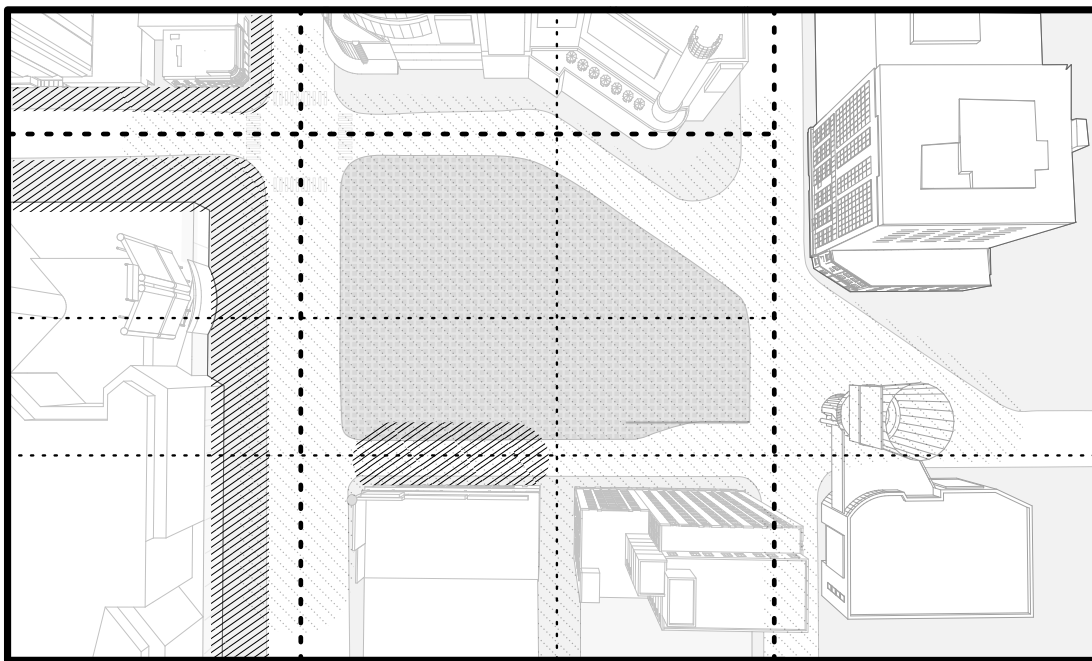
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Figure 3.30 Proposed Continuous Surface

The first step in the proposal will be a reimagining of the existing stone surface. The resurfacing will be supplemented by electrical grid sub soil that will provide ample points into an energy source.

The surface will be a gently rolling surface, dipping up and down creating small peaks and valleys that keep an open surface but also modulate the varying spatial conditions.

The typology of shared streets can be found in existing urban historical centres, such as Trastevere in Rome. Narrow streets operate while pedestrians, cyclists, and motor vehicles, patiently share the road. This may seem alien and even radical for contemporary western society, but this method has already been tested and proved in reducing traffic accidents while simultaneously improving street life in cities such as London, Seattle, Buffalo, and more recently, Chicago. A shared street does away with the differentiated zones in favour of areas that allow individuals using the space to be aware and accountable. Generally these zones encourage slower traffic.<sup>[44]</sup>



-  OVERALL SURFACE
-  CAFE
-  RETAIL
-  MARKET
-  TRANSIT

liminal matter

Figure 3.31 Extended Program Areas

The proposed diffusive, filamentary environment is informed by programmatic adjacencies and shaped by aspects such as scale, speed, and program. These adjustments allow the program to “bleed” in the sense that activities are so tightly contained to the existing building envelope. For example, patio conditions can emerge beyond the restaurant zone through the creation of small nooks within the larger scaffold, allowing for couples to eat in a particular and attuned environment. In contrast, a central major event space accommodates large crowds and provides observational views from all sides of the square.

Instead of habitually distinguishing man from other living beings, the notion of program denotes a movement of “difference” and “spacing” that goes “far beyond the possibilities of the “intentional consciousness.”<sup>[45]</sup>





liminal matter

Figure 3.32 Architectural Features

In addition to program type, several architectural conditions are identified upon the site. These also influence the architectural circumstances of the new environment. Some are directly related to existing program adjacencies and others are based on current locations of certain social groupings.

1. Retail Street Front
2. Patio Street Front
3. Alleyway
4. Ticket Booth/Security Office
5. Lounge and Lay Space
6. Major Event Space
7. Minor Event Space
8. Transit Platform
9. Subway Entrance
10. Ticket Booth/Information Pavilion
11. Security Office

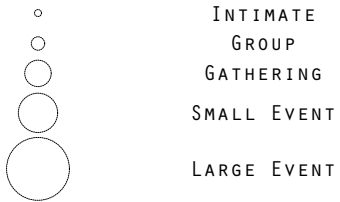
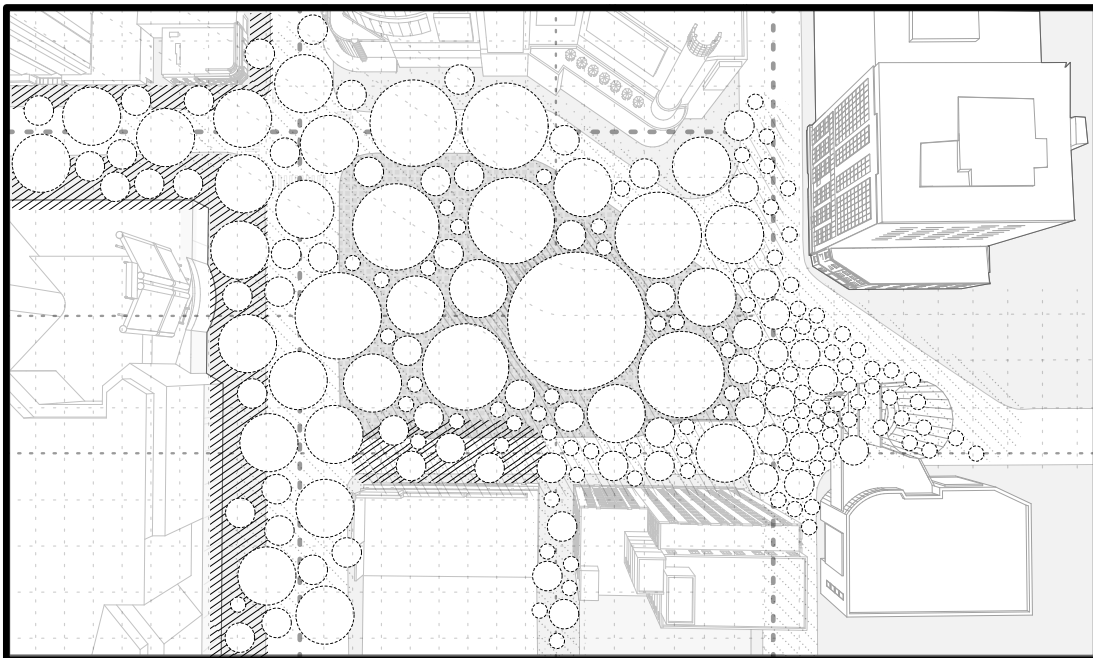


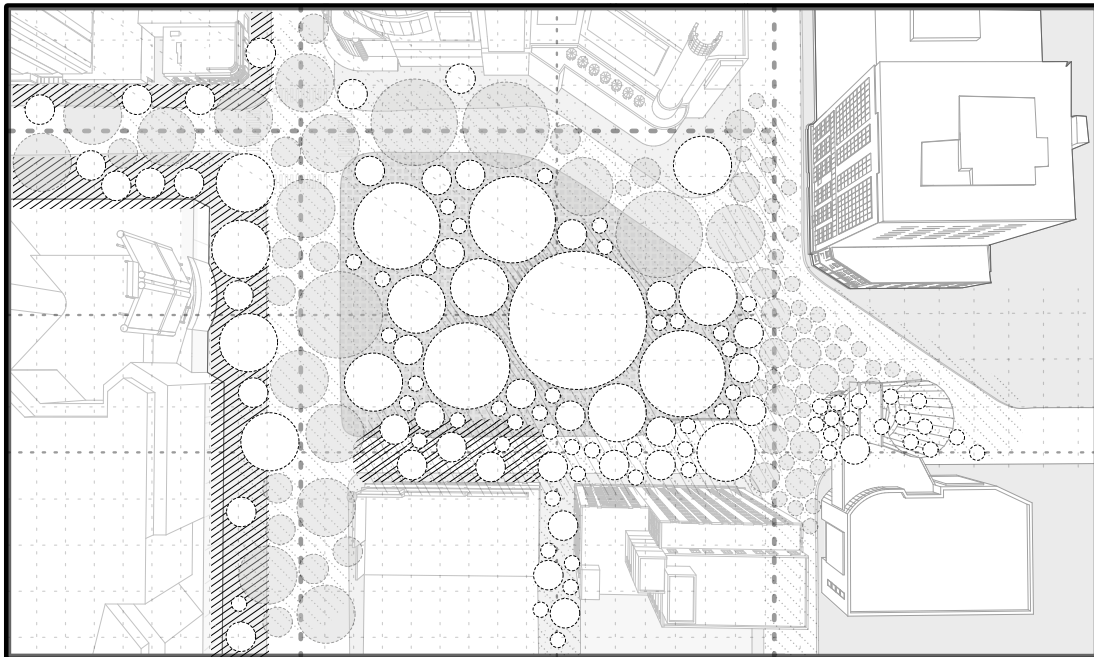
Figure 3.33 Implied Social 'Rooms'

The general idea...is the concept of the Cluster. The Cluster,—a close-knit, complicated, often-moving aggregation, but an aggregation with a distinct structure. This is perhaps as close as one can get to a description of the new ideal in architecture and planning...

It is traditionally the architect's job to create the signs or images which represent the functions, aspirations and beliefs of the community, and create them in such a way that they add up to a comprehensible whole. The cluster concept provides us with a way of creating new images, using the techniques for example of road and communication engineering.<sup>[46]</sup>

A cluster of “rooms” illustrates diagrammatically the types of social structures that can occur based on program and social scales.

“But that’s a definite architectural quality. It has the same quality as all religious places... It’s terrific. It’s the beginning of architecture. It isn’t made out of a handbook. It doesn’t start from practical issues. It starts from a kind of feeling that there must be a world within a world. The world where man’s mind somehow becomes sharp.”<sup>xv</sup>



liminal matter

Figure 3.34 Rooms subdued through existing Transit Infrastructure.

Upon the resurfaced ground, a series of room structures are implemented in the existing grid system. Rooms along the transportation routes will be removed in favour of free flowing surface conditions. These areas will still feature canopy conditions and other elements of the diffuse environment.

“In setting up a well-disposed field, the designer stages the conditions necessary to precipitate a maximum range of opportunities in time, turning negatives and limits into positives and potentials.”<sup>xvi</sup>

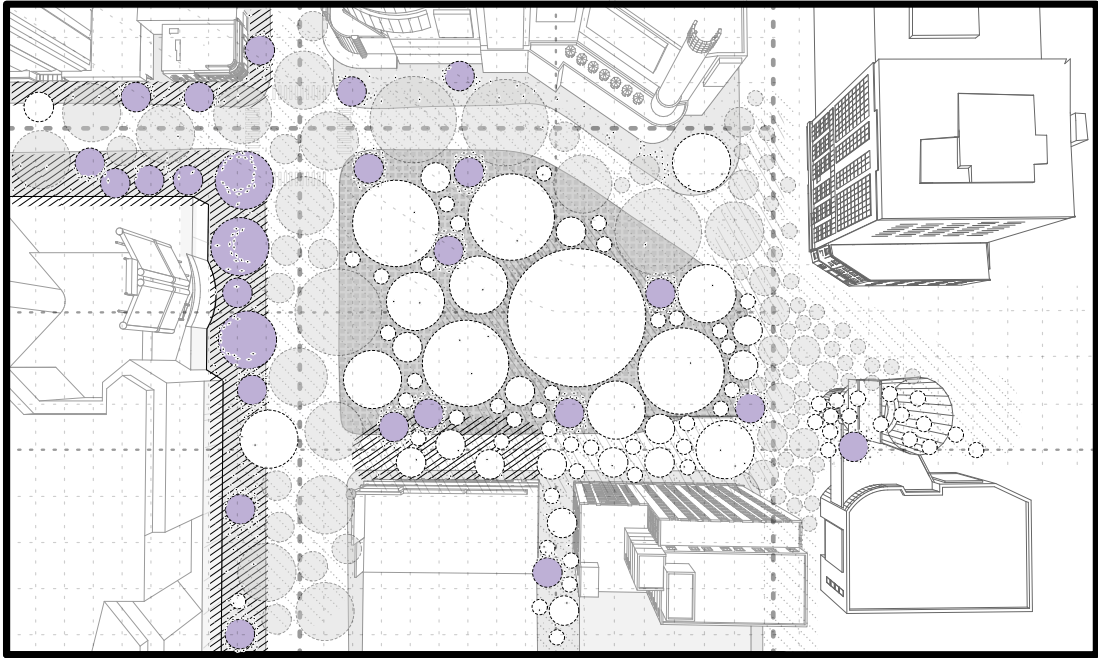


Figure 3.36 Minor Event Spaces

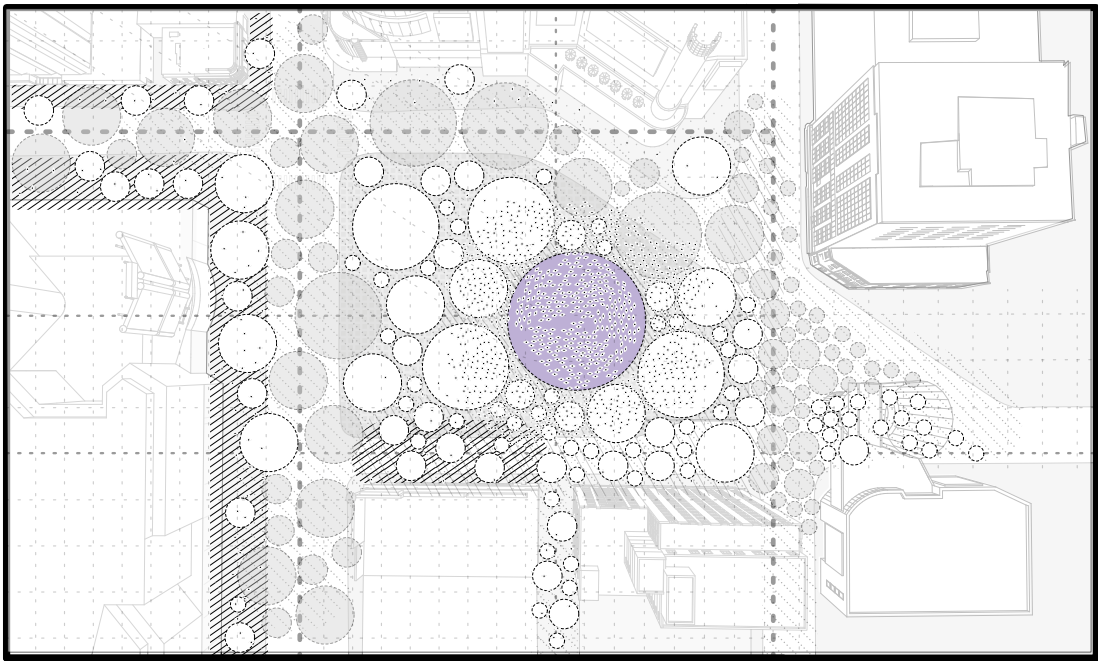


Figure 3.35 Major Event Space

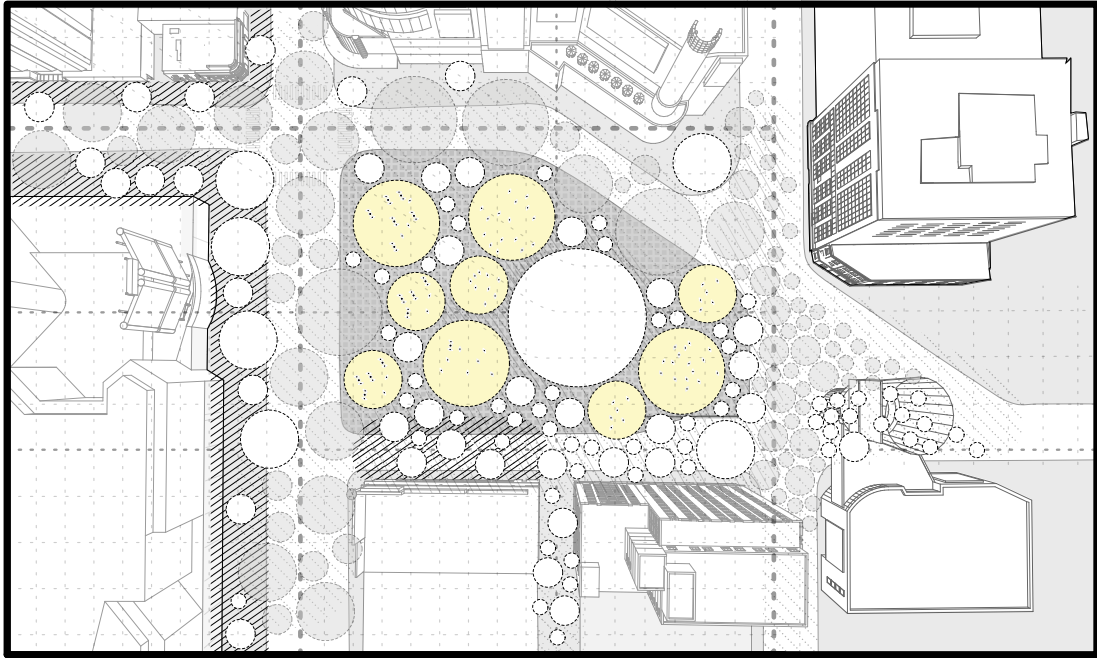


Figure 3.38 Lounge and Lay Spaces

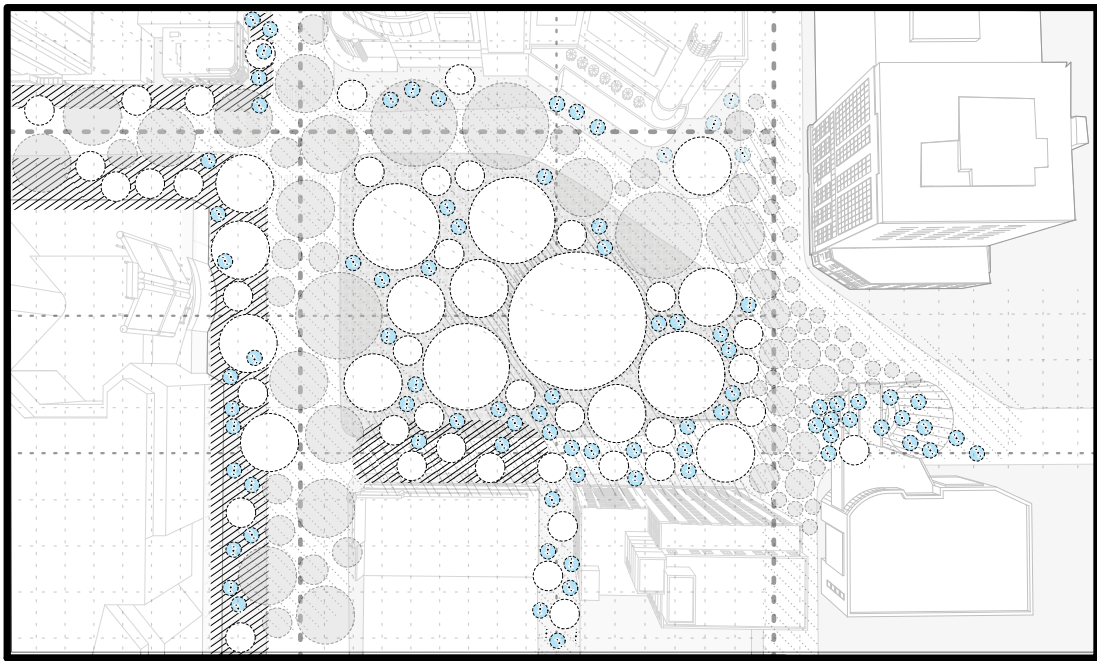


Figure 3.37 Intimate Spaces



liminal matter



**Part Three: Synthesis**

“This experience is multisensory in its very essence, but it also involves judgements beyond the five Aristotelian senses, such as the senses of orientation, gravity, balance, stability, motion, duration, continuity, scale, and illumination...the immediate judgement of the character of space calls upon our entire embodied and existential sense, and it is perceived in a diffuse and peripheral manner, rather than through precise and conscious observation.”<sup>[47]</sup>

## Premise

In conceptualizing a more organic, fluid urbanism, ecology itself becomes an extremely useful lens through which to analyze and project alternative urban futures. The lessons of ecology have aimed to show how all life on the planet is deeply bound into dynamic relationships. Moreover, the complexity of interaction between elements within ecological systems is such that linear, mechanistic models prove to be markedly inadequate to describe them. Rather, the discipline of ecology suggests that individual agents acting across a broad field of operation produce incremental and cumulative effects that continually evolve the shape of an environment over time.<sup>[48]</sup>

This design is a counterproject, a fictional iteration of a different spirit of time and place rather than a critique on Dundas Square. The site is chosen as an experiment for a possible future. Smart, empathetic systems are emplaced in order to create real time feedback loops between individuals and their built environment. Rather than viewing public space as a living room, it becomes a home: a place of intimate comfort, culture and diversity. The site is a testing ground for a future public environment, a future Toronto, say, fifty years in time. By this time, steel frame window technology will have become archaic. Rather than re-skin or retrofit the window, this proposition sees opportunity in a series of concentric, undulating, delicate thresholds of space. In contrast to the modernist glass encasement, modulating filamentary gradient fields create space for action rather than dictate how to act. A multisensory environment that activates all senses, inviting conversation based on the energetic stimuli of bodies interacting in space, provides this opportunity. The design seeks to breathe with character, vibrancy and difference into the space, in sharp contrast to the stimuli-impoverished modernity that Christian Norberg-Schulz describes or what Western culture has decided to prioritize in architecture.<sup>[49]</sup> This architectural system attempts to focus on ambience, which Juhani Pallasmaa describes in his text on atmosphere:

The serious Western tradition is entirely based on seeing architecture as a material and geometric object through focused vision, whereas ambience is a kind of an immaterial 'halo' that the material reality seems to extrude.<sup>[50]</sup>

The square is given a new topographic condition, indicating a paradigm shift in the city: the pedestrian is valued over the vehicle.<sup>[51]</sup> As the site of a major local transit hub and a social forum, the space is imagined as an urban focal point. The resurfacing of the site transforms an area that collides with the edges of the existing built fabric, spilling out into the thresholds of "feeder" streets. Extricating the axial privilege along the Yonge street corridor and opening the space up to areas that are currently forgotten, social and circulatory dynamics become possible. As Alex Wall describes in *Recovering Landscape*,

"Our imaginations, haunted by the old archetypes, have remained far behind the sophistication of the machines. The various attempts to integrate modern science into new myths remain inadequate. Meanwhile abstraction has invaded all the arts, contemporary architecture in particular. Pure plasticity, inanimate and storyless, soothes the eye. Elsewhere other fragmentary beauties can be found — while the promised land of new syntheses continually recedes into the distance. Everyone wavers between the emotionally still-alive past and the already dead future.

We don't intend to prolong the mechanistic civilizations and frigid architecture that ultimately lead to boring leisure.

We propose to invent new, changeable decors."<sup>xvii</sup>

ECOLOGY  
: "...ecology is especially significant here, for ecology addresses the interrelationships of parts and dynamic systems."<sup>xviii</sup>

The grafting of new instruments and equipment onto strategically staged surfaces allows for a transformation of the ground-plane into a living, connective tissue between increasingly disparate fragments and unforeseen programs.<sup>[52]</sup>

“In an age of cars, computers and commuting, the desire for such a meeting place may well be more emotional than practical.”<sup>xix</sup>

The surface of Dundas Square serves as a foundation for the amalgam of scaffolds supporting components of the diffuse environments, including the electrical sensing and actuation systems triggered by human presence. Passive instruments do exist within the square, possessing properties related to the season and climatic conditions associated with indexing time, as well as energy harvesting mechanisms and vegetation patches. These instruments with varying qualities all contribute to the ecology of the public space. In the words of Stephen A. Gage,

I put forward a possible environment that could be constructed out of an array of exquisite objects: enclosing structures, lighting systems, environmental modulators, routes, passages. The “observers in” these worlds of natural magic would construct their own understandings and would be delighted in the process of doing this. Wherever possible, the physical constructs would be laid out to engage seasonal variation and moment to moment changes in the natural weather systems, so that the observers in these buildings and landscapes are offered the possibility of repeatedly reconstructing their environments.<sup>[53]</sup>

These proposed integrated, responsive machines evolve at a rate dependent on their learning, driven by experiencing evolutionary emotions through interactions and learning from its inhabitants. A post-natural, post-human forest emerges, infusing metabolic, emotional and atmospheric conditions into the constructed environment. The proposed environment becomes a synthetic being or bodies, rather than structure or container. Similar to the evolution of Braitenberg's vehicles, the objects and their network of systems go through the motions of experiencing movement, then are able to act on simple emotions, such as fear, before becoming comfortable and learning love. This element of learning transforms the environment into a companion species for its inhabitants. The system requires responses from its inhabitants in order to evolve. This is discerned through the connected nature of the system, where overall trends and behaviours can be used to determine what is accepted or pleasurable and what is aggressive or destructive. The embodied space develops character, participates in the interactions that occur around it, and contributes to the overall experience of place. The diffusive system strives to provide a possibility to the questions that Stephen A. Gage puts forth in the essay *The Wonder of Trivial Machines*

Is it possible to envisage constructed constructs that can show outputs that have pattern and are unpredictable?

Is it possible to construct a wide range of physical devices that behave like von Foerster's non-trivial machine, where an output is a form of pattern that continually changes but remains strangely familiar?<sup>[54]</sup>

The goal is to create alternative, emergent, spatial experiences that support of emotional understanding, communication, and interaction. This is performed through an array mediums that total to an impactful architecture.

This is a suggested implementation of a feedback loop predicated on the idea of an attentive and concerned architecture that adapts with investment in the emotional well being of the collective. This loop is based on the indexing of data as a series of parameters that can begin to quantify human emotion. Architecture and public space will no longer exist in a one-way relationship between itself and its occupants.

There is a wholehearted attempt to heed George Baird's advice and create a hybrid place that approaches the individual as both citizen and flaneur.<sup>[55]</sup> This is done through the consideration of what public action is and can be, as well as what it looks like. Through understanding, wonder and delight, and the power of both the participant and the observer in the engagement of trivial and non-trivial machines,

...the newly public realm I am attempting to imagine for our time will not be an altogether conscious construct. It seems to me almost certain that it will be fabricated, in part, of known historical models, but these models will have been fragmented and reconstituted in newly affirmative ways. It will also be rhetorical in its explicit taking up of public positions, but the concatenation of those positions will itself be heterogeneous—not to say pluralistic. And its formation will disclose evidence of many an engaged hand in the process of its fabrication.<sup>[56]</sup>

“Of course, we have some other ideas which are not about today but about the future urban environment. A pavilion of this size should not be concerned with super-practical things, because that can limit its life to the present. It should not be for now, but for 20 or 50 years later. People can imagine how such a living environment could be the future city, or future house, or the future park. I like to create such imaginings, and I hope people just casually enjoy this dream of architecture’s potential.”<sup>xx</sup>

“Poetic forms such as architecture seek participation by speaking not about the speaker but about the ‘world,’ by expressing not technologic control or political domination but true wonder and the supreme mystery of humankind...the difficulty of such a task should not be underestimated, however. Contemporary mental pathologies notwithstanding, modern man and woman remain determined to exclude whatever cannot be articulated through logical reason.”<sup>xxi</sup>

“Now if you consider this it must be put in mind differentiations of a wonderful kind. It brings in mind the difference between the garden, the court and a piazza. Because your connections are not going to be just colonnades and that sort of thing, it’s going to be mental, the connection. You’re going to feel it in some way ... So the connection, then, is the realization of what is a garden, what is a court, what is an avenue, what is a piazza ...”<sup>xxii</sup>







liminal matter

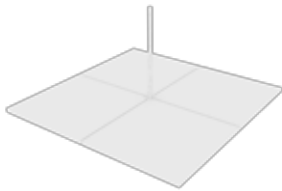
Figure 3.39 Future Dundas Square, Key Spaces, Sectional Path



aromatic and thermal diffuser



ground tentacle



rectangular operable LED screen panels



lightweight mesh filter layer



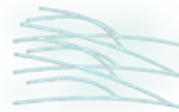
hanging vegetative mesh



welded steel dodecahedral, weire-phalen influenced structural unit



extruded orb



tendrils



audio orb



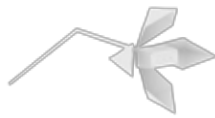
hexagonal panel surface



dandelion massagers



diagrid mesh



flower light sensors



orb



inflatable bladder with localized temperment lighting



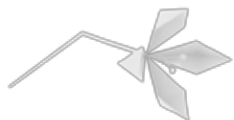
photovoltaic flower



synthetic vines



vinyl mood balloons



flower light signals



reflexive canopy

liminal matter

Figure 3.40 Taxonomy of Components

1

2

3

1 Commercial/Patio  
Dining Threshold

2 Immersive Patio Detail

3 Lounge/Lay + Major Event  
Space

4 Market and Transit Space

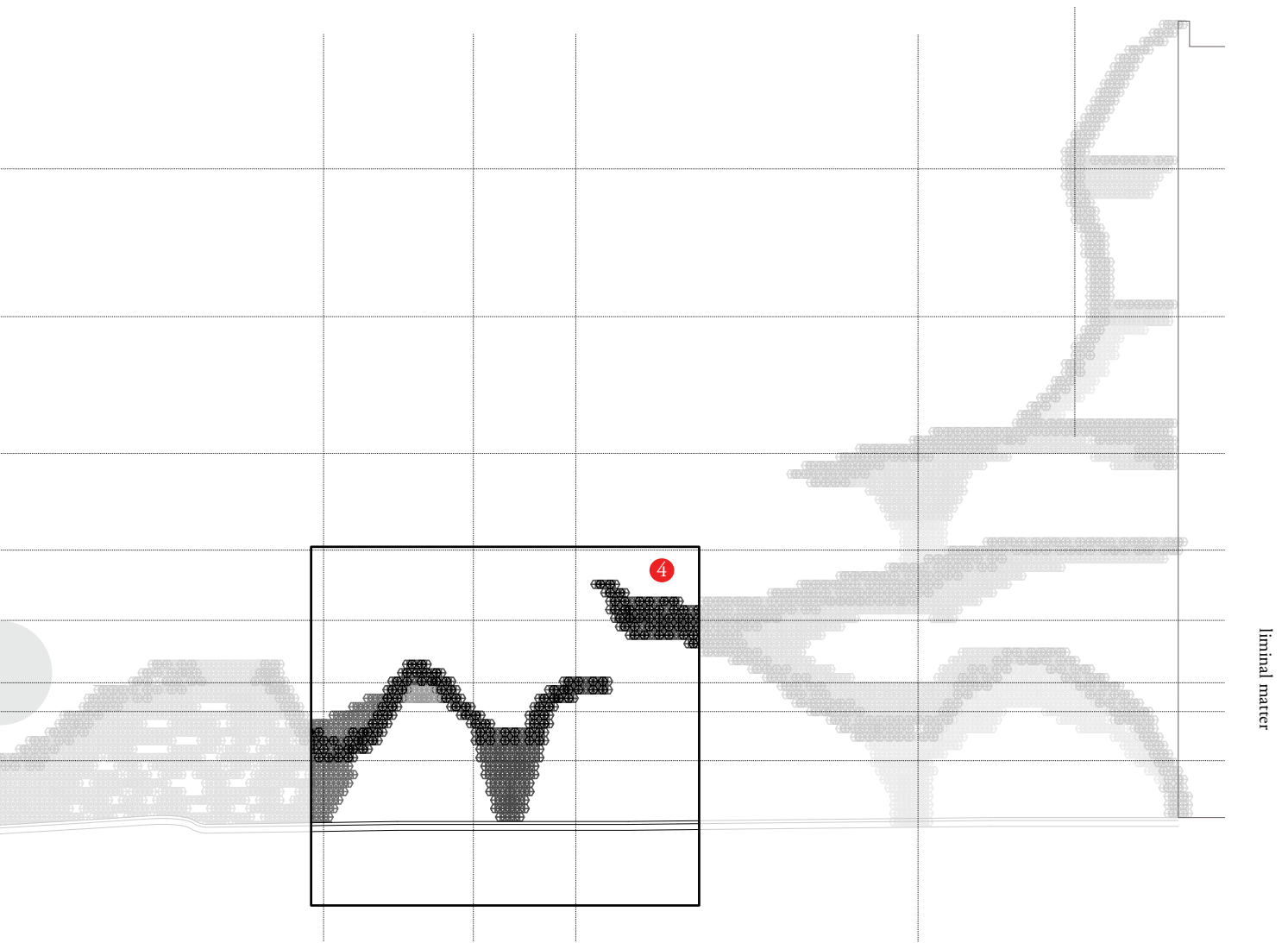
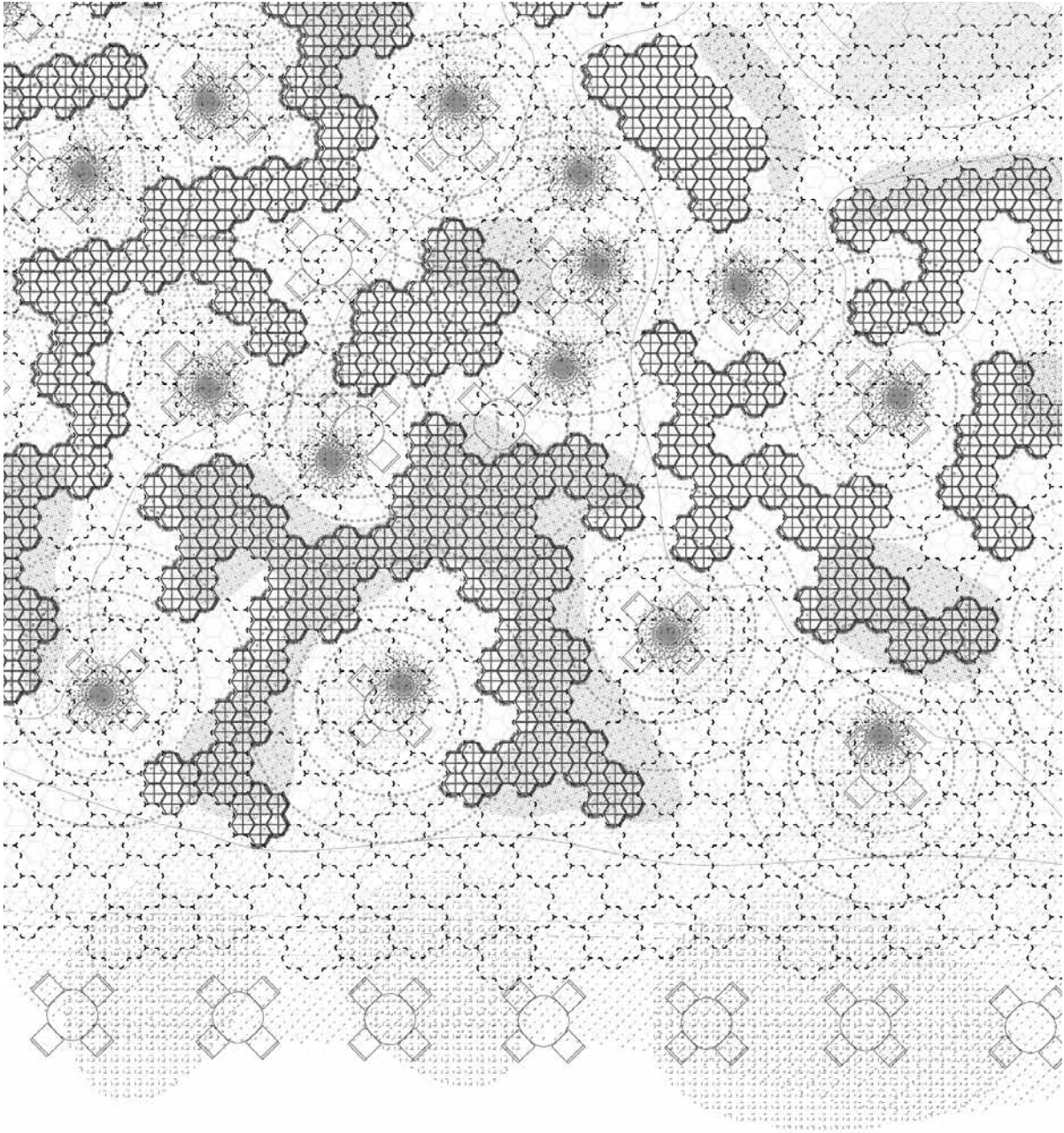


Figure 3.41 Key Program Areas

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## 1: Commercial Patio/Dining Threshold

The existing restaurant building at the South edge of the site has its internal dining space bleed out into the public space. The density of scaffolding, and supplementary devices allow for varying sized groups on the ground and upper sized floors, which can accommodate for intimate dining, as well as large groups. Wayfinding and service communication is integrated into the lighting and floor paneling systems. The varying components assert themselves based on occupant size, temperament, and actions in addition to basic climatic comforts such as thermal, moisture and wind. These modifications are intended as subtle augmentations of surrounding conditions, rather than homeostatic systems.



liminal matter

Figure 3.42 Ground Floor Dining Area

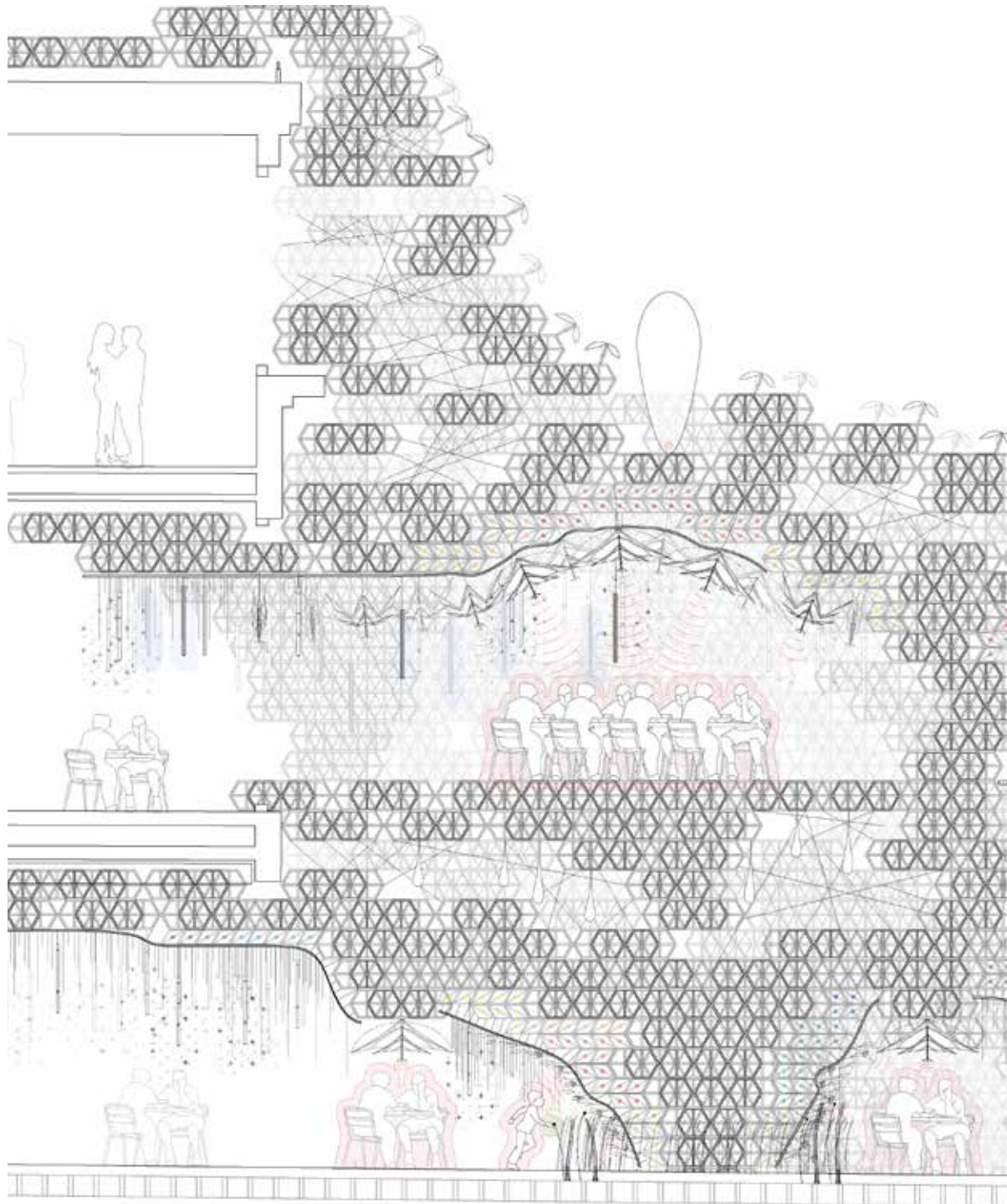
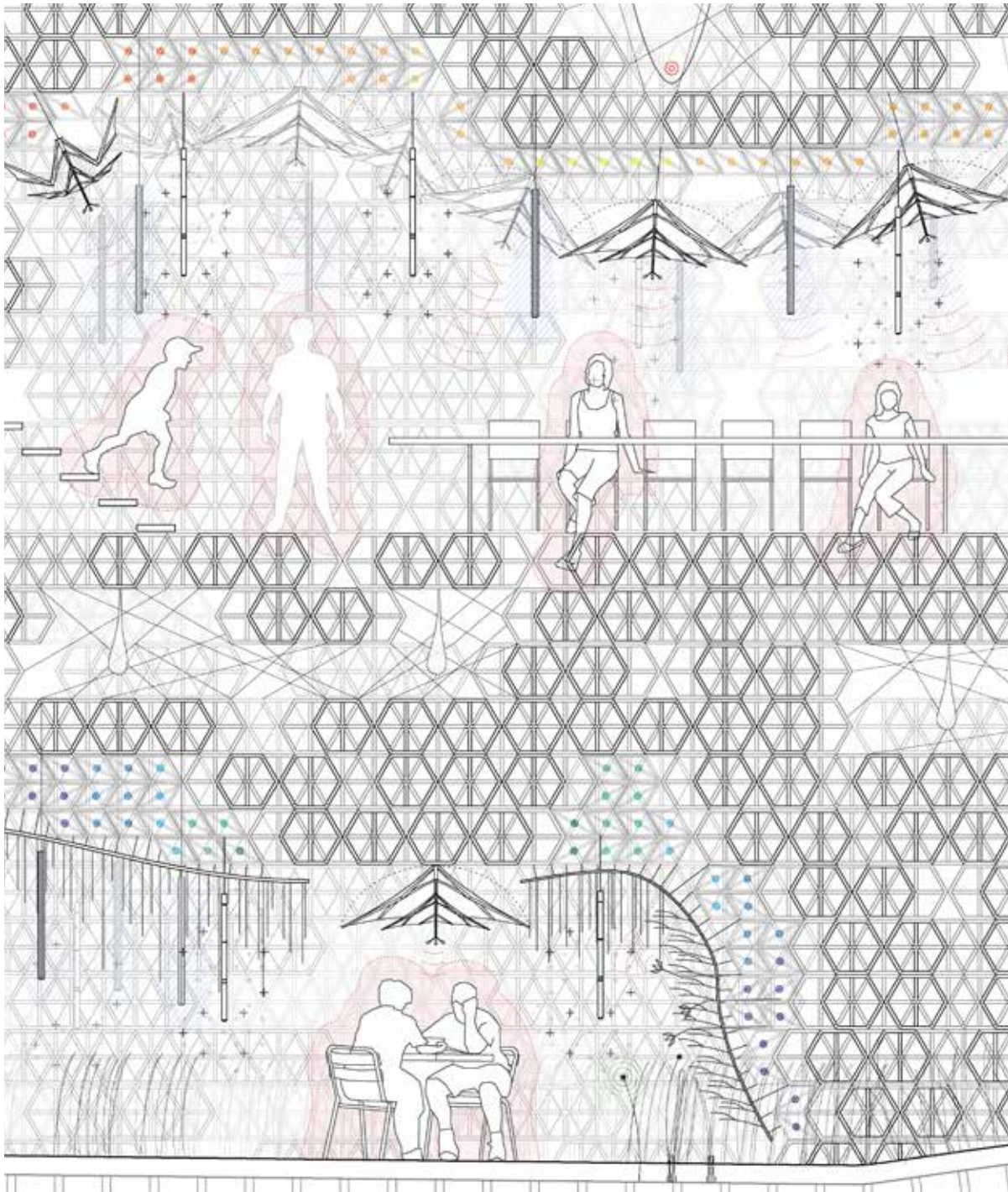


Figure 3.43 Layered Dining Spaces





liminal matter

Figure 3.44 Interacting Spaces, Varying Moods and Environments



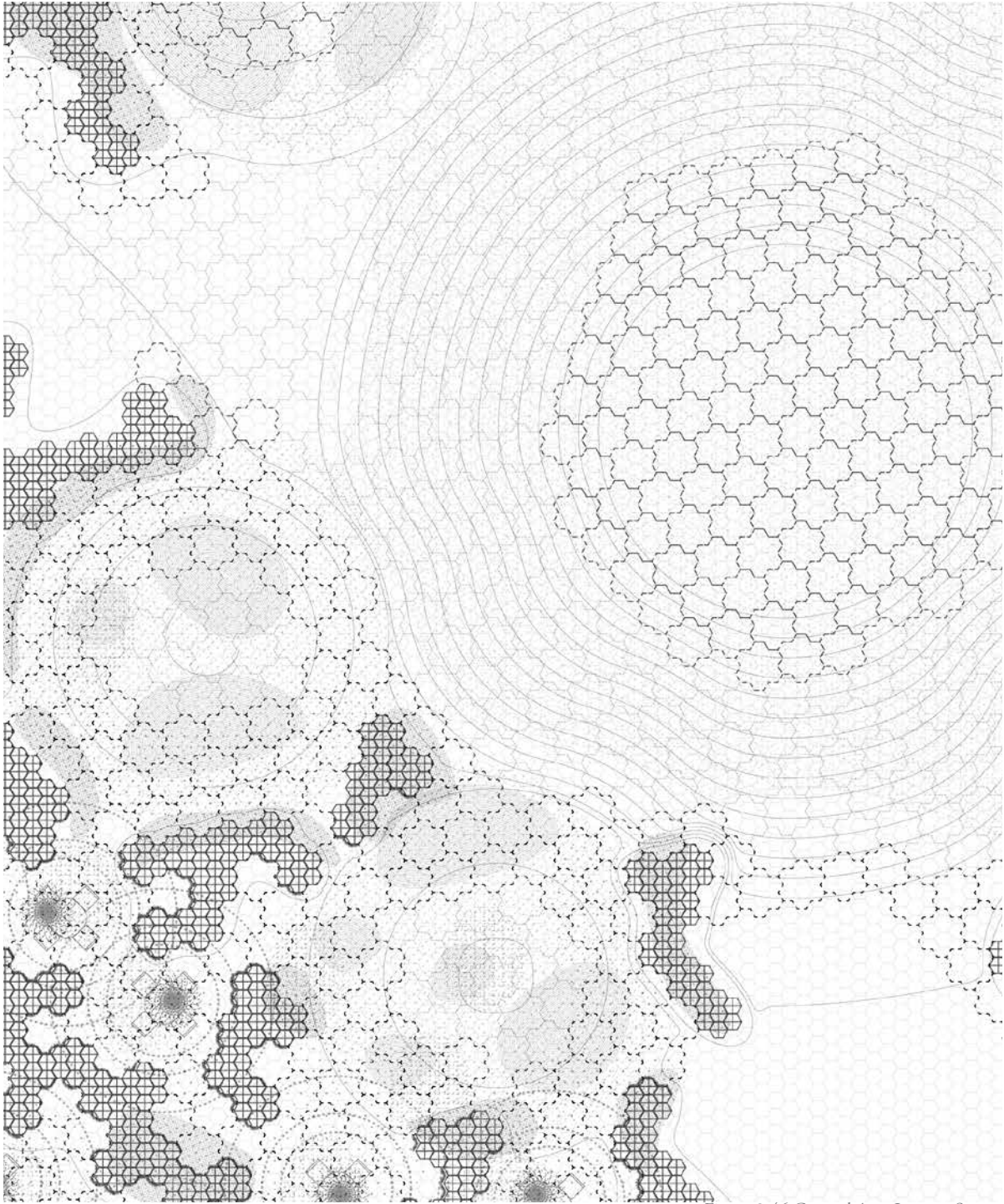
liminal matter

Figure 3.45 Diffuse, Responsive Dining Environment

## 2 + 3: Lounge and Lay , Major Event Space

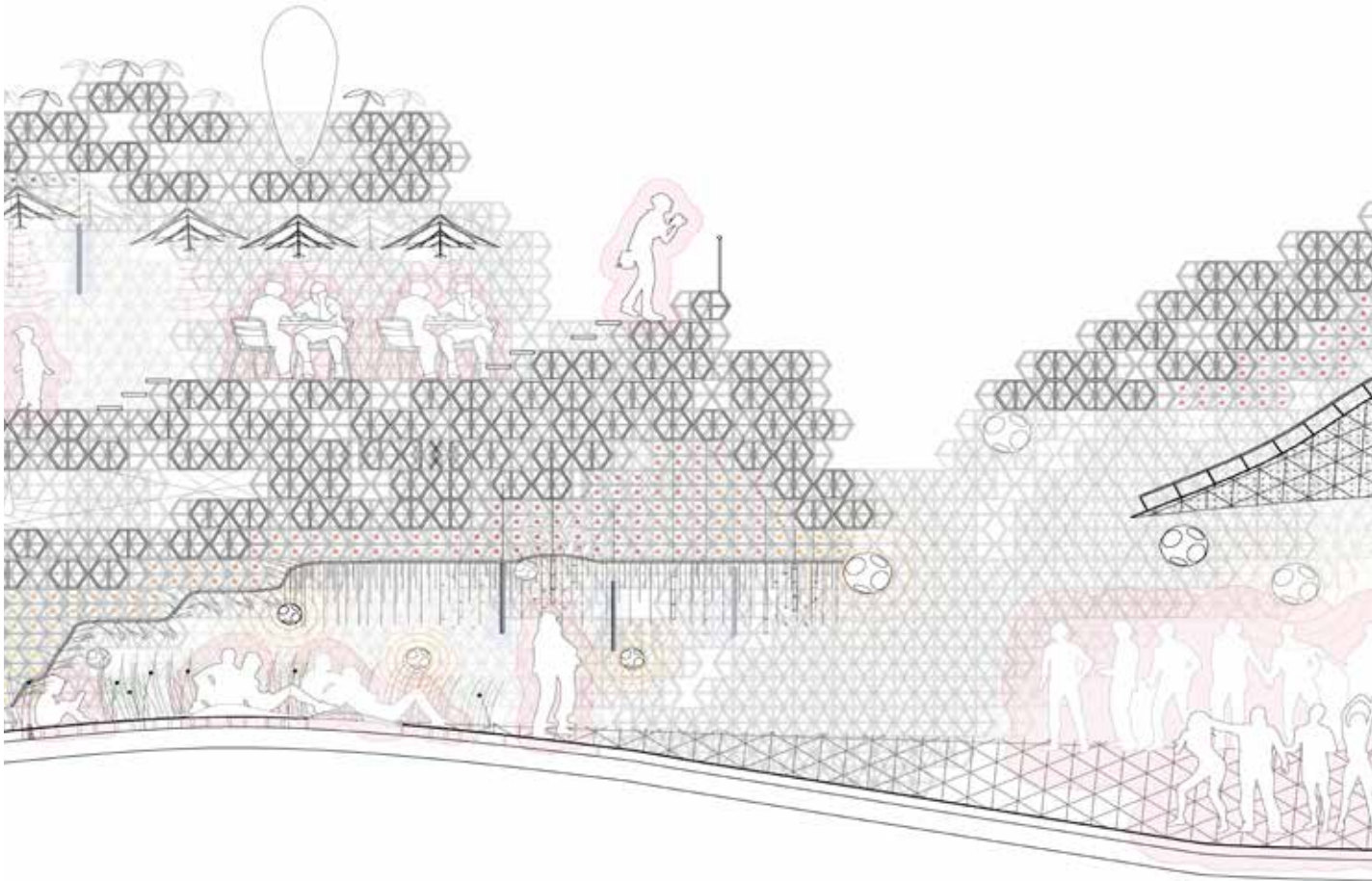
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Lounge and Lay spaces are scattered throughout the space, generally in proximity to the major event area, allowing for passive engagement in active events. The spaces allow for groups of varying temperments to relax and to recline in the ways they prefer. Inflatable pillows are inserted throughout the surface, allowing for soft, changeable landscapes for various groups and body positions. Audio, Thermal, and Light components mingle with planted vegetation, creating unique oases throughout the square.



liminal matter

Figure 3.46 Ground Area Lounge Spaces



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Figure 3.47 Lounge and Lay, Major Event



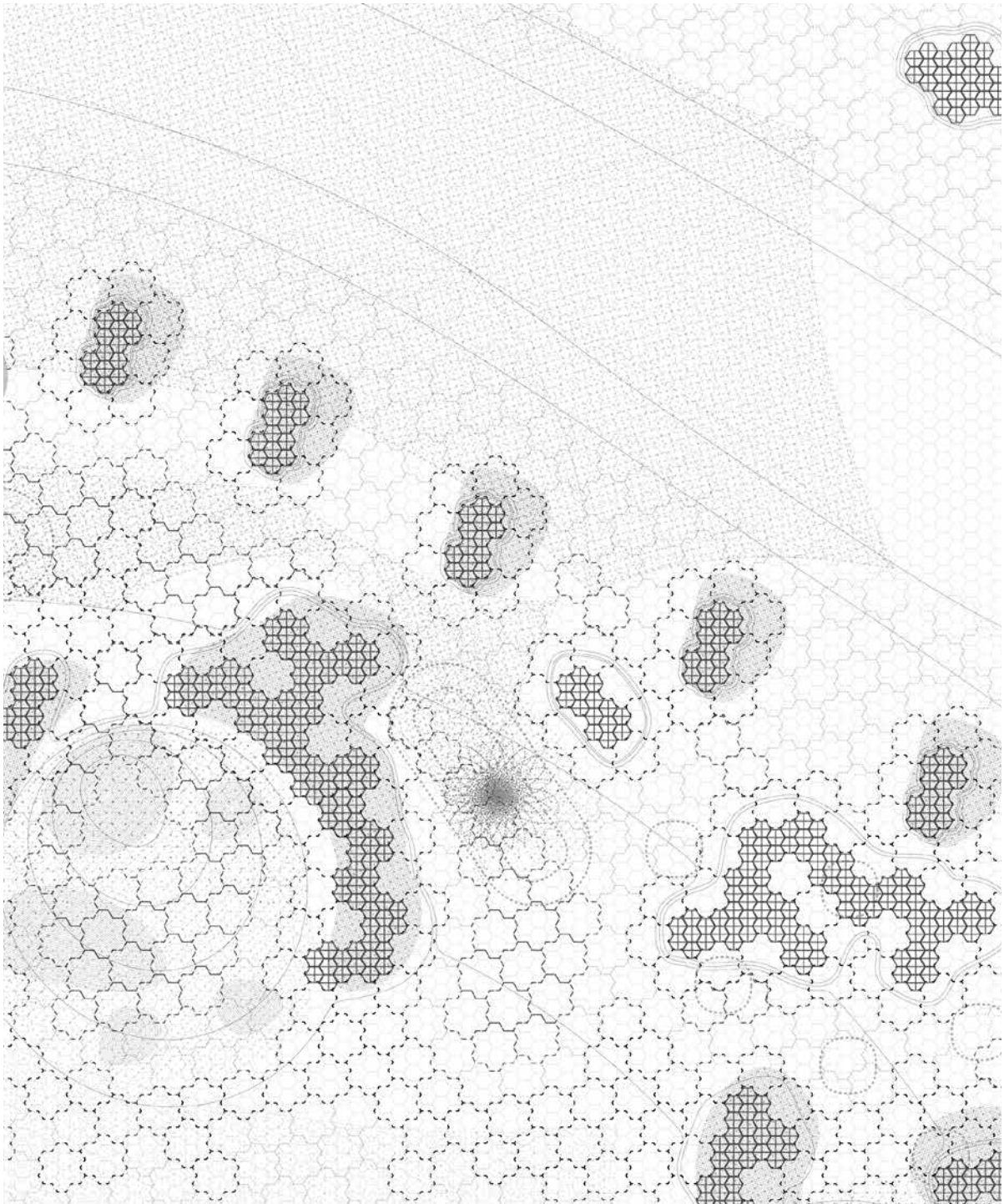


Figure 3.48 Enjoying a Free Show

## 4 + 5: Market and Transit Area

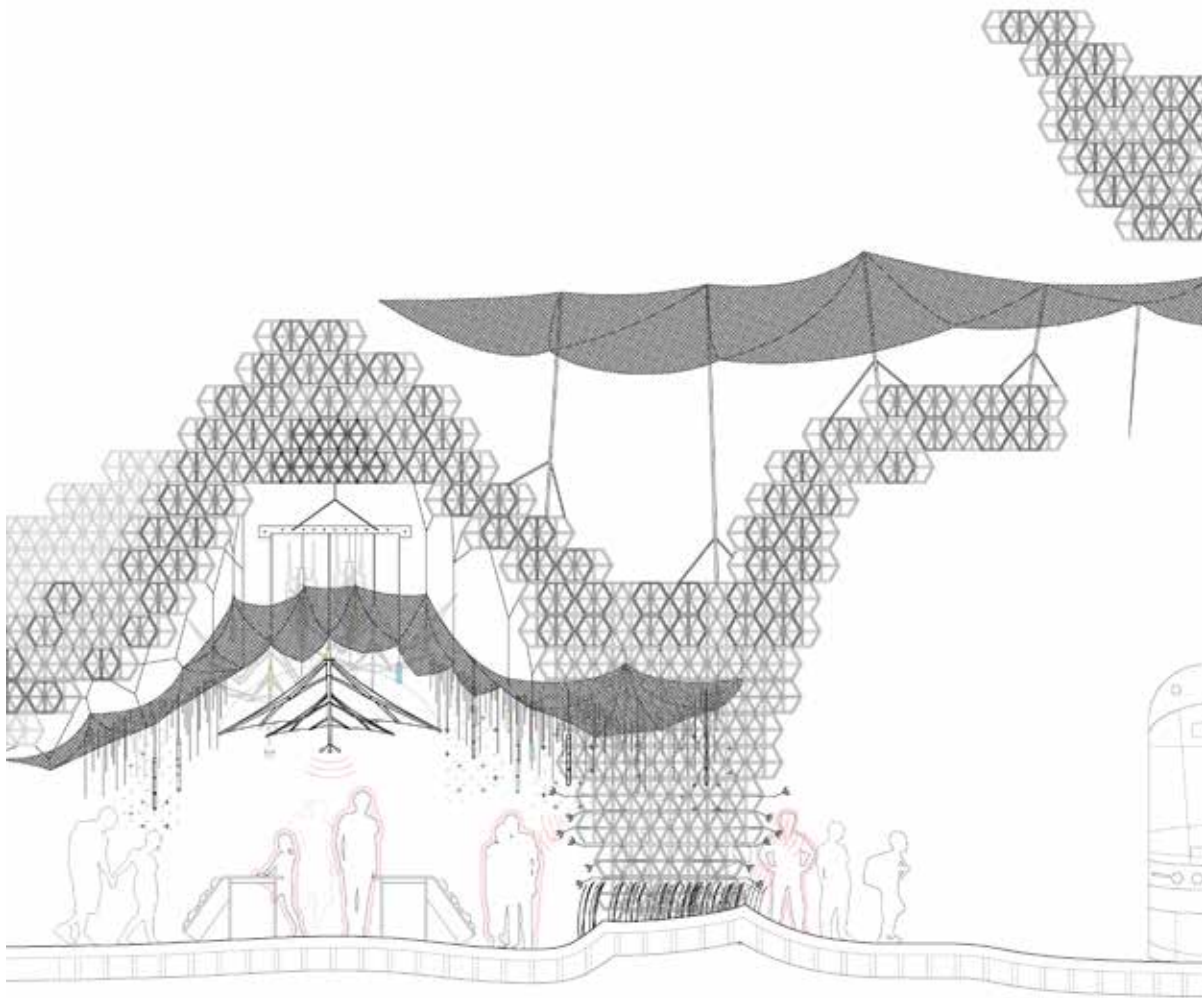
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The North side of the site hosts the major East-West path through the square. This is where Public Transit systems and Bicycle Paths can be found. This area is also immediately adjacent to a zone designated for makeshift market stalls that could house farmers markets, craft sales or hacker culture seminars. An area that promotes the exchange of local knowledge and local goods. An area that connects the space to others of the city in many ways.



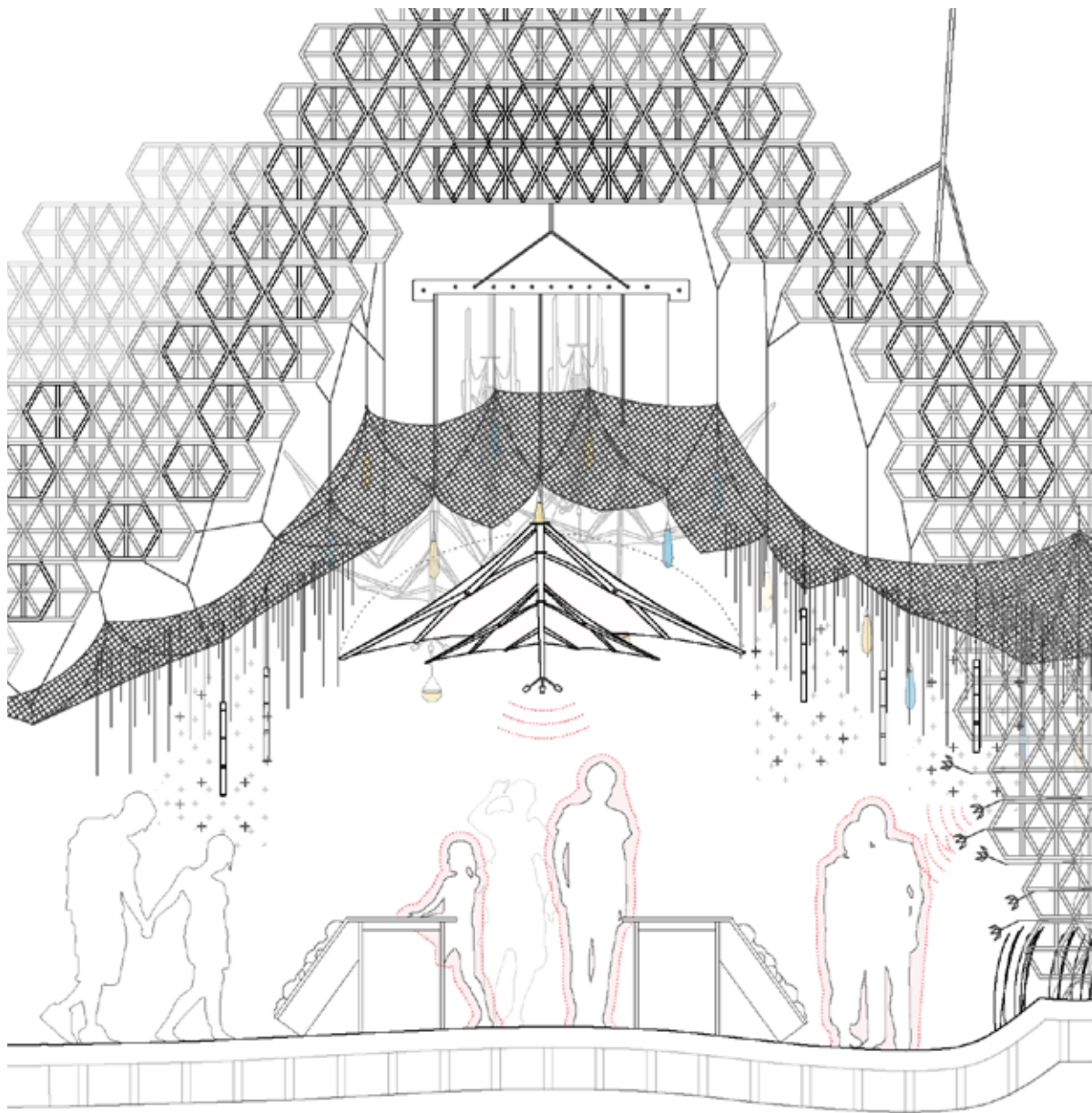
liminal matter

Figure 3.49 North Ground Station and Market Area



Synthesis

Figure 3.50 Market Vendors, Individuals Waiting for the Streetcar



liminal matter

Figure 3.51 An Amalgam of Components  
Shape the Occupant Experience



Figure 3.52 Bicycles Pass, The Streetcar Arrives, People are Waiting

## Conclusion

### Ethics and Accountability for Architecture in the Digital Age

I unexpectedly found myself sitting beside a professor at a large group celebration immediately preceding a colleagues' M.Arch defence. This professor, surprisingly enough, was someone I had not spent much time talking to in all the years we shared a campus. It is correct to say that we knew of one another, but the desire to approach him never occurred. Now, here we sat at this table, in a pub, amidst one of the more cacophonous nights this place had probably experienced in months.

After having seated, the conversation progressed towards a discussion around some of his new work. The pace started quickly and gained energy—only sputtering due to my occasional interjections—hoping for the repetition of names I had never heard, in an accent that I had not quite grasped, in a place that was none too quiet. He spoke immediately of his trips to Auschwitz. Each time he visits the concentration camp, he asks his companions to pair up and for one person to stand on either side of the barbed wire fence lining the property edge. This fence becomes the thorny lens for the participants on either side, staring across to the other person, in a moment characterized as “the reverse gaze.”

“And that is what this new book is about...”

My mind returns to the pub, having found myself attempting to fathom the details of this moment—not in order to collect this experience, but to understand what was being said to me. The professor continued energetically on the power of empathy, of how building and space can empower these emotions when it is treated as a “thou” rather than an “it.” He speaks of his disdain for the seductive and numbing powers of sight. How our culture exploits it, and in turn dampens the other senses. He speaks again of the concentration camps and how he instructs complete strangers to walk through the site, through periods of darkness, with their hands grasped tightly together.

“The breach of personal space is intentional.”

He goes on. His words dance over references: Rilke's *Torso of Apollo*, Medieval Gothic Cathedrals and Lacan's *Philosophy of the Gaze* stitched into the sculptural pedagogy of Auguste Rodin. But really, none of it was ever just about the work. It was about a way of thinking, a way of seeing. These lessons all encourage one to encounter their surroundings with a fresh outlook. To look closer; not simply in distance, but in all senses of the word. To yearn to know more and to search for new perspective.

And just as quickly as he began, it seemed he was off, with urgency. One conversation fumbled into another as acquaintances joined the table. The same colleague who initiated the first conversation began again, this time

Perhaps one day you touch the young  
branch  
of something beautiful. & it grows & grows  
despite your birthdays & the death  
certificate,  
& it one day shades the heads of something  
beautiful  
or makes itself useful to the nest. Walk out  
of your house, then, believing in this.  
Nothing else matters.

All above us is the touching  
of strangers & parrots,  
some of them human,  
some of them not human.

Listen to me. I am telling you  
a true thing. This is the only kingdom.  
The kingdom of touching;  
the touches of the disappearing, things.<sup>xviii</sup>



inquiring about a lecture *On Presence* we had seen less than an hour earlier...

\*\*\*

This conversation touched on the important notion that the Architect must champion empathy. They must possess the ability to understand, not strictly in agreement, but through allowing oneself to see a different perspective. This different perspective is about searching for what is not easily rendered tangible, and it means allowing oneself to be vulnerable. It is a violation of personal space. It's about connecting with our surroundings and allowing "it's" to become "thou's."

The concept of the reverse gaze relates to the idea of the environment as companions rather than slaves or objects. Donna Haraway speaks of the role of "significant otherness" in her *Companion Species Manifesto*, as it modifies the behavioural qualities of both subject and object.<sup>[57]</sup> The reverse gaze can be likened to studies in empathy and the scientific discovery of mirror neurons. Research found that the same synapses would fire in the brain of an individual viewing a person experiencing pain, as in the person experiencing the pain themselves.<sup>[58]</sup> A sensor based, responsive architecture could embody empathy and furthermore accountability as an attempt to establish behavioural change in the human-environment relationship. A human-environment relationship that activates a greater collective, aimed at cultivating social-emotional learning.<sup>[59]</sup>

The view of responsive architecture as a "companion animal" is realistic in a period of time where the technological evolutions of industrial designed appliances have augmented reality into a "cyborg" state. Referring again to the *Companion Species Manifesto*, cyborgs— with their historical congealings of the machinic and the organic and the inorganic in the codes of information, where boundaries are less about skin than about statistically defined densities of signal and noise— fit within the taxon of companion species.<sup>[60]</sup>

Human and nature are less removed from one another than previously assumed. Beyond that, they are delineated through their equal effect on culture. Donna Haraway references Andy Goldsworthy's artwork *Arch* as an art of nature cultures:

The relation is the smallest unit of analysis, and the relation is about significant otherness at every scale. That is the ethic, or perhaps better, mode of attention...<sup>[61]</sup>

The two major points of contention are as follows,

1. The relation between what counts as nature and what counts as culture in Western discourse and it's cousins, and 2. the correlated issue of who and what counts as an actor. These things matter for political, ethical and emotional action in techno culture.<sup>[62]</sup>

Maybe it is a human disservice to build such finite and robust structures by creating separations rather than loose boundaries and teasing thresholds. The development of architecture can work alternatively to “nature” and “environment” remediation, a contemporary method in favour of sterility. It is possible to operate within a reciprocal relationship between a given context and the collective inhabitants. Time, seasons, weather and temperament become friends in the dance between collective effects.

Architectural environments can be considered fragile yet robust, like the sturdy weathered trunks of trees whose leaves are shed and grown in annual cycle. Such an environment can encourage a connected awareness of the building environment and flows of energy. For this to happen, the architect must acknowledge and deliberately designing spaces that are vulnerable—that allow people to feel vulnerable. Referencing *The Companion Species Manifesto*, love provides this opportunity for a sensitive and considerate spatial arrangement:

Love, commitment, and yearning for skill with another not zero sum games...Acts of love like training...breed acts of love like caring about and for other concatenated, emergent worlds.<sup>[63]</sup>

If each person can learn to love the surrounding environment as a companion, it opens a new realm of understanding for the development of the cities of the future. Love and companionship is linked to the power of the gaze, and so, to return to its power in the words of Pierre Teilhard de Chardin,

And that, doubtless, is why the history of the living world can be summarised as the elaboration of ever more perfect eyes within a cosmos in which there is always something more to be seen. After all, do we not judge the perfection of an animal, or the supremacy of a thinking being, by the penetration and synthetic power of their gaze? To try to see more and better is not a matter of whim or curiosity or self-indulgence. To see or to perish is the very condition laid upon everything that makes up the universe, by reason of the mysterious gift of existence. And this, in superior measure, is man's condition.<sup>[64]</sup>

Architecture and public space will no longer stand to exist in a one-way relationship between itself and its occupants. Instead, it will keep its gaze fixed on actively engaging with the living world.

"Confuse the sacred and the secular in your environment. Create a liminal, neither here nor there, milieu. It is always in the liminal places that significant things happen, so work at creating liminality."<sup>xxiv</sup>

“Where does all this lead? It leads to a vision (just out of reach, soon attainable). It is an architecture that dovetails into the site beyond an anthropocentric scale but at ecological scales, microcosmic and cosmoscopic scales. An architecture that has the capacity to reboot torn ecologies with helpful architectonic scaffolds, which dismantle themselves when all is well again. An architecture that traps more carbon than its environmental footprint. An architecture that contributes to the health of its users and environment. An architecture that hasn’t forgotten history, or how we are all different. An architecture that rejoices in that difference. An architecture whose exquisite tailoring is imbued with nuances that resonate with familiar and non-familiar worlds. An architecture that knows where it is and why it is and what it has to offer, but doesn’t deny its difference and ours.

This surely must be any architect’s goal in the 21st century—a goal that denies ill-fitted containers and the design of objects as obstacles. Architecture that digitally, historically, uncannily and ecologically doesn’t FORGET. An architecture led by structural expedience seldom delivers the rich tapestry of multivalent parameters so desperately needed in today’s fast-moving world.”<sup>[65]</sup>

“I know I am talking nonsense, but I’d rather go rambling on, and partly expressing something I find it difficult to express, than to keep on transmitting faultless platitudes.”<sup>xv</sup>

## End Notes

### FRONT MATTER

1. Stephen Emmott. *Ten Billion*. Vintage, 2013. Non-page.
2. Michelle Addington. "Architecture of Contingency." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley (Cambridge, Ontario: Riverside Architectural Press, 2010) 68.
3. Neil Leach. *The Anaesthetics of Architecture* (Cambridge, Massachusetts: MIT Press, 1999) vii.
4. Jeremy Rifkin. "Introduction." In *The Empathic Civilization: The Race to Global Consciousness in a World in Crisis* (New York: J.P. Tarcher/Penguin, 2009) 1.
5. Donna Jeanne Haraway. "Species." In *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003) 24-25.
6. Neil Spiller, "NEIL SPILLER: The Great Forgetting," *Lebbeus Woods*, July 16, 2010, accessed January 11, 2015, <https://lebbeuswoods.wordpress.com/2010/07/17/neil-spiller-the-great-forgetting/>.
7. Michelle Addington. "Architecture of Contingency." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley (Cambridge, Ontario: Riverside Architectural Press, 2010) 67.
8. Louis Khan. "Silence and Light, 1969." In *Theories and Manifestoes of Contemporary Architecture*, edited by Charles Jencks (Chichester, West Sussex: Academy Editions, 1997) 237.
9. James Corner ref. David Harvey "Terra Fluxus." In *The Landscape Urbanism Reader*, edited by Charles Waldheim (New York: Princeton Architectural Press, 2006) 28-29.
10. *ibid.*

### FRONT MATTER NOTES

- i. "Liminal." Merriam-Webster. Accessed January 11, 2015.
- ii. Victor W Turner. *From Ritual to Theatre: The Human Seriousness of Play* (New York City: Performing Arts Journal Publications, 1982) 113.
- iii. "Matter." Merriam-Webster. Accessed January 11, 2015.
- iv. Neeraj Bhatia, "Crazy-Radical Soft Architecture, From The 1950s To Today," *Architizer*, August 7, 2013, accessed January 11, 2015, <http://architizer.com/blog/soft-architecture/>.
- v. Jeremy Rifkin. "The Hidden Paradox of Human History." In *The Empathic Civilization: The Race to Global Consciousness in a World in Crisis* (New York: J.P. Tarcher/Penguin, 2009) 12.

### UNDERSTANDING THE BODY IN SPACE

1. Indra Kagis McEwen ref. Vitruvius. "The Body Beautiful: Venus, Venustas." *Vitruvius: Writing the Body of Architecture* (Cambridge, Mass.: MIT, 2003) 198.
2. Juhani Pallasmaa. "Part 2." *The Eyes of the Skin: Architecture and the Senses*. (Chichester: Wiley-Academy, 2005) 38.
3. Kenneth Clark. *The Nude: A Study in Ideal Form*. (New Edition ed. London: Folio Society, 2010) 134-135.
4. An explanation for his inefficient discus throwing could be that the ancient Olympic sportsmen had a set rotation of three quarters before the discus was thrown. This rotation could well have been a deliberate handicap to make the sport more difficult, *Discobolus*, March 25, 2015, accessed November 13, 2015, <http://en.wikipedia.org/wiki/Discobolus>.
5. William Harlan Hale. *World of Rodin, 1840-1917* (Time-Life Library of Art ed. New York: Time-Life Books, 1973) 76.
6. Rachel Gershman, "Constantin Brancusi Synopsis," *Constantin Brancusi Biography, Art, and Analysis of Works*, accessed December 20, 2014.
7. Sanford Kwinter, and Umberto Boccioni. "Landscapes of Change: Boccioni's 'Stati D'animo' as a General Theory of Models." *Assemblage 19* (Cambridge, Mass.: MIT Press, 1992) 52-53.
8. Richard Padovan ref. Le Corbusier, "The Modulor". *Proportion Science, Philosophy, Architecture*. (London: E & FN Spon, 1999) 320.

9. Léopold Lambert, "#ARCHITECTURAL THEORIES /// A Subversive Approach to the Ideal Normalized Body," *The Funambulist*. April 29, 2012, accessed January 10, 2015, <http://thefunambulist.net/2012/04/29/architectural-theories-a-subversive-approach-to-the-ideal-normalized-body/>
10. William Wilson, "Oskar Schlemmer: Bauhaus' Mr. Clean," *Los Angeles Times*, September 14, 1986, accessed January 11, 2015, [http://articles.latimes.com/1986-09-14/entertainment/ca-12135\\_1\\_arnold-l-lehman](http://articles.latimes.com/1986-09-14/entertainment/ca-12135_1_arnold-l-lehman).
11. Ann Hutchinson Guest, and Doug Anderson. *Labanotation; Or, Kinetography Laban; the System of Analyzing and Recording Movement*. 4th Rev. and Expanded ed. (New York: Theatre Arts Books, 2005)
12. Michelle Addington. "Architecture of Contingency." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley (Cambridge, Ontario: Riverside Architectural Press, 2010) 67.
13. Pierre Teilhard de Chardin, and Julian Huxley. *The Phenomenon of Man*. (New York: Harper, 1959) 13.
14. Harry Francis Mallgrave. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 77.
15. Gary Wolf. "Antephase," *Quantified Self*, accessed April 12 2014, <http://antephase.com/quantifiedself>.
16. Henry Markram. "A Brain in a Supercomputer." *TED*. July 1, 2009, accessed January 11, 2015. [https://www.ted.com/talks/henry\\_markram\\_supercomputing\\_the\\_brain\\_s\\_secrets](https://www.ted.com/talks/henry_markram_supercomputing_the_brain_s_secrets).
17. Matt Richtel. "Attached to Technology and Paying a Price." *The New York Times*. June 6, 2010, accessed January 11, 2015, [http://www.nytimes.com/2010/06/07/technology/07brain.html?\\_r=0](http://www.nytimes.com/2010/06/07/technology/07brain.html?_r=0).
18. Arendt, Hannah. *The Human Condition* (Chicago: University of Chicago Press, 1958) 39.
19. Henry Markram, "A Brain in a Supercomputer," *TED*. July 1, 2009, accessed January 11, 2015, [https://www.ted.com/talks/henry\\_markram\\_supercomputing\\_the\\_brain\\_s\\_secrets](https://www.ted.com/talks/henry_markram_supercomputing_the_brain_s_secrets).
20. Ted Krueger. "Emotional Architectures." In *Euphoria & Dystopia: The Banff New Media Institute Dialogues* (Canada: Banff Centre Press, Riverside Architectural Press, 2012) 403.
21. Canadian Nurse, "Healing by Design," June 1, 2013, accessed January 11, 2015. <http://canadian-nurse.com/en/articles/issues/2013/june-2013/healing-by-design>.
22. Ontario Ministry of Economic Development, Employment and Infrastructure, "Make Your Website Accessible," November 26, 2014, accessed January 9, 2015. [http://www.mcsc.gov.on.ca/en/mcsc/programs/accessibility/info\\_sheets/info\\_comm/website.aspx](http://www.mcsc.gov.on.ca/en/mcsc/programs/accessibility/info_sheets/info_comm/website.aspx).
23. Robin Harvey, "It Takes a Village - Canadian Mental Health Association, Ontario Division," *Canadian Mental Health Association Ontario Division*, accessed January 9, 2015, <http://ontario.cmha.ca/network/it-takes-a-village/>.
24. Harry Francis Mallgrave ref. Giacomo Rizzolatti and Corrado Sinigaglia. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 77.
25. Harry Francis Mallgrave. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 83.
26. Harry Francis Mallgrave ref. Sjoerd J. H. Ebisch et al. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 83.
27. Mallgrave, Harry Francis. "Cognition in the Flesh...The Human in Design." Edited by Tyler Stevermer. *Thresholds 42* (2014): 84.
28. *ibid.* 84.
29. Harry Francis Mallgrave ref. Donald O. Hebb. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 79.
30. Harry Francis Mallgrave. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 79.

31. *ibid.* 79.
32. Christie Nicholson, "Q&A: New Evidence Shows Brain-training Games Don't Work," *SmartPlanet*, May 28, 2012, accessed January 11, 2015, <http://www.zdnet.com/article/qa-new-evidence-shows-brain-training-games-dont-work/>. There is ongoing research about the successes of these systems. For in depth reading of fluid intelligence with memory training, please see: Jaeggi, Susanne, Martin Buschkuhl, John Jonides, and Walter Perrig. "Improving Fluid Intelligence with Training on Working Memory," proceedings of the National Academy of Sciences of the United States of America.
33. Paul Allen, and Mark Greaves, "Paul Allen: The Singularity Isn't Near," *MIT Technology Review*. October 12, 2011, accessed January 11, 2015, <http://www.technologyreview.com/view/425733/paul-allen-the-singularity-isnt-near/>.
34. Harry Francis Mallgrave ref. Sue Ramsden et al. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 80.
35. Harry Francis Mallgrave. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 81.
36. *ibid.*
37. Harry Francis Mallgrave ref. Lisa Feldman Barrett. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 81.
38. Harry Francis Mallgrave ref. A.J Blood and Robert J. Zatorre. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 81.
39. Harry Francis Mallgrave. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 81.
40. *ibid.*
41. Juhani Pallasmaa, "Space, Place, and Atmosphere: Peripheral Perception in Existential Experience." In *Architectural Atmospheres: On the Experience and Politics of Architecture*, edited by Christian Borch (Basel: Birkhauser, 2014) 20.
42. Harry Francis Mallgrave ref. Robert Vischer. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 82.
43. Harry Francis Mallgrave. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 82.
44. Harry Francis Mallgrave ref. Heinrich Wölfflin. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 82.
45. Harry Francis Mallgrave. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 80.
46. Marshall McLuhan, and Quentin Fiore. *The Medium Is the Massage*. (New York: Bantam Books, 1967) 184.
47. Sean Lally, and Jessica Young. "Preface: The Stuff Between, In & Around." In *Softspace: From a Representation of Form to a Simulation of Space* (Abingdon, Oxon: Routledge, 2007) non-page.
48. Philip Beesley ref. Titus Lucretius Carus. "Introduction: Liminal Responsive Architecture." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley (Cambridge, Ontario: Riverside Architectural Press, 2010) 12.
49. Sanford Kwinter, and Umberto Boccioni. "Landscapes of Change: Boccioni's 'Stati D'animo' as a General Theory of Models." *Assemblage 19* (Cambridge, Mass.: MIT Press, 1992) 52-53.
50. Pierre Teilhard de Chardin, and Julian Huxley. *The Phenomenon of Man*. (New York: Harper, 1959) 42.
51. Sean Lally. *The Air from Other Planets: A Brief History of Architecture to Come*. (Zurich: Lars Muller Publishers, 2014) 98.
52. Alex Grey. "Bio." accessed 12 Apr. 2014. <http://alexgrey.com/bio/>.
53. Lally, Sean ref. Jeff Kipnis, "The Cunning of Cosmetics". "Material Energies: Auras." *Air from Other Planets: A Brief History of Architecture to Come*. 98. Zurich: Lars Muller Publishers, 2014.
54. Sean Lally ref. Jeff Kipnis. *The Air from Other Planets: A Brief History of Architecture to Come*. (Zurich: Lars Muller Publishers, 2014) 100.
55. *ibid.* 148.
56. Alain de Botton. *The Architecture of Happiness*. (New York: Pantheon Books, 2006)

- 17.
57. William J. Mitchell. *Me++, the Cyborg Self and the Networked City* (Cambridge, Mass.: MIT Press, 2003) 23.
58. Carey Wolfe ref. Niklas Luhmann. "Queasy Posthumanism: Hylozoic Ground." In *Hylozoic Ground: Liminal Responsive Architecture*: compiled by Philip Beesley (Cambridge, Ont.: Riverside Architectural Press, 2010) 60.
59. Sean Lally. *The Air from Other Planets: A Brief History of Architecture to Come*. (Zurich: Lars Muller Publishers, 2014) 72.
60. *ibid.* 71.
61. *ibid.* 148.
62. *ibid.* 112.
63. Reyner Banham. "Environmental Management." In *The Architecture of the Well-tempered Environment* (Chicago: University of Chicago, 1969) 18-20.
64. Jan Gehl ref. Edward T. Hall. "Senses and Scale." In *Cities for People*. (Washington, DC: Island Press, 2010) 33.
65. Pierre Teilhard de Chardin, and Julian Huxley. *The Phenomenon of Man*. (New York: Harper, 1959) 63.
66. Carey Wolfe ref. Niklas Luhmann. "Queasy Posthumanism: Hylozoic Ground." In *Hylozoic Ground: Liminal Responsive Architecture*: compiled by Philip Beesley (Cambridge, Ont.: Riverside Architectural Press, 2010) 61.
67. *ibid.* 61
68. Jan Gehl ref. Edward T. Hall. "Senses and Scale." In *Cities for People*. (Washington, DC: Island Press, 2010) 33-54.
69. William J. Mitchell. "Being There." In *City of Bits: Space, Place, and the Infobahn*, (Cambridge, Mass.: MIT Press, 1995) 47.
70. Matt Johnson ref. Claude Bernard, "The Milieu Interieur." In *Thresholds 42*, edited by Tyler Stevermer. (Cambridge, Mass.: SA+P Press, 2014) 122.
71. Matt Johnson ref. Charles Gross, "The Milieu Interieur." In *Thresholds 42*, edited by Tyler Stevermer. (Cambridge, Mass.: SA+P Press, 2014) 122-123.
72. *ibid.* 123.
73. Banham, Reyner. "Environmental Management." In *The Architecture of the Well-tempered Environment* (Chicago: University of Chicago, 1969) 18-20.
74. Yves Klein, Peter Noever, and Los Angeles Architecture. *Yves Klein: Air Architecture*. (Ostfildern: Hatje Cantz, 2004)
75. Mariabruna Fabrizi. "The Possibility of an Immaterial Architecture: The Collaboration..." *SOCKS*. January 27, 2014. Accessed January 12, 2015. <http://socks-studio.com/2014/01/27/the-possibility-of-an-immaterial-architecture-the-collaboration-between-yves-klein-and-claude-parent/>.
76. Banham, Reyner. "Environmental Management." In *The Architecture of the Well-tempered Environment* (Chicago: University of Chicago, 1969) 18.
77. Danielle Wiley ref. William Mitchell. "The Urban Square: Remediating Public Space." *Stream: Culture, Politics, Technology 1, no. 1* (2008): 4.
78. Sean Lally. *The Air from Other Planets: A Brief History of Architecture to Come*. (Zurich: Lars Muller Publishers, 2014) 72.
79. Sean Lally ref. Michelle Addington. *The Air from Other Planets: A Brief History of Architecture to Come*. (Zurich: Lars Muller Publishers, 2014) 72.
80. *ibid.* 72.
81. Nicole's Systems Sites and Building ref. Michelle Addington. "Modernism Is Indeed Infatuated with the Idea of the Machine." October 3, 2010. Accessed January 12, 2015. <https://ndk4yx.wordpress.com/2010/10/04/modernism-is-indeed-infatuated-with-the-idea-of-the-machine/>.
82. Matt Johnson, "The Milieu Interieur." In *Thresholds 42*, edited by Tyler Stevermer. (Cambridge, Mass.: SA+P Press, 2014) 124.
83. Simon Sadler. *Archigram: Architecture without Architecture* (Cambridge, Mass.: MIT Press, 2005) 5.
84. Neeraj Bhatia, "Crazy-Radical Soft Architecture, From The 1950s To Today,"

- Architizer*, August 7, 2013, accessed January 11, 2015, <http://architizer.com/blog/soft-architecture/>.
85. Arcspace, "The Blur Building by Diller Scofidio Renfro," November 23, 2001, accessed January 12, 2015, <http://www.arcspace.com/features/diller-scofidio--renfro/blur-building/>.
86. Serpentine Galleries, "Catherine Mosbach - Phase Shift Park," July 13, 2012, accessed January 12, 2015, <https://vimeo.com/45696535>.
87. Sean Lally. "EOS." *WEATHERS / Sean Lally*. Accessed January 12, 2014. <http://www.weathers.cc/EOS>.
88. Matt Johnson, "The Milieu Interieur." In *Thresholds 42*, edited by Tyler Stevermer. (Cambridge, Mass.: SA+P Press, 2014) 129.
89. *ibid.* 131.
90. Matt Johnson ref. Bruno Latour, "The Milieu Interieur." In *Thresholds 42*, edited by Tyler Stevermer. (Cambridge, Mass.: SA+P Press, 2014) 127.
91. Matt Johnson, "The Milieu Interieur." In *Thresholds 42*, edited by Tyler Stevermer. (Cambridge, Mass.: SA+P Press, 2014) 125.

#### UNDERSTANDING THE BODY IN SPACE: NOTES

- i. Sanford Kwinter, and Umberto Boccioni. "Landscapes of Change: Boccioni's 'Stati D'animo' as a General Theory of Models." *Assemblage 19* (Cambridge, Mass.: MIT Press, 1992) 52-53.
- ii. Harry Francis Mallgrave ref. Joseph Ledoux. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 80.
- iii. Merleau-Ponty, Maurice. "Preface." In *Phenomenology of Perception*, edited by Ted Honderich (London: Routledge & Kegan Paul, 1962) vii.
- iv. Alex Grey. "Bio." accessed 12 Apr. 2014. <http://alexgrey.com/bio/>.

#### UNDERSTANDING THE PRESENCE OF OTHERS

1. Donna Jeanne Haraway. "Donna Haraway, "A Cyborg Manifesto Science, Technology, and Socialist-Feminism in the Late Twentieth Century," in *Simians, Cyborgs and Women: The Reinvention of Nature* (New York; Routledge, 1991) 149-181.
2. William J. Mitchell, *Me++ : The Cyborg Self and the Networked City* (Cambridge, Massachusetts; London: MIT Press, 2003) 168.
3. Online Etymology Dictionary "Online Etymology Dictionary." accessed March 22, 2015. <http://www.etymonline.com/index.php?term=machine>.
4. *ibid.*
5. *ibid.*
6. Dustyn Roberts. "Introduction to Mechanisms and Machines." In *Making Things Move: DIY Mechanisms for Inventors, Hobbyists, and Artists* (New York: McGraw-Hill, 2010) 3.
7. Marshall McLuhan. *Understanding Media: The Extensions of Man* (London and New York: Routledge, 1964) 18.
8. William J. Mitchell, *Me++ : The Cyborg Self and the Networked City* (Cambridge, Massachusetts; London: MIT Press, 2003) 168.
9. Clynes, Manfred E., and Nathan S. Kline. "Cyborgs and Space." *Astronautics* (1960) 26.
10. Amber Case, "We Are All Cyborgs Now," *TED*, accessed March 22, 2014, [http://www.ted.com/talks/amber\\_case\\_we\\_are\\_all\\_cyborgs\\_now?language=en](http://www.ted.com/talks/amber_case_we_are_all_cyborgs_now?language=en).
11. Matt Johnson ref. Antoine Picon, "The Milieu Interieur." In *Thresholds 42*, edited by Tyler Stevermer. (Cambridge, Mass.: SA+P Press, 2014) 83.
12. MacLuhan, Marshall. *The Medium Is the Message* (Corte Madera: Gingko Press, 2005) 18.
13. Donna Jeanne Haraway. "Donna Haraway, "A Cyborg Manifesto Science, Technology, and Socialist-Feminism in the Late Twentieth Century," in *Simians, Cyborgs and Women: The Reinvention of Nature* (New York; Routledge, 1991) 149-181.
14. Michelle Addington. "Architecture of Contingency." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley (Cambridge, Ontario: Riverside Architectural Press, 2010) 67.
15. Corner, James. "Eidetic Operations and New Landscapes." In *Recovering Landscape: Essays in Contemporary Landscape Architecture* (New York: Princeton Architectural Press, 1999) 155.



16. *ibid.* 158.
17. Michelle Addington. "Architecture of Contingency." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley (Cambridge, Ontario: Riverside Architectural Press, 2010) 67.
18. Ray Kurzweil. *How to Create a Mind: The Secret of Human Thought Revealed* (New York: Viking, 2012) 6.
19. Hannah Arendt. "The Public and Private Realm." In *The Human Condition*. (Chicago: University of Chicago Press, 1958) 22.
20. *ibid.* 23.
21. Pierre Teilhard de Chardin, and Julian Huxley. *The Phenomenon of Man*. (New York: Harper, 1959) 34.
22. Martin Pawley. *The Private Future: Causes and Consequences of Community Collapse in the West* (New York: Random House, 1974) 11.
23. Steven Pinker and Rebecca Newberger Goldstein, "The Long Reach of Reason," *TED*, February 1, 2012, accessed March 22, 2015, [https://www.ted.com/talks/steven\\_pinker\\_and\\_rebecca\\_newberger\\_goldstein\\_the\\_long\\_reach\\_of\\_reason?language=en](https://www.ted.com/talks/steven_pinker_and_rebecca_newberger_goldstein_the_long_reach_of_reason?language=en).
24. Jeremy Rifkin. "Introduction." In *The Empathic Civilization: The Race to Global Consciousness in a World in Crisis* (New York: J.P. Tarcher/Penguin, 2009) 2.
25. Ray Kurzweil. "KurzweilAI | Accelerating Intelligence," *KurzweilAI The Law of Accelerating Returns*, March 7, 2001, accessed March 22, 2013, <http://www.kurzweilai.net/the-law-of-accelerating-returns>.
26. Jeremy Rifkin. "Introduction." In *The Empathic Civilization: The Race to Global Consciousness in a World in Crisis* (New York: J.P. Tarcher/Penguin, 2009) 30.
27. Pierre Teilhard de Chardin, and Julian Huxley. *The Phenomenon of Man*. (New York: Harper, 1959) 34.
28. Alan Watts. *The Book; on the Taboo against Knowing Who You Are* (New York: Pantheon Books, 1966) 9.
29. Pierre Teilhard de Chardin, and Julian Huxley. *The Phenomenon of Man*. (New York: Harper, 1959) 105.
30. Harry Francis Mallgrave ref. Evan Thompson. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer (Cambridge, Mass.: SA+P Press, 2014) 76.
31. *ibid.* ref. James Gibson, George Lakoff and Mark Johnson. 77.
32. Jeremy Rifkin. "Introduction." In *The Empathic Civilization: The Race to Global Consciousness in a World in Crisis* (New York: J.P. Tarcher/Penguin, 2009) 29.
33. *ibid.*
34. *ibid.* ref. Edith Cobb. 40.
35. *ibid.* 41.
36. Danielle Wiley. "The Urban Square: Remediating Public Space." *Stream: Culture, Politics, Technology 1*, no. 1 (2008): 5.
37. Sean Lally. *The Air from Other Planets: A Brief History of Architecture to Come*. (Zurich: Lars Muller Publishers, 2014) 111-112.

#### UNDERSTANDING THE PRESENCE OF OTHERS NOTES

- i. William J. Mitchell, *Me++ : The Cyborg Self and the Networked City* (Cambridge, Massachusetts/London: MIT Press, 2003) 22.

#### THE LIVING CITY

1. Pierre Teilhard de Chardin, and Julian Huxley. *The Phenomenon of Man*. (New York: Harper, 1959) 111.
2. Rachel Armstrong, "Combined Advanced Technologies & Flexible Urban Infrastructures: Mapping the Landscape for Agile Design," *Organs Everywhere 4, Material Shifts*. 70.
3. Matt Richtel. "Attached to Technology and Paying a Price." *The New York Times*. June 6, 2010, accessed January 11, 2015, [http://www.nytimes.com/2010/06/07/technology/07brain.html?\\_r=0](http://www.nytimes.com/2010/06/07/technology/07brain.html?_r=0).
4. Andrew E. Benjamin. *Blurred Zones: Investigations of the Interstitial: Eisenman*

- Architects, 1988-1998* (New York: Monacelli Press, 2003) 6.
5. Neil Leach ref. Freud's late theory centered around the conflict between Eros and Thanatos. *The Anaesthetics of Architecture* (Cambridge, Massachusetts: MIT Press, 1999) 40-41.
6. Wiley, Danielle. "The Urban Square: Remediating Public Space." *Stream: Culture, Politics, Technology 1*, no. 1 (2008) 5.
7. Simon Sadler. *Archigram: Architecture without Architecture* (Cambridge, Mass.: MIT Press, 2005) 4.
8. Alex Wall. "Programming the Urban Surface." In *Recovering Landscape: Essays in Contemporary Landscape Architecture* (New York: Princeton Architectural Press, 1999) 235-236.
9. Neil Leach ref. Sadie Plant. *The Anaesthetics of Architecture* (Cambridge, Massachusetts: MIT Press, 1999) 56.
10. Baird, George. *The Space of Appearance*. (Cambridge, Mass.: MIT Press, 1995) 308.
11. *ibid.*
12. Simon Sadler. *Archigram: Architecture without Architecture* (Cambridge, Mass.: MIT Press, 2005) 5.
13. Neil Leach ref. Sadie Plant. *The Anaesthetics of Architecture* (Cambridge, Massachusetts: MIT Press, 1999) 58.
14. Neil Leach ref. Libero Andreotti and Xavier Costa. *The Anaesthetics of Architecture* (Cambridge, Massachusetts: MIT Press, 1999) 58.
15. Neil Leach ref. Ivan Chitchevlov. *The Anaesthetics of Architecture* (Cambridge, Massachusetts: MIT Press, 1999) 59.
16. Neil Leach. *The Anaesthetics of Architecture* (Cambridge, Massachusetts: MIT Press, 1999) 57.
17. Neil Leach ref. Guy Debord. *The Anaesthetics of Architecture* (Cambridge, Massachusetts: MIT Press, 1999) 59.
18. *ibid.*
19. Patrick Sykes. "A Long Way from Utopia: Planning Cities without the Citizen." *The Inkling*. accessed January 4, 2014. <http://www.theinklingmag.com/fields-buildings/planning-cities-without-the-citizen/>.
20. Neil Leach ref. Libero Andreotti and Xavier Costa. *The Anaesthetics of Architecture* (Cambridge, Massachusetts: MIT Press, 1999) 59.
21. Neil Leach ref. Baudrillard. *The Anaesthetics of Architecture* (Cambridge, Massachusetts: MIT Press, 1999) 59.
22. Alex Wall. "Programming the Urban Surface." In *Recovering Landscape: Essays in Contemporary Landscape Architecture* (New York: Princeton Architectural Press, 1999) 233-235.
23. George Baird. *The Space of Appearance*. (Cambridge, Mass.: MIT Press, 1995) 15.
24. Donna Jeanne Haraway. *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003) 62.
25. J. G. Ballard. "Thousand Dreams of Stellavista." In *Vermilion Sands* (New York, N.Y.: Carroll & Graf, 1988)
26. Armstrong, Rachel, "Combined Advanced Technologies & Flexible Urban Infrastructures: Mapping the Landscape for Agile Design," *Organs Everywhere 4, Material Shifts*. 70.
27. Donna Jeanne Haraway. *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003) 22-23.
28. Philip Beesley. "Introduction: Liminal Responsive Architecture." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley (Cambridge, Ontario: Riverside Architectural Press, 2010) 11.
29. *ibid.*
30. Neil Spiller. "Liberating the Infinite Architectural Substance." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley (Cambridge, Ontario: Riverside Architectural Press, 2010) 51.
31. *ibid.*
32. Tristan d'Estrée Sterk. "Building Upon Negroponte: A Hybridized Model of Control Suitable for A Responsive Architecture." In *eCAADe 21* (2003) 407.
33. Bob Sheil, and Stephen A. Gage. "The Wonder of Trivial Machines." In *Protoarchitecture:*

- Analogue and Digital Hybrids* (London: John Wiley, 2008) 17.
34. *ibid.*
35. *ibid.*
36. *ibid.* 18.
37. *ibid.*
38. Pickering, Andrew ref. Gordon Pask, 1971. *The Cybernetic Brain Sketches of Another Future* (Chicago: University of Chicago Press, 2010) 76.
39. *ibid.* 323.
40. *ibid.*
41. Margit Rosen. "Pask, Gordon: The Colloquy of Mobiles." *Media Art Net*. Accessed January 4, 2015.
42. Braitenberg, Valentino. *Vehicles, Experiments in Synthetic Psychology* (Cambridge, Mass.: MIT Press, 1984) 2.
43. *ibid.* 2.
44. *ibid.* 3.
45. *ibid.* 4-5.
46. *ibid.* 6.
47. *ibid.* 6-9.
48. *ibid.* 12.
49. *ibid.* 14.
50. *ibid.*
51. Neil Spiller. "Liberating the Infinite Architectural Substance." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley (Cambridge, Ontario: Riverside Architectural Press, 2010) 51.
52. *ibid.* ref. Chaucer, *The Canterbury Tales*. 52-53.
53. Brier, Soren ref. Bateson. "Information and Consciousness: A Critique of the Mechanistic Concept of Information." In *Cybernetics and Human Knowing* (1992)
54. Armstrong, Rachel, "Combined Advanced Technologies & Flexible Urban Infrastructures: Mapping the Landscape for Agile Design," *Organs Everywhere 4, Material Shifts*. 66.
55. *ibid.* 65.
56. Alain de Botton. *The Architecture of Happiness*. (New York: Pantheon Books, 2006) 10.
57. Michelle Addington. "Architecture of Contingency." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley (Cambridge, Ontario: Riverside Architectural Press, 2010) 71.
58. Sean Lally, and Jessica Young. "Preface: The Stuff Between, In & Around." In *Softspace: From a Representation of Form to a Simulation of Space* (Abingdon, Oxon: Routledge, 2007) non-page.

## NOTES

- i. Alex Wall. "Programming the Urban Surface." In *Recovering Landscape: Essays in Contemporary Landscape Architecture* (New York: Princeton Architectural Press, 1999) 233.
- ii. Neil Leach ref. Guy Debord. *The Anaesthetics of Architecture* (Cambridge, Massachusetts: MIT Press, 1999) 60.
- iii. *ibid.*
- iv. A. Gage, Stephen. "Constructing the User." *ACADIA 09: ReForm (2009)* 45.
- v. Neil Leach ref. Guy Debord. *The Anaesthetics of Architecture* (Cambridge, Massachusetts: MIT Press, 1999) 59.
- vi. *ibid.*
- vii. Merriam-Webster. Accessed June 29, 2014.

## SYNTHESIS

1. Kenniff, Thomas-Bernard ref. Christopher Hume quoting Robert Glover, "Dundas Square could set Yonge free". *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario:

- University of Waterloo, 2005) 116.
2. Kenniff, Thomas-Bernard ref. City of Toronto, Dundas Square Design Competition Brief. *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 116.
  3. Kenniff, Thomas-Bernard ref. Nate Hendley, Eye, “Yonge Love”. *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 134.
  4. Kenniff, Thomas-Bernard ref. Christopher Hume quoting Robert Glover, “Dundas Square could set Yonge free”. *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 116.
  5. Downtown Yonge BIA. Accessed August 28, 2014. <http://www.downtownyonge.com/>.
  6. “Toronto City Hall and Nathan Phillips Square.” *Toronto City Hall and Nathan Phillips Square*. Accessed April 12, 2014. <http://urbantoronto.ca/database/projects/toronto-city-hall-and-nathan-phillips-square>.
  7. Kenniff, Thomas-Bernard ref. Christopher Hume, “‘Big Urban Room’ a Winner”. *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 117.
  8. Kenniff, Thomas-Bernard ref. Wallace Immen, “Dundas Square”. *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 117.
  9. Kenniff, Thomas-Bernard ref. Pamela Young, “Architects Devise Calm Eye in Urban Storm”. *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 120.
  10. Kenniff, Thomas-Bernard ref. Lisa Rochon, “There’s no there there”. *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 133.
  11. Kenniff, Thomas-Bernard ref. Christopher Hume, “‘Big Urban Room’ a Winner”. *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 118.
  12. Kenniff, Thomas-Bernard ref. Christopher Hume, “A European Space”. *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 122.
  13. Kenniff, Thomas-Bernard ref. City of Toronto, Dundas Square Design Competition Brief. *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 119.
  14. Kenniff, Thomas-Bernard ref. Pamela Young, “Architects Devise Calm Eye in Urban Storm”. *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 119.
  15. *ibid.* 134.
  16. Clear Channel Outdoor, “Yonge Dundas Square,” *Yonge Dundas Square*, accessed November 12, 2014, <http://www.clearchanneloutdoor.ca/yonge- Dundas-square.html>.
  17. 8-80 Cities, “O’Keefe Laneway, Toronto,” accessed October 18, 2013, *Make A Place For People*, <http://www.8-80cities.org/images/tools-community-reports-articles/okeefe-lane-report.pdf>.
  18. Juhani Pallasmaa, “Space, Place, and Atmosphere: Peripheral Perception in Existential Experience.” In *Architectural Atmospheres: On the Experience and Politics of Architecture*, edited by Christian Borch (Basel: Birkhauser, 2014) 20.
  19. Villagomez, Erick, “Five Key Questions for the Study of Public Life - Spacing National,” *Spacing National*. August 20, 2014, accessed January 3, 2015. <http://spacing.ca/national/2014/08/20/five-key-questions-study-public-life/>.
  20. Castells, Manuel. *The Network Society a Cross-Cultural Perspective* (Cheltenham, UK: Edward Elgar Publishers, 2004) 91.
  21. Project for Public Spaces, “Placemaking and the Future of Cities,” accessed October 21, 2014, <http://www.pps.org/wp-content/uploads/2012/09/PPS-Placemaking-and-the-Future-of-Cities.pdf>.
  22. Betty Nigianni ref. Marina Abramovic. “Marina Abramovic Presents: Architectural Experience as Critical, Self-reflective Practice.” *Art & Education*. accessed January 7, 2015. (2010) <http://www.artandeducation.net/paper/marina-abramovic-presents-architectural->

experience-as-critical-self-reflective-practice/.

23. *ibid.*

24. C. H. Waddington. *The Strategy of the Genes; a Discussion of Some Aspects of Theoretical Biology* (London: Allen & Unwin, 1957) 3.

25. Sanford Kwinter, and Umberto Boccioni ref. Conrad Waddington. "Landscapes of Change: Boccioni's 'Stati D'animo' as a General Theory of Models." *Assemblage 19* (Cambridge, Mass.: MIT Press, 1992) 63.

26. C. H. Waddington. *The Strategy of the Genes; a Discussion of Some Aspects of Theoretical Biology* (London: Allen & Unwin, 1957) 29.

27. Sanford Kwinter, and Umberto Boccioni ref. Conrad Waddington. "Landscapes of Change: Boccioni's 'Stati D'animo' as a General Theory of Models." *Assemblage 19* (Cambridge, Mass.: MIT Press, 1992) 62.

28. C. H. Waddington. *The Strategy of the Genes; a Discussion of Some Aspects of Theoretical Biology* (London: Allen & Unwin, 1957) 35.

29. Sanford Kwinter, and Umberto Boccioni ref. Conrad Waddington. "Landscapes of Change: Boccioni's 'Stati D'animo' as a General Theory of Models." *Assemblage 19* (Cambridge, Mass.: MIT Press, 1992) 62.

30. *ibid.* 63.

31. James Corner. "Terra Fluxus." In *The Landscape Urbanism Reader*, edited by Charles Waldheim (New York: Princeton Architectural Press, 2006) 24.

32. Karin Jaschke. "City is House and House is City: Aldo van Eyck, Piet Blom and the Architecture of Homecoming." In *Intimate Metropolis: Urban Subjects in the Modern City*, edited by Vittoria Di Palma, Diana Periton and Marina Lathouri. (London and New York: Routledge) 175.

33. *ibid.* 176.

34. Max Risselada. *Team 10: 1953-81, in Search of a Utopia of the Present* (Rotterdam: NAI, 2005) 11.

35. Baird, George. *The Space of Appearance*. (Cambridge, Mass.: MIT Press, 1995) 339.

36. Karin Jaschke. "City is House and House is City: Aldo van Eyck, Piet Blom and the Architecture of Homecoming." In *Intimate Metropolis: Urban Subjects in the Modern City*, edited by Vittoria Di Palma, Diana Periton and Marina Lathouri (London and New York: Routledge) 180.

37. Sofia Balters, "AD Classics: Amsterdam Orphanage / Aldo Van Eyck." *ArchDaily*. August 26, 2011, accessed January 18, 2015. <http://www.archdaily.com/151566/ad-classics-amsterdam-orphanage-aldo-van-eyck/>.

38. Karin Jaschke ref. Van Eyck. "City is House and House is City: Aldo van Eyck, Piet Blom and the Architecture of Homecoming." In *Intimate Metropolis: Urban Subjects in the Modern City*, edited by Vittoria Di Palma, Diana Periton and Marina Lathouri (London and New York: Routledge) 176.

39. *ibid.* 184.

40. George Baird. *The Space of Appearance*. (Cambridge, Mass.: MIT Press, 1995) 31.

41. Carey Wolfe. "Queasy Posthumanism: Hylozoic Ground." In *Hylozoic Ground: Liminal Responsive Architecture*: compiled by Philip Beesley (Cambridge, Ont.: Riverside Architectural Press, 2010) 63-64.

42. Michelle Addington. "Architecture of Contingency." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley (Cambridge, Ontario: Riverside Architectural Press, 2010) 70.

43. Allen, Stan ref. Kwinter. *Points + Lines: Diagrams and Projects for the City* (New York: Princeton Architectural Press, 1999) 92.

44. Leber, Jessica. "On A New Shared Street In Chicago, There Are No Sidewalks, No Lights, And Almost No Signs." *Co.Exist*. October 27, 2014. Accessed January 18, 2015.

45. Carey Wolfe ref. Derrida. "Queasy Posthumanism: Hylozoic Ground." In *Hylozoic Ground: Liminal Responsive Architecture*: compiled by Philip Beesley (Cambridge, Ont.: Riverside Architectural Press, 2010) 64.

46. George Baird. *The Space of Appearance*. (Cambridge, Mass.: MIT Press, 1995) 73.

47. Juhani Pallasmaa, "Space, Place, and Atmosphere: Peripheral Perception in Existential Experience." In *Architectural Atmospheres: On the Experience and Politics of Architecture*, edited by Christian Borch (Basel: Birkhauser, 2014) 19.
48. James Corner "Terra Fluxus." In *The Landscape Urbanism Reader*, edited by Charles Waldheim (New York: Princeton Architectural Press, 2006) 29.
49. Guilherme Abreu, José ref. Norberg-Schulz, "A Phenomenological Model for Public Sculpture," *Metapractice*, May 14, 2010, accessed December 18, 2014, <https://metapractice.wordpress.com/public-states/a-phenomenological-model-for-public-sculpture/>.
50. Juhani Pallasmaa, "Space, Place, and Atmosphere: Peripheral Perception in Existential Experience." In *Architectural Atmospheres: On the Experience and Politics of Architecture*, edited by Christian Borch (Basel: Birkhauser, 2014) 23-24.
51. Jan Gehl. *Cities for People*. (Washington, DC: Island Press, 2010) 1.
52. Alex Wall. "Programming the Urban Surface." In *Recovering Landscape: Essays in Contemporary Landscape Architecture* (New York: Princeton Architectural Press, 1999) 235-236.
53. Bob Sheil, and Stephen A. Gage. "The Wonder of Trivial Machines." In *Protoarchitecture: Analogue and Digital Hybrids* (London: John Wiley, 2008) 20.
54. *ibid.*
55. George Baird. *The Space of Appearance*. (Cambridge, Mass.: MIT Press, 1995) 345.
56. *ibid.* 347.
57. Donna Jeanne Haraway. "Species." In *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003)
58. Rifkin, Jeremy. "The Hidden Paradox of Human History." In *The Empathic Civilization: The Race to Global Consciousness in a World in Crisis*, 14. New York: J.P. Tarcher/Penguin, 2009.
59. *ibid.* 41.
60. Jeremy Rifkin. "The Hidden Paradox of Human History." In *The Empathic Civilization: The Race to Global Consciousness in a World in Crisis* (New York: J.P. Tarcher/Penguin, 2009) 21.
61. *ibid.* 24.
62. *ibid.* 27.
63. *ibid.* 61.
64. Pierre Teilhard de Chardin, and Julian Huxley. *The Phenomenon of Man*. (New York: Harper, 1959) 31.
65. Neil Spiller, "NEIL SPILLER: The Great Forgetting," *Lebbeus Woods*, July 16, 2010, accessed January 11, 2015, <https://lebbeuswoods.wordpress.com/2010/07/17/neil-spiller-the-great-forgetting/>.

## NOTES

- i. Koolhaas, Rem. *Small, Medium, Large, Extra-large: Office for Metropolitan Architecture, Rem Koolhaas, and Bruce Mau*. 2d ed. (New York, N.Y.: Monacelli Press, 1998) 202.
- ii. Kenniff, Thomas-Bernard ref. Guy debord, "The Society of the Spectacle". *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 4.
- iii. Merriam-Webster. Accessed June 29, 2014.
- iv. Merriam-Webster. Accessed June 29, 2014.
- v. Merriam-Webster. Accessed June 29, 2014.
- vi. Allen, Stan ref. Kwinter. *Points + Lines: Diagrams and Projects for the City* (New York: Princeton Architectural Press, 1999) 92.
- vii. C. H. Waddington. *The Strategy of the Genes; a Discussion of Some Aspects of Theoretical Biology* (London: Allen & Unwin, 1957) 32.
- viii. Karin Jaschke. "City is House and House is City: Aldo van Eyck, Piet Blom and the Architecture of Homecoming." In *Intimate Metropolis: Urban Subjects in the Modern City*, edited by Vittoria Di Palma, Diana Periton and Marina Lathouri. (London and New York: Routledge) 186.

- ix. Wang Shu. *Imagining the House* (Ennetbaden: Lars Müller Verlag, 2012)
- x. Brian Goodall. *The Penguin Dictionary of Human Geography* (London: Penguin, 1987)
- xi. Rachel Armstrong, “Combined Advanced Technologies & Flexible Urban Infrastructures: Mapping the Landscape for Agile Design,” *Organs Everywhere 4, Material Shifts*. 66.
- xii. Karin Jaschke. “City is House and House is City: Aldo van Eyck, Piet Blom and the Architecture of Homecoming.” In *Intimate Metropolis: Urban Subjects in the Modern City*, edited by Vittoria Di Palma, Diana Periton and Marina Lathouri. (London and New York: Routledge) 182.
- xiii. Alex Wall. “Programming the Urban Surface.” In *Recovering Landscape: Essays in Contemporary Landscape Architecture* (New York: Princeton Architectural Press, 1999) 247.
- xiv. Stan Allen, *Points + Lines: Diagrams and Projects for the City* (New York: Princeton Architectural Press, 1999) 97.
- xv. Louis Khan. “Silence and Light, 1969.” In *Theories and Manifestoes of Contemporary Architecture*, edited by Charles Jencks (Chichester, West Sussex: Academy Editions, 1997) 238.
- xvi. James Corner ref. Francois Jullien. “Eidetic Operations and New Landscapes.” In *Recovering Landscape: Essays in Contemporary Landscape Architecture* (New York: Princeton Architectural Press, 1999) 155.
- xvii. Ivan Chchtecheglov. “Formulary for a New Urbanism.” January 1, 2006. Accessed November 18, 2014. <http://www.bopsecrets.org/SI/Chtcheglov.htm>.
- xviii. Alex Wall. “Programming the Urban Surface.” In *Recovering Landscape: Essays in Contemporary Landscape Architecture* (New York: Princeton Architectural Press, 1999) 247.
- xix. Thomas-Bernard Kenniff ref. Christopher Hume, “‘Big Urban Room’ a Winner”. *Assembly: A Reevaluation of Public Space in Toronto* (Cambridge, Ontario: University of Waterloo, 2005) 118.
- xx. Jack Self ref. Sou Fujimoto, “Harmony Cannot Be Obvious,” *Domusweb*. June 10, 2013, accessed June 15, 2013. [http://www.domusweb.it/en/architecture/2013/06/7/sou\\_fujimoto\\_serpentinegallery.html](http://www.domusweb.it/en/architecture/2013/06/7/sou_fujimoto_serpentinegallery.html).
- xxi. Neil Spiller ref. Alberto Perez-Gomez, “NEIL SPILLER: The Great Forgetting,” *Lebbeus Woods*, July 16, 2010, accessed January 11, 2015, <https://lebbeuswoods.wordpress.com/2010/07/17/neil-spiller-the-great-forgetting/>.
- xxii. Louis Khan. “Silence and Light, 1969.” In *Theories and Manifestoes of Contemporary Architecture*, edited by Charles Jencks (Chichester, West Sussex: Academy Editions, 1997) 237.
- xxiii. Aracelis Girmay. “Elegy”. *Kingdom Animalia: Poems*. (Rochester, NY: Boa Editions, 2011) 84.
- xxiv. Thomas Moore. *A Religion of One’s Own: A Guide to Creating a Personal Spirituality in a Secular World*. 144.
- xxv. Thomas Mann, and H. T. Porter. *The Magic Mountain* (Der Zauberberg. New York: Knopf, 1953)

## **Bibliography**

8-80 Cities, "O'Keefe Laneway, Toronto." accessed October 18, 2013. *Make A Place For People*. <http://www.8-80cities.org/images/tools-community-reports-articles/okeefe-lane-report.pdf>.

Abreu, José Guilherme ref. Norberg-Schulz. "A Phenomenological Model for Public Sculpture." *Metapractice*. May 14, 2010. accessed December 18, 2014. <https://metapractice.wordpress.com/public-states/a-phenomenological-model-for-public-sculpture/>.

Addington, Michelle. "Architecture of Contingency." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley. Cambridge, Ontario: Riverside Architectural Press, 2010.

Adorno, Theodor W. *Minima Moralia: Reflexionen Aus D. Beschädigten Leben*. 1. Aufl. ed. Frankfurt Am Main: Suhrkamp, 1980.

Allen, Paul, and Greaves, Mark. "Paul Allen: The Singularity Isn't Near." *MIT Technology Review*. October 12, 2011. accessed January 11, 2015. <http://www.technologyreview.com/view/425733/paul-allen-the-singularity-isnt-near/>.

Allen, Stan. *Points + Lines: Diagrams and Projects for the City*. New York: Princeton Architectural Press, 1999.

Allen, Stan. "From Object to Field: Field Conditions in Architecture and Urbanism." In *Space Reader: Heterogeneous Space in Architecture*, edited by Michael Hensel. Chichester, U.K.: Wiley, 2009.

Arendt, Hannah. "The Public and Private Realm." *The Human Condition*. Chicago: University of Chicago Press, 1958.

Arcspace. "The Blur Building by Diller Scofidio Renfro." November 23, 2001. accessed January 12, 2015. <http://www.arcspace.com/features/diller-scofidio--renfro/blur-building/>.

Armstrong, Rachel, "Combined Advanced Technologies & Flexible Urban Infrastructures: Mapping the Landscape for Agile Design," *Organs Everywhere 4, Material Shifts*.

Baird, George. *The Space of Appearance*. Cambridge, Mass.: MIT Press, 1995.

Ballard, J. G. "Thousand Dreams of Stellavista." In *Vermilion Sands*. New York, N.Y.: Carroll & Graf, 1988.

Balters, Sofia. "AD Classics: Amsterdam Orphanage / Aldo Van Eyck." *ArchDaily*. August 26, 2011. accessed January 18, 2015. <http://www.archdaily.com/151566/ad-classics-amsterdam-orphanage-aldo-van-eyck/>.

Banham, Reyner. "Environmental Management." In *The Architecture of the Well-tempered Environment*. Chicago: University of Chicago, 1969.

Bateman, Chris. "10 Things That You Just Don't Do in Toronto." *BlogTo*. November 6, 2014. accessed November 6, 2014. [http://www.blogto.com/city/2014/11/10\\_things\\_that\\_you\\_just\\_dont\\_do\\_in\\_toronto/](http://www.blogto.com/city/2014/11/10_things_that_you_just_dont_do_in_toronto/).

Beesley, Philip. "Introduction: Liminal Responsive Architecture." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley. Cambridge, Ont.: Riverside Architectural Press, 2010.



- E. Benjamin, Andrew. *Blurred Zones: Investigations of the Interstitial : Eisenman Architects, 1988-1998*. New York: Monacelli Press, 2003.
- Bhatia, Neeraj. "Crazy-Radical Soft Architecture, From The 1950s To Today." *Architizer*. August 7, 2013. accessed January 11, 2015. <http://architizer.com/blog/soft-architcture/>.
- Bhatia, Neeraj. *Goes Soft: Bracket : Architecture, Environment, Digital Culture*. Barcelona: Actar, 2012.
- Bier, Henriette and Knight, Terry edit. *Footprint 6, Delft School of Design Journal: Digitally-Driven Architecture*. Delft, The Netherlands:Stichting Footprint, 2010.
- Bonnemaison, Sarah, and Ronit Eisenbach. *Installations by Architects Experiments in Building and Design*. New York: Princeton Architectural Press, 2009.
- de Botton, Alain. *The Architecture of Happiness*. New York: Pantheon Books, 2006.
- Boyko, Erik Alexander. *Hybrid Human Agency: A Teleodynamic Socio-spatial Interaction Model for Emergent Human Agency Architecture*. Waterloo, Ontario: University of Waterloo, 2010.
- Braitenberg, Valentino. *Vehicles, Experiments in Synthetic Psychology*. Cambridge, Mass.: MIT Press, 1984.
- Brier, Soren. "Information and Consciousness: A Critique of the Mechanistic Concept of Information." In *Cybernetics and Human Knowing*. 1992.
- Canadian Nurse. "Healing by Design." June 1, 2013. accessed January 11, 2015. <http://canadian-nurse.com/en/articles/issues/2013/june-2013/healing-by-design>.
- Case, Amber. "We Are All Cyborgs Now." *TED*. accessed March 22, 2014. [http://www.ted.com/talks/amber\\_case\\_we\\_are\\_all\\_cyborgs\\_now?language=en](http://www.ted.com/talks/amber_case_we_are_all_cyborgs_now?language=en).
- Castells, Manuel. *The Network Society a Cross-Cultural Perspective*. Cheltenham, UK: Edward Elgar Publishers, 2004.
- Clark, Kenneth. *The Nude: A Study in Ideal Form*. New Edition ed. London: Folio Society, 2010.
- Clear Channel Outdoor. "Yonge Dundas Square." *Yonge Dundas Square*. accessed November 12, 2014. <http://www.clearchanneloutdoor.ca/yonge- Dundas-square.html>.
- Clynes, Manfred E. and Kline, Nathan S. "Cyborgs and Space." *Astronautics*. 1960.
- Corner, James. "Eidetic Operations and New Landscapes." In *Recovering Landscape: Essays in Contemporary Landscape Architecture*. New York: Princeton Architectural Press, 1999.
- Corner, James. "From "The Landscape Imagination" – James Corner's Essay on the High Line." *ArchDaily*. June 19, 2014. accessed July 21, 2014. <http://www.archdaily.com/516847/from-the-landscape-imagination-james-corner-s-essay-on-the-high-line/>.
- Corner, James. "Terra Fluxus." In *The Landscape Urbanism Reader*, compiled by Charles Waldheim. New York: Princeton Architectural Press, 2006.
- The Creators Project. "Artist Turns Invisible Cell Phone Signals Into Colorful 3D Maps | The Creators Project." December 12, 2013. accessed January 11, 2015.

The Creators Project. "Curating Public Space | Hirshhorn, High Line, Lincoln Center & More." *YouTube*. February 14, 2013. accessed February 25, 2013. [http://www.youtube.com/watch?v=NHvhWR4S1z4&feature=share&list=PL6uqON-thyraDG9IP8QQIMkEKv\\_1TuRC4](http://www.youtube.com/watch?v=NHvhWR4S1z4&feature=share&list=PL6uqON-thyraDG9IP8QQIMkEKv_1TuRC4).

de Chardin, Pierre Teilhard, and Julian Huxley. *The Phenomenon of Man*. New York: Harper, 1959.

Emmott, Stephen. *Ten Billion*. Vintage, 2013.

d'Estrée Sterk, Tristan. "Building Upon Negroponite: A Hybridized Model of Control Suitable for A Responsive Architecture." In *eCAADe 21*. 2003.

The European Graduate School. accessed January 9, 2015. <http://www.egs.edu/faculty/donna-haraway/articles/donna-haraway-a-cyborg-manifesto/>.

Fabrizi, Mariabruna. "The Possibility of an Immaterial Architecture: The Collaboration..." *SOCKS*. January 27, 2014. accessed January 12, 2015. <http://socks-studio.com/2014/01/27/the-possibility-of-an-immaterial-architecture-the-collaboration-between-yves-klein-and-claude-parent/>.

Fabrizi, Mariabruna. "Sonsbeek Pavilion in Arnhem, Aldo Van Eyck (1966)." *SOCKS*. November 18, 2013. accessed July 18, 2014. <http://socks-studio.com/2013/11/18/sonsbeek-pavilion-in-arnhem-aldo-van-eyck-1966/>.

Farro, Antimo, and Henri Lustiger-Thaler. "Subjectivity, Memory, and Collective Action." In *Reimagining Social Movements: From Collectives to Individuals*. 1988.

A. Gage, Stephen. "Constructing the User." *ACADIA 09: ReForm*. 2009.

Gehl, Jan ref. Edward T. Hall. "Senses and Scale." In *Cities for People*. Washington, DC: Island Press, 2010.

Gershman, Rachel. "Constantin Brancusi Synopsis." *Constantin Brancusi Biography, Art, and Analysis of Works*. Accessed December 20, 2014.

Girmay, Aracelis. "Elegy". *Kingdom Animalia: Poems*. Rochester, NY: Boa Editions, 2011.

Goodall, Brian. *The Penguin Dictionary of Human Geography*. London: Penguin, 1987.

Guattari, Felix. *The Three Ecologies*. London; New York: The Athlone Press, 2005.

Guest, Ann Hutchinson, and Anderson, Doug. *Labanotation; Or, Kinetography Laban; the System of Analyzing and Recording Movement*. 4th Rev. and Expanded ed. New York: Theatre Arts Books, 2005.

Grey, Alex. "Bio." accessed 12 Apr. 2014. <http://alexgrey.com/bio/>.

Haraway, Donna Jeanne. *The Companion Species Manifesto: Dogs, People, and Significant Otherness*. Chicago: Prickly Paradigm Press, 2003.

Harlan, Matthew. "Suits for Modernity." *Soiled 02: Skinscrapers*. December, 2011. accessed December 7, 2012. <http://soiledzine.org/category/issues/skinscrapers/>.

Harvey, Robin. "It Takes a Village - Canadian Mental Health Association, Ontario Division." *Canadian Mental Health Association Ontario Division*. accessed January 9, 2015. <http://ontario.cmha.ca/network/it-takes-a-village/>.

Hooton, Christopher. "Anthropocene: We Might Be about to Move from the Holocene to a New Epoch." *The Independent*. October 16, 2014. accessed December 21, 2014. <http://www.independent.co.uk/news/science/anthropocene-we-might-be-about-to-move-from-the-holocene-to-a-new-epoch-9798854.html>.

Hooton, Christopher. "Sir David Attenborough: Humans May Be an Endangered Species." *The Independent*. December 13, 2014. accessed December 21, 2014. <http://www.independent.co.uk/arts-entertainment/tv/news/sir-david-attenborough-humans-may-be-an-endangered-species-9950523.html>.

Humphrey, Jonah. "Integrated Systems: The Breathing Cycle." In *Hylozoic Ground*, compiled by Philip Beesley. Waterloo: Riverside Architectural Press, 2010.

Huxley, Aldous. *Brave New World*. New York: Harper & Bros., 1946.

Huxley, Aldous. *The Doors of Perception*. New York: Harper & Brothers, Publishers, 1954.

Jaeggi, Susanne, Martin Buschkuhl, John Jonides, and Walter Perrig. "Improving Fluid Intelligence with Training on Working Memory." *Proceedings of the National Academy of Sciences of the United States of America*. Accessed January 9, 2015.

Jamison, Leslie. "The Believer - The Empathy Exams by Leslie Jamison - @believermag." *The Believer*. February 1, 2014. accessed March 13, 2014. [http://www.believermag.com/issues/201402/?read=article\\_jamison](http://www.believermag.com/issues/201402/?read=article_jamison).

Jaschke, Karin. "City is House and House is City: Aldo van Eyck, Piet Blom and the Architecture of Homecoming." In *Intimate Metropolis: Urban Subjects in the Modern City*, edited by Vittoria Di Palma, Diana Periton and Marina Lathouri. London and New York: Routledge.

Johnston, Matt. "The Milieu Interieur". In *Thresholds 42*. Cambridge, Mass.: MIT Press, 2014.

Kahn, Jennifer. "Can Emotional Intelligence Be Taught?" *The New York Times*. September 14, 2013. accessed March 5, 2014. <http://www.nytimes.com/2013/09/15/magazine/can-emotional-intelligence-be-taught.html?pagewanted=all&r=0>.

Kenniff, Thomas-Bernard. *Assembly: A Reevaluation of Public Space in Toronto*. Cambridge, Ontario: University of Waterloo, 2005.

Khan, Louis. "Silence and Light, 1969." In *Theories and Manifestoes of Contemporary Architecture*, edited by Charles Jencks. Chichester, West Sussex: Academy Editions, 1997.

Klein, Yves, Noever, Peter and Los Angeles Architecture. *Yves Klein: Air Architecture*. Ostfildern: Hatje Cantz, 2004.

Koolhaas, Rem. *Small, Medium, Large, Extra-large: Office for Metropolitan Architecture, Rem Koolhaas, and Bruce Mau*. 2d ed. (New York, N.Y.: Monacelli Press,

1998) 202.

Krauss, Rosalind, "Sculpture in the Expanded Field." *October*, Vol. 8. Spring, 1979.

Krueger, Ted. "Emotional Architectures." In *Euphoria & Dystopia: The Banff New Media Institute Dialogues*. Canada: Banff Centre Press, Riverside Architectural Press, 2012.

Krznicaric, Roman. "How to Start an Empathy Revolution: Roman Krznaric at TEDxAthens 2013." *You Tube*. January 28, 2014. accessed February 12, 2014. <http://www.youtube.com/watch?v=RT5X6NIJR88>.

Kurzweil, Ray. "KurzweilAI | Accelerating Intelligence." *KurzweilAI The Law of Accelerating Returns*. March 7, 2001. accessed March 22, 2013. <http://www.kurzweilai.net/the-law-of-accelerating-returns>.

Kurzweil, Ray. *How to Create a Mind: The Secret of Human Thought Revealed*. New York: Viking, 2012.

Kurzweil, Ray. *The Singularity Is Near: When Humans Transcend Biology*. New York: Viking, 2005.

Kwinter Sanford, and Umberto Boccioni. "Landscapes of Change: Boccioni's 'Stati D'animo' as a General Theory of Models." *Assemblage 19*. Cambridge, Mass.: MIT Press, 1992.

Lai, Jimenez. *Citizens of No Place: An Architectural Graphic Novel*. Princeton Architectural Press, 2012.

Lai, Jimenez. "Obstruction." *Soiled 02: Skinscrapers*. December, 2011. accessed December 7, 2012. <http://soiledzine.org/category/issues/skinscrapers/>.

Lally, Sean, and Young, Jessica. "Preface: The Stuff Between, In & Around." In *Softspace: From a Representation of Form to a Simulation of Space*. Abingdon, Oxon: Routledge, 2007.

Lally, Sean. *The Air from Other Planets: A Brief History of Architecture to Come*. Zurich: Lars Muller Publishers, 2014.

Lally, Sean. "EOS." *WEATHERS / Sean Lally*. Accessed January 12, 2014. <http://www.weathers.cc/EOS>.

Léopold Lambert. "#ARCHITECTURAL THEORIES /// A Subversive Approach to the Ideal Normalized Body." *The Funambulist*. April 29, 2012. accessed January 10, 2015. <http://thefunambulist.net/2012/04/29/architectural-theories-a-subversive-approach-to-the-ideal-normalized-body/>.

Leach, Neil. *The Anaesthetics of Architecture*. Cambridge, Mass.: MIT Press, 1999.

Lucarelli, Fosco. "'A Home Is Not a House', by Reyner Banham and François..." *SOCKS*. October 31, 2011. accessed January 12, 2014. <http://socks-studio.com/2011/10/31/francois-dallegret-and-reyner-banham-a-home-is-not-a-house-1965/>.

Mallgrave, Harry Francis. "Cognition in the Flesh...The Human in Design." *Thresholds 42*, edited by Tyler Stevermer. Cambridge, Mass.: SA+P Press, 2014.

Mann, Thomas, and Porter, H. T. *The Magic Mountain*. Der Zauberberg. New York: Knopf, 1953.

- Markram, Henry. "A Brain in a Supercomputer." *TED*. July 1, 2009. accessed January 11, 2015. [https://www.ted.com/talks/henry\\_markram\\_supercomputing\\_the\\_brain\\_s\\_secrets](https://www.ted.com/talks/henry_markram_supercomputing_the_brain_s_secrets).
- Martin, Miguel. *Miguel Martín Graduate Thesis Blog*. February 26, 2010. accessed January 10, 2015. <http://miguelmartindesign.com/blog/the-origins-of-le-corbusier's-modulor>.
- Mau, Bruce, and Jennifer Leonard. *Massive Change*. London: Phaidon, 2004.
- May, Kyle. *Sci-fi*. New York, N.Y.: CLOG, 2013.
- McEwen, Indra Kagis ref. Vitruvius. "The Body Beautiful: Venus, Venustas." *Vitruvius: Writing the Body of Architecture*. Cambridge, Mass.: MIT Press, 2003.
- McLuhan, Marshall, and Quentin Fiore. *The Medium Is the Massage*. New York: Bantam Books, 1967.
- MacLuhan, Marshall. *The Medium Is the Message*. Corte Madera: Gingko Press, 2005.
- McLuhan, Marshall. *Understanding Media: The Extensions of Man*. London and New York: Routledge, 1964.
- Meslin, Dave. "Dave Meslin Creative Director, PigeonHat Productions." *TEDxToronto*. 2010. Accessed November 7, 2013. <http://www.tedxtoronto.com/speakers/dave-meslin/>.
- Mills, C. Wright. "On Intellectual Craftsmanship," appendix to *The Sociological Imagination*. Londong: Oxford University Press, 1959.
- Mitchell, William J. "Being There." In *City of Bits: Space, Place, and the Infobahn*. Cambridge, Mass.: MIT Press, 1995.
- Mitchell, William J. *Me++, the Cyborg Self and the Networked City*. Cambridge, Mass.: MIT Press, 2003.
- Merleau-Ponty, Maurice. "Preface." In *Phenomenology of Perception*, edited by Ted Honderich. London: Routledge & Kegan Paul, 1962.
- Moore, Thomas. *A Religion of One's Own: A Guide to Creating a Personal Spirituality in a Secular World*.
- My City Lives. "My City Lives: Dave Meslin and the Fourth Wall." *Spacing Toronto*. April 3, 2012. Accessed January 11, 2013. <http://spacing.ca/toronto/2012/04/03/my-city-lives-dave-meslin-and-the-fourth-wall/>.
- The New York Times. "China's Web Junkies: Internet Addiction Documentary | Op-Docs | The New York Times." *You Tube*. January 24, 2014. Accessed June 12, 2014. <http://www.youtube.com/watch?v=jqctG3NnDa0>.
- Nicholson, Christie. "Q&A: New Evidence Shows Brain-training Games Don't Work." *SmartPlanet*. May 28, 2012. accessed January 11, 2015. <http://www.zdnet.com/article/qa-new-evidence-shows-brain-training-games-dont-work/>.
- Nicole's Systems Sites and Building. "Modernism Is Indeed Infatuated with the Idea of the Machine." October 3, 2010. Accessed January 12, 2015. <https://ndk4yx>.

wordpress.com/2010/10/04/modernism-is-indeed-infatuated-with-the-idea-of-the-machine/.

Nigianni, Betty. "Marina Abramovic Presents: Architectural Experience as Critical, Self-reflective Practice." *Art & Education*. 2010.

Ontario Ministry of Economic Development, Employment and Infrastructure. "Make Your Website Accessible." November 26, 2014. Accessed January 9, 2015. [http://www.mcsc.gov.on.ca/en/mcscs/programs/accessibility/info\\_sheets/info\\_comm/website.aspx](http://www.mcsc.gov.on.ca/en/mcscs/programs/accessibility/info_sheets/info_comm/website.aspx).

Oxman, Neri. "Fabricating Networks: Notes on Biologically Inspired Design." *Networks Understanding Networks*. Recorded October 17, 2011. accessed October 23, 2012. <https://www.youtube.com/watch?v=x4F0bdr9It0>.

Padovan, Richard ref. Le Corbusier, "The Modulor". *Proportion Science, Philosophy, Architecture*. London: E & FN Spon, 1999.

Pallasmaa, Juhani. "Space, Place, and Atmosphere: Peripheral Perception in Existential Experience." In *Architectural Atmospheres: On the Experience and Politics of Architecture*, edited by Christian Borch. Basel: Birkhauser, 2014.

Pallasmaa, Juhani. "Part 2." *The Eyes of the Skin: Architecture and the Senses*. Chichester: Wiley-Academy, 2005.

Pawley, Martin. *The Private Future: Causes and Consequences of Community Collapse in the West*. New York: Random House, 1974.

Pinker, Steven and Newberger Goldstein, Rebecca "The Long Reach of Reason." *TED*. February 1, 2012. accessed March 22, 2015. [https://www.ted.com/talks/steven\\_pinker\\_and\\_rebecca\\_newberger\\_goldstein\\_the\\_long\\_reach\\_of\\_reason?language=en](https://www.ted.com/talks/steven_pinker_and_rebecca_newberger_goldstein_the_long_reach_of_reason?language=en).

Pickering, Andrew. *The Cybernetic Brain Sketches of Another Future*. Chicago: University of Chicago Press, 2010.

The Poetics of Space (1957) - Gaston Bachelard . "The Poetics of Space (1957) - Gaston Bachelard." accessed April 21, 2013. <http://www.jahsonic.com/PoeticsSpace.html>.

Project for Public Spaces. "Placemaking and the Future of Cities." accessed October 21, 2014. <http://www.pps.org/wp-content/uploads/2012/09/PPS-Placemaking-and-the-Future-of-Cities.pdf>.

Richtel, Matt, "Attached to Technology and Paying a Price." *The New York Times*. June 6, 2010. accessed January 11, 2015. [http://www.nytimes.com/2010/06/07/technology/07brain.html?\\_r=0](http://www.nytimes.com/2010/06/07/technology/07brain.html?_r=0).

Rifkin, Jeremy. "Introduction." In *The Empathic Civilization: The Race to Global Consciousness in a World in Crisis*. New York: J.P. Tarcher/Penguin, 2009.

Rifkin, Jeremy. "The Hidden Paradox of Human History." In *The Empathic Civilization: The Race to Global Consciousness in a World in Crisis*. New York: J.P. Tarcher/Penguin, 2009.

Rifkin, Jeremy. "The New View of Human Nature." In *The Empathic Civilization: The Race to Global Consciousness in a World in Crisis*. New York: J.P. Tarcher/Penguin, 2009.

- Risselada, Max. *Team 10: 1953-81, in Search of a Utopia of the Present*. Rotterdam: NAI, 2005.
- Roberts, Dustyn. "Introduction to Mechanisms and Machines." In *Making Things Move: DIY Mechanisms for Inventors, Hobbyists, and Artists*. New York: McGraw-Hill, 2010.
- Rosen, Margit. "Pask, Gordon: The Colloquy of Mobiles." *Media Art Net*. accessed January 4, 2015.
- Sadler, Simon. *Archigram: Architecture without Architecture*. Cambridge, Mass.: MIT Press, 2005.
- Sammarco, Cecilia. "Nomads." *Visual Think*. April 1, 2013. accessed September 9, 2014. [http://visualthink.blogspot.ca/2013\\_04\\_01\\_archive.html](http://visualthink.blogspot.ca/2013_04_01_archive.html).
- Self, Jack. "Harmony Cannot Be Obvious." *Domusweb.it*. June 10, 2013. accessed January 11, 2015. [http://www.domusweb.it/en/architecture/2013/06/7/sou\\_fujimoto\\_serpentinegallery.html](http://www.domusweb.it/en/architecture/2013/06/7/sou_fujimoto_serpentinegallery.html).
- Sennett, Richard. "Richard Sennett "The Open City"" *YouTube*. September 21, 2013. accessed November 30, 2014. <https://www.youtube.com/watch?v=eEx1apBAS9A>.
- Serpentine Galleries. "Catherine Mosbach - Phase Shift Park." July 13, 2012. accessed January 12, 2015. <https://vimeo.com/45696535>.
- Sheil, Bob and Gage, Stephen A. "The Wonder of Trivial Machines." In *Protoarchitecture: Analogue and Digital Hybrids*. London: John Wiley, 2008.
- Shu, Wang. *Imagining the House*. Ennetbaden: Lars Müller Verlag, 2012.
- Speaks, Michael. "Design: Intelligence vs. Ideology." *Vimeo*. February 3, 2012. accessed January 10, 2015. <https://vimeo.com/51572413>.
- Spiller, Neil. "NEIL SPILLER: The Great Forgetting." *Lebbeus Woods*. July 16, 2010. Accessed January 11, 2014. <https://lebbeuswoods.wordpress.com/2010/07/17/neil-spiller-the-great-forgetting/>.
- Spiller, Neil. "Liberating the Infinite Architectural Substance." In *Hylozoic Ground: Liminal Responsive Architecture*, compiled by Philip Beesley. Cambridge, Ontario: Riverside Architectural Press, 2010.
- Sykes, Patrick. "A Long Way from Utopia: Planning Cities without the Citizen." *The Inking*. accessed January 4, 2014. <http://www.theinkingmag.com/fields-buildings/planning-cities-without-the-citizen/>.
- TEAM 10 ONLINE. accessed April 21, 2014. <http://www.team10online.org/>.
- W. Turner, Victor. *From Ritual to Theatre: The Human Seriousness of Play*. New York City: Performing Arts Journal Publications, 1982.
- Thomas, Jonathon. "Documenting the Oneiric House." *Cinema Metafisica*. August 25, 2010. accessed August 21, 2013. <http://cinemametafisica.wordpress.com/essays/documenting-the-oneiric-house/>.

- Urban Toronto RSS. "Thread: Where Is "downtown Toronto?" accessed May 15, 2014. <http://urbantoronto.ca/forum/showthread.php/18191-Where-is-quot-downtown-Toronto-quot>.
- Villagomez, Erick. "Five Key Questions for the Study of Public Life - Spacing National." Spacing National. August 20, 2014. accessed January 11, 2015. <http://spacing.ca/national/2014/08/20/five-key-questions-study-public-life/>.
- Vollard, Piet. "Van Eyck's Sonsbeek Pavilion Rebuilt." *Archined*. April 5, 2006. accessed January 8, 2015. <http://www.archined.nl/en/news/van-eycks-sonsbeek-pavilion-rebuilt/>.
- Waddington, C. H. *The Strategy of the Genes; a Discussion of Some Aspects of Theoretical Biology*. London: Allen & Unwin, 1957.
- Wadu. "Suitaloon." *Future House(s):Genealogy*. accessed October 18, 2014. <http://future-house-genealogy.blogspot.ca/p/suitaloon.html>.
- Walker, Andrew. *EDGE CONDITIONS - "fragments of Superimposition."* accessed March 21, 2014. <http://edge-conditions.tumblr.com/>.
- Wall, Alex. "Programming the Urban Surface." In *Recovering Landscape: Essays in Contemporary Landscape Architecture*. New York: Princeton Architectural Press, 1999.
- Watts, Alan. *The Book; on the Taboo against Knowing Who You Are*. New York: Pantheon Books, 1966.
- Weinschenk, Susan. *100 Things Every Designer Needs to Know about People*. Berkeley, CA: New Riders, 2011.
- Wiley, Danielle. "The Urban Square: Remediating Public Space." *Stream: Culture, Politics, Technology 1, no. 1*, 2008.
- Wiley, Danielle. *The Urban Square: Rethinking Public Space in the Digital Age*. Cambridge, Ontario: University of Waterloo, 2002.
- Wilson, William. "Oskar Schlemmer: Bauhaus' Mr. Clean." *Los Angeles Times*. September 14, 1986, accessed January 11, 2015. [http://articles.latimes.com/1986-09-14/entertainment/ca-12135\\_1\\_arnold-l-lehman](http://articles.latimes.com/1986-09-14/entertainment/ca-12135_1_arnold-l-lehman).
- Wikipedia. "Labanotation." accessed April 24, 2014. [http://en.wikipedia.org/wiki/Labanotation#cite\\_note-1](http://en.wikipedia.org/wiki/Labanotation#cite_note-1).
- Wikipedia. "Oskar Schlemmer: The Bauhaus Years." accessed April 21, 2014. [http://en.wikipedia.org/wiki/Oskar\\_Schlemmer#The\\_Bauhaus\\_years](http://en.wikipedia.org/wiki/Oskar_Schlemmer#The_Bauhaus_years).
- Wolf, Gary, "Antephase," *Quantified Self*, accessed April 12 2014, <http://antephase.com/quantifiedself>.
- Young Dundas Square. accessed January 14, 2013. <http://www.ydsquare.ca/>.
- YouTube. "Dave Meslin - The Fourth Wall in London, Ontario." April 27, 2012. accessed January 11, 2013. <https://www.youtube.com/watch?v=GbRRVXBzcSQ>.
- Zylinska, Joanna. "Grounding." In *Minimal Ethics for the Anthropocene*, 9-24. Michigan: Open Humanities Press, 2014.