Think About Thinking About Light:
A Phenomenological Investigation of Lighting in Built Environments

A Major Paper submitted to the Faculty of Environmental Studies in partial
fulfillment of the requirements for the degree of Master in Environmental Studies,
York University, Ontario, Canada.

Taylor Stone
210601706

July 26, 2011

Student Signature: _____

Supervisor Signature: _____   (Peter Timmerman)

Table of Contents

Abstract

This Major Paper is a phenomenological investigation of lighting in built environments. As a work in phenomenology, there is no thesis guiding the inquiry. Instead, the paper is framed around a set of questions, and a search for insights through experience. Research is focused on the relationship between experiential and theoretical understandings of light, and the implications for ecological design. Much has been said regarding the varied history and theories of light. Likewise, quantitative concerns over lighting are prevalent in environmental literature. However, few works explore light from a qualitative perspective. As such, a new avenue is opened here for exploration – investigating the philosophical presuppositions informing understandings of light and their significance for environmental thought. The underlying thematic focus is a consideration of light's ability to either foster or hinder notions of connectedness between humans and the more-than-human world, specifically in built environments.

After introducing the topic of light as an area of inquiry, the larger theoretical framework, namely ecological design, is addressed. An argument is made for a deeper questioning of beliefs informing design theory, and the usefulness of environmental thought for progressing this goal. Phenomenology, and specifically embodied architectural phenomenology and Merleau-Pontian ecophenomenology, are introduced as a more focused methodological and conceptual framework, merging architectural theory and environmental thought. Utilizing this framework, a research methodology is developed that combines hermeneutic and first person phenomenological analysis.

Following the establishment of a conceptual framework, a phenomenological investigation of light is undertaken. The argument is made that, due to light's unique nature, it cannot be experienced as an isolated phenomenon. Hence, metaphorical interpretations are used to describe and understand light. While some conceptual abstractions (discussed herein) can be useful, they also disregard the experiential light informing their existence. A proposed understanding of light through *relationality*, akin to Merleau-Ponty's notion of *flesh*, is made. From this new vantage point, a contemporary interpretation of light is explored.

After establishing a relational conception of light, the tension between experiential and interpretive understandings are explored in three case studies: Dundas Square, The Terrence Donnelly Centre for Cellular and Biomolecular Research, and St. Gabriel's Passionist Parish. A chapter is devoted to each site, designed as phenomenological descriptions with inserted historical/philosophical *touchstones*. The format is meant to further discussion concerning the relationship between experiences of light and metaphorical overtones, as well as how understandings of light manifest in built environments. Throughout each case study, several insights are uncovered regarding light and lighting's ability to enhance or shadow the connectedness between humans and the more-than-human world. The conclusion briefly summarizes case study findings, and offers future directions for related research.

Foreword: Role of Major Paper in Plan of Study

The primary goal of my Area of Concentration was to critically examine presuppositions underlying understandings of architecture, focused on the potential utilization of environmental thought in architectural theory. My Major Paper addresses my Area of Concentration as a whole, concerned with this primary research interest (as well as several learning objectives).

Chapter 2 is largely an exercise in expanding and refining my Area of Concentration. It also further develops the learning objective from the component *Contemporary Green Architecture and Theory* (learning objective 4.1). Chapters 3, and my research method (in the Appendix), evolve from the component *Environmental Thought and Writing* generally, and *Phenomenology* specifically. I have built on the learning objectives concerned with ecocriticism and environmental writing (1.2 and 1.3), and applied them within the conceptual framework of architectural and ecological phenomenology (2.2 and 2.3). The investigations into architectural phenomenology, while directly satisfying learning objective 2.2, also develop 4.1 and my Area of Concentration generally. Hence, I have used the component *Phenomenology*, within the broader scope of *Environmental Thought and Philosophy*, to address both *Contemporary Green Architecture and Theory* and my Area of Concentration holistically.

My Major Paper does not expand on the component *Environmental Psychology*. The related learning objectives (3.1 and 3.2) were satisfied through coursework, and I chose not to pursue them any further. While I believe developments in environmental psychology relating to behaviour and health are important, my emerging research interests are concerned with phenomenological understandings of experience. As I progressed through my MES degree, the intersection of environmental thought and architectural theory became my primary interest (rather than research into the behavioural and health-related effects of buildings).

Light was selected as a research topic within the broader philosophical scope of my Area of Concentration, allowing for the application of various theories to a particular phenomenon. Chapters 4 -7 examine light and lighting in detail, applying the learning objectives listed above to a relevant topic for contemporary architectural theory.

Acknowledgements

Introduction:
In Search of Light

Seeing light is a metaphor for seeing the invisible in the visible, for detecting the fragile imaginal garment that holds our planet and all existence together. Once we have learned to see light, surely everything else will follow.

-Zajonc, Catching the Light 343

Times Square at Night

In the spring of 2010 I visited New York City for the first time. My partner, friend, and I drove from Toronto and arrived well after sunset. We were staying with a friend in New Jersey, who lived along the shore of the Hudson River. From her apartment balcony we could see the steady glow of Manhattan's jagged skyline. Excited to explore the city, we immediately took an evening ferry across.

It was nearing 10pm when we stepped foot in Manhattan. Our first task was to walk east into the heart of the city. We zigzagged along a seemingly infinite maze of low-rise buildings. Due to the consistent height of the buildings, the darkness, and my unfamiliarity with New York, it was surprisingly difficult to orient myself within the gridded network. These factors, combined with my efforts to take in as much as possible, did not prepare me for the spectacle ahead.

Without warning, we stepped into the heart of Times Square, near the corner of 49th and 7th. I found it a dazzling and magnificent sight, even as someone who lives in a major metropolis. Not only were the streets buzzing with pedestrian traffic, but the sky was alive with an array of colourful lights. Enormous neon signs and screens filled the space around and above us. The site was fluid with movement – of people and colours –in every direction. The lights stood out against the shadowy backdrop of the cityscape and bluish-charcoal sky beyond, creating both a dynamic site and an architectural space, in its own right. But it was more than simply observing a light show: I became immersed in the flow of yellows, blues, reds, and greens. I was in a space of "liquid colour," as Holl describes Times Square at night (*Questions of Perception* 69). The light did not merely create the mood of the space; the light *was* the space. Without passing through any doors, I had entered into a new space both physically and figuratively – a space created out of light.

The next day we walked through Times Square again. This time, however, it was mid-afternoon. The foot traffic was equally congested, but the space was completely different. Most of the same lights were on, but now sunlight was penetrating the streetscape, creating atmospheric light and fully illuminating the space. No longer were the electric lights points of interest on a dark background, but they were tiny spots competing with the ambient and reflected light of the sun. These artificial light sources were not so bright or magnificent now, and the buildings and the ground around them, at night just a muted canvas, were fully visible. The dull grey concrete, vast amounts of steel and glass, and hyper-advertising were now prevalent. The space, denied of its "true colours," was dirty, crowded, and hectic. It was, by all accounts, just another crowded intersection in a major city.

Shortly after this visit, my exploration into light began. I found my thoughts returning to Times Square consistently, specifically the fascinating and troublesome

contrasting versions of Times Square. How far have we come, that we can create spaces meant to be experienced free of natural light? Times Square is an artificial space created by vast amounts of artificial light, carved out of the depth of darkness beyond and above. It is evidence that we can now push back the darkness at will. So, what becomes of the night? And what becomes of natural light, the most essential facet of Earth's ecology? In order to explore these questions, we must take first consider light itself as a topic for investigation.

Light as a Topic of Inquiry

Reflecting on my inspirations for writing about light, the experience of visiting Times Square carries a strong resonance. Where ideas originate I cannot say, but I can conclude that visiting Times Square was an instance where something "everyday" was perceived in a new way. Living in Toronto, and growing up in southern Ontario, I have been surrounded by outdoor electric lights – street lamps, neon signs, billboards, etc – my entire life. Yet that particular experience allowed me to understand this phenomenon in a new way, to see it from a different vantage point. In the concluding pages of *Catching the Light*, Zajonc emphasizes the importance of epiphanous moments, or moments of insight, for the development of knowledge. "For millennia one can see the sun rise and never notice the rotation of the earth… We can wake each morning for sixty years to the glow of the dawn and never see light" (342). We consistently pass by the immediate lived experience of a phenomenon and move towards an abstract notion, thought to be the true reality. What is needed, urges Zajonc, is the development of our ability for insight through an attentiveness to these moments of epiphany. This is perhaps the central task of my research: to take the phenomenon of light, as presented in the lived experience of three built sites in Toronto, and attempt to see those experiences from a slightly altered vantage point. The goal is to look behind the light we typically "see" and re-discover the light given to our senses. I will

be *holding light up to the light*, or "holding a candle to the Sun to see the Sun better" (Kahn, "Silence and Light" 231).

I will examine the environmental implications of a phenomenological investigation of light. A great deal has been written on the varied scientific, philosophical, and religious theories of light. Likewise, architects and architectural theorists have said much regarding lighting. Yet there is little literature that explores the philosophy of light and lighting from an explicitly environmental perspective. Lighting is often considered via its various quantitative aspects in environmental thought, but little attention is given to the underlying presuppositions informing our conceptions of light. My research will merge philosophical and architectural theories of light within an environmental framework, opening a new avenue for exploration. Such an investigation will prove relevant for a range of disciplines, but should first and foremost be understood as an exercise in environmental thought with implications for architectural theory. I am examining built environments as embodied manifestations of our understanding of light.

Light has been a focus of theologians, philosophers, artists, and scientists for centuries. Some of the greatest thinkers in history, from Plato to Newton to Einstein, all spent considerable time searching for the "true nature" of light, yet it has consistently eluded capture. To move forward with a relevant exploration, we should not try to find some "true nature" but explore how light manifests itself in our experiences. What is needed is not a final truth concerning light, but a reflexive and relevant understanding of how light participates in our daily lives.

> The transformations of cultures over time have had profound effects on the insights humanity has had into nature. We have seen the character of successive ages reflected in the images they have made of light. These form a sequence, not of disjointed fragments, but a whole that unfolds in time, a series of awakenings that bespeaks an inner evolutionary development... The very existence of that transformation suggests the possibility of further evolution, individually and culturally, and the possibility of relinking the moral and sensual, the physical and spiritual, in a fresh, unitary imagination. Past change occurred with little

self-consciousness. Mistakes could be left behind. The time of unconscious change is over, as environmental and nuclear hazards daily bring home to us. We now inhabit the entire planet, and have learned the potency of our accomplishments. Future evolution must be shaped self-consciously. (Zajonc 337-8)

Light can be considered both as a physical phenomenon, and also as a conceptual one. It is the boundary between the physical and the metaphysical, between space and ideas. In our time of growing environmental concerns, a conscious interpretation of light in required. At best, we may find some aspect of experiencing light that draws us out of ourselves and allows us (and our built environment) to participate in the cosmos, to access our connectedness to the more-than-human world[1] in some small way.

Note on Paper Structure

I used phenomenology as a conceptual framework and research method,[2] and so did not have a thesis guiding my investigation – an important aspect of phenomenological research is to allow for flexibility in research and outcome (van Manen, *Researching Lived Experience* 13). Rather, my inquiry was formed around an initial question: how can experiences of light in built environments provide a source of connectedness between humans and the more-than-human world; and, conversely, how does mediated or artificial lighting act to reinforce the conceptual division between *built* and *natural* environments? As a work of phenomenological research, I began my study without a firm conclusion in mind. Throughout my literature review of light and lighting, ideas began to form. When I started writing I had a general direction and layout, both of which have changed dramatically since. Hence, the process of discovery through research and writing has served as the primary output.

---

[1] The term "more-than-human world," which will be used throughout in reference to the natural world beyond humans, is borrowed from David Abram's *The Spell of the Sensuous*.
[2] See Chapters 2 and 3 for my conceptual framework, and Appendix – "Research Methods" for a detailed account of my research methodology.

The following chapter will contextualize the present research in relation to contemporary trends in green architectural theory, with an emphasis on the need for green design to move beyond quantitative ways of knowing. I will make the argument that environmental thought is an extremely relevant avenue for research in architectural theory. Chapter 3 will focus on the theoretical framework for the present inquiry, namely a merging of architectural and ecological phenomenology (within the larger fields of architectural theory and environmental thought, respectively). Chapter 4 is a phenomenological investigation of light, examining the tension between firsthand experiences and abstract metaphors used to understand light. Chapters 5-7 are case studies of three built sites in Toronto, meant to build on the explorations in Chapter 4. The case studies will be structured as first-person phenomenological writings, with scholarly *touchstones* added to complement the descriptions. The first-person accounts build on the experiential understanding of light first discussed in Chapter 4. The touchstones are meant to expand on metaphorical understandings that each space embodies, thereby enriching the firsthand observations. The three sites are: Dundas Square, the Terrence Donnelly Centre for Cellular and Biomolecular Research (CCBR), and St. Gabriel's Passionist Parish. All are recently completed sites – Dundas Square is an outdoor urban public space, the CCBR is an explicitly green academic building, and St. Gabriel's is the first LEED-certified church in Canada. As such, the case studies represent areas of key importance for future green design practice.

<p style="text-align:center">* * *</p>

"In the middle of the forest there's an unexpected clearing which can only be found by those who have gotten lost."
<p style="text-align:right">*-Tranströmer, "The Clearing" (qtd. in Stoner 141)*</p>

When searching for light, it is easy to get lost. However, in the process we may catch a glimpse of the "unexpected clearing," where our society's meaningful interpretation of light rests. Disentangling our varied ideas of light is as difficult as separating the sun from

the light it emits, yet it must be attempted if we are to create a quality of lighting in architecture that may engender an environmental ethic within us. Light's "true nature," or the elusive "first light" that scientists and philosophers seek, is really a metaphor for the "connective tissue weaving together all of existence" we so often look for (Zajonc 325). Searching for light reveals many intricacies and mysteries, but at the centre of the clearing there is perhaps only a reflection of us. When looking for light, we can only hope to find our values, our aspirations, and ourselves. "Again and ever again, it is ourselves whom we study in studying light" (Zajonc 329). By nature, light is only ever what we *choose to see* as light. As the quote from Zajonc beginning the introduction implies, examining that reflection will have a resonating effect within environmental thought, architectural theory, and beyond.

Questioning Architecture:
Ecological Design as a Qualitative Field of Inquiry

Environmentalism and Architecture

Architecture and design face necessary changes. Societies around the world are confronted with ever-increasing environmental concerns, causing designers to incorporate new models and technologies. An important development has been the Leadership in Energy and Environmental Design (LEED) Green Building Rating System and professional accreditation. In their own words, LEED "encourages and accelerates global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria" (Canada Green Building Council). The LEED rating system is predominately concerned with technical efficiencies, focusing on issues such as energy consumption, water usage, and indoor air quality. The resultant standard implies that a skyscraper or mansion built more efficiently than its predecessors has been officially "greened."

Technological interventions are, of course, extremely important, but are not sufficient for a truly ecological architecture.[1] The primary shortfall of this technological strand of green architecture is that it operates within a preexisting design paradigm. As Buchanan explains in *Ten Shades of Green*, most contemporary architecture (green or otherwise) conforms to either modern or post-modern paradigms (29). Modern architecture is a reflection of modern culture, born of reductive and instrumental thinking focused on capitalism, growth, and maximizing profit. While early modern architecture sought to critique industrial society's exploitation of nature, it too was eventually co-opted by governmental and commercial clients. The tenet of "functionalism" became an excuse for universalism and utilitarianism with regards to standards and cost. Ironically, the functionalist style, adopted worldwide, has proved to be dysfunctional in many climates (Buchanan 16). Post-modern architecture was a reactionary (at least in some of its expressions) and temporary successor to modernism, based on "spurious theory" and with little staying power (Buchanan 29). The resultant architecture of the 20th century relied heavily on an industrial aesthetic and ideology. Light, within this paradigm, has fallen into prescribed technocratic categorizations – natural light must be "maximized" in green design, or is a source of heat and electricity to be harvested. It becomes a quantifiable and controllable feature, existing mainly as one "checkmark" on a long list of design strategies.

Discussing the relationship between architecture and nature, in *The Dynamics of Architectural Form*, Arnheim defines two approaches (214): we can see ourselves as rational creatures superior to nature and use geometrical forms, thus setting us apart from the inferior wilderness. Or, we can see ourselves as an "outgrowth" of nature and attempt to

---

[1] The adjectives *green*, *sustainable*, and *ecological* are used throughout this Major Paper. While all describe the same general practice, I would like to distinguish between their meanings. I am using *green* and *sustainable* to describe technical and superficial approaches, and *ecological* to describe design approaches that incorporate technologies into a larger philosophical framework attempting to facilitate a relationship between humans and nature/natural processes.

design in harmony with natural surroundings. Buildings could grow out of the landscape

and take biomorphic shapes, as was the intention of Frank Lloyd Wright's *Organicism*. Both

approaches carry strong symbolic statements regarding how we understand our existence

within, and relationship to, our surroundings (Arnheim 216). While these two opposing

approaches may be oversimplifying the issue, the idea presented is important – how should

we conceive of our culture and our selves in the world, and in relation to nature?

Presuppositions underlying design theory must be scrutinized alongside technical

interventions. Green, or sustainable, architecture operating within an existing paradigm

may only reduce negative impacts, inextricably failing to address any fundamental changes

in the relationship between built and natural environments. Various designers have looked

for more radical starting points, since the "eco-efficiency" of current practice runs the risk of

simply destroying Earth at a slower pace (McDonough and Braungart 61-3). Buchanan

explains that green design must transcend "mere energy efficiency and the minimization of

pollution" (19), allowing nature time to repair and regenerate. In *Cradle-to-Cradle*,

McDonough and Braungart argue for an eco-*effective* design strategy that contributes to the

health of natural systems and produces no lasting degradation. In *Building for Life*, Kellert

argues for a design philosophy that supersedes minimizing negative impacts and is

reciprocally restorative for humans and nature. The resulting designs would incorporate

natural materials, forms, and processes as viable alternatives to dominant modes of

building, while also examining forgotten traditional design wisdom.[2] In summary, a

questioning of the relationship between social and natural systems is underway, with a

particular focus on the mediating role of the built environment.

The above theorists, and others, often advocate for a foundational *environmental*

ethic informing design practice; this is the focal point for my research. Before designing, or

---

[2] The anthology *Sustainable Architecture White Papers* (2005) provides a wide range environmental
initiatives and practitioners currently working in this field.

establishing theories of design, a critical examination of the fundamental assumptions

informing our thinking about architecture must occur – we need to think about *how we*

think about architecture. Technological innovations provide a ready response to

environmental concerns, but are limited to short-term tools, thus failing to investigate the

evolving relationship between humans and the more-than-human world. What LEED (and

other similar approaches) gives is an *answer*, but what is needed is a deeper questioning of

our cultural assumptions, our design assumptions, and our place in the world. "Hence, the

design of green buildings must involve more than resolving technical and ecological issues

to also address social and spiritual ones" (Buchanan 13). While Buchanan's "10 Shades of

Green" are largely concerned with technological and health-related issues, his tenth shade,

Community and Connection, opens up an important philosophical discourse:

> The mind set that tolerated our destruction of the natural world and the
> legacies left to us by history depended on the suppression of a sense of
> connection with each other, nature and the cosmos, as well as to past and future
> generations. If a green architecture is to help bring about a sustainable culture,
> it must regenerate a sense of community and connection to, even communion
> with, the natural world... The ultimate ideal would be an architecture that
> fostered in various ways a deep sense of communion with nature and the
> cosmos. (37)

Similarly, Wines states, "The mission now in architecture, as in all human endeavor, is to

recover those fragile threads of connectedness with nature that have been lost for most of

the century" (18). For Wines, this can only be achieved by bridging "conservaion

technology" with an "Earth-centric philosophy" (18).

This is Not About Architecture

If architecture is to recover our forgotten relationship with nature, architectural

theory must seek to understand *what* that connectedness is. To achieve this goal, we must

interrogate the ethical basis for designing by incorporating the explorations of

environmental thought into design theory.[3] As Deluca explains, "…environmentalism has always highlighted the importance of how we think about the environment, that ideas of nature are powerful because practices follow from ideas. In other words, how we think about nature guides how we act towards nature" (68). If so, our conceptualization of the relationship between built and natural environments is paramount for architectural theory.

Architecture possesses a rich potential for philosophical investigations from an environmental standpoint, despite the "anti-urban bias" traditionally found in environmental thought (Light and Wallace 4-10). Buildings are uniquely positioned as agents of change, due to their ability to reflect, affect, and comment on cultural values. "At the moment of its creation, architecture is bound to the present in a very special way. It reflects the spirit of its inventor and gives its own answers to the questions of our time through its functional form and appearance, its relationship with other works of architecture, and with the place where it stands" (Zumthor, *Thinking Architecture* 23). King, in "Environmental Ethics and the Built Environment," adds an environmental ethic to this position, arguing that "we consider how we might critique the contemporary built environment and envision one more in consonance with environmental aspirations." (116). He continues,

> …we need to understand the metaphorical usefulness of this concept of the margin between the built and the wild. Buildings, cities, and domesticated spaces of all kinds function in part as permeable margins between the human and the nonhuman world, articulating and ramifying human interactions with the nonhuman world… The very material of our buildings, their relationships to one another in space, the degree to which their structures are sensitive to the forces of sun, wind, and water, and the extent to which our buildings enhance human well-being or promote illness, all these dimensions of the built environment mediate between the human and the natural world. How we build and design our world will have a profound effect on our ability to perceive "through" that built medium to connect with a wild nature beyond it. (129)

---

[3] I am using the term *environmental thought* in place of *environmental philosophy* to better represent the diverse range of frameworks and resources within environmental studies. Here ecophenomenology is of primary concern, but research in philosophy, literature, nature writing, cultural studies, art, ecofeminism, etc can have ramifications within architectural theory.

King's beliefs clearly resonate with the aspirations of Buchanan and Wines. Given

architecture's cultural importance, architectural theory cannot be left out of environmental

thought (and vice versa). Architecture needs to carefully draw inspiration from

environmental thought, fulfilling its duty to provide spiritual as well as physical shelter

(Harries 17). What is needed, as Harries states, is architecture that "transforms our

understanding of how we should live… A greener architecture is needed, not just to address

ever-more unavoidable environmental problems but, more fundamentally, to help bring

about a change of heart" (17). Leopold stated in relation to his Land Ethic that, "We can be

ethical only in relation to something we can see, feel, understand, love, or otherwise have

faith in" (214). As such, a truly ecological vision of architecture needs to include more than

just physical characteristics.

I will be proceeding from the stance that environmental concerns are a cultural

question more than a technological problem. As Evernden explains,

> It is not a question of our encountering the crisis and resolving it through
> technology. The crisis is not simply something we can examine and resolve. We
> *are* the environmental crisis. The crisis is a visible manifestation of our very
> being, like territory revealing the self at its centre. The environmental crisis is
> inherent in everything we believe and do; it is inherent in the context of our
> lives. (128)

There is no environment "out there" that we can separate ourselves from, just as we cannot

isolate our buildings from the natural world (the devastating natural disasters of the past

few years serve as somber reminders of this fact). Addressing environmental dilemmas, and

thus potential architectural "solutions," requires a careful consideration of our beliefs

regarding *natural* and *built* environments, and our own involvement in the more-than-

human world.

Moving forward, ecological design must be re-opened for questioning, allowing

poetics and philosophical pondering back in. We must explore ideas to see where they lead,

and not walk head-down toward the "answer" to an ill-conceived question. My current

research looks for a deeper understanding of light – not a specific design intervention that

uses light, but the theory that can inform that design. I will be utilizing phenomenology, and

more specifically the developments in architectural and ecological phenomenology, as a tool

for reaching this goal. Through detailed descriptions informed by environmental thought,

one can interrogate the built environment for its ecological (dis)connectedness. In the book

On Architecture, Rush ponders whether an embodied experiential understanding could elicit

a re-conceptualization of architecture (47). I would like to expand on that question and ask:

can the concept of an embodied experience of architecture, when combined with

environmental thought, engender a shift in values, or at the least a raised level of ecological

consciousness?

Phenomenology:
Theoretical Framework

There is a power in the ordinary things of everyday life...
We only have to look at them long enough to see it.
-Zumthor, Thinking Architecture 17

To search for "epiphanous moments of insight" into light, as Zajonc urges, we must attempt to break free of conceptual abstractions and return to lived experience. Thus, an interrogation of our built environment, searching for the seeds of connectedness contained within, can benefit from the methodological tools of phenomenology.

The following is a brief discussion of phenomenology, and more specifically its architectural and ecological sub-disciplines. It must be noted, however, that the goal is not to convey a complete or extensive overview of phenomenology, or these sub-disciplines. The following discussion represents a critical selection of phenomenological ideas that are relevant to my current exploration.

In Search of the Experiential Basis of Experiences

Phenomenology can be defined as the exploration and description of phenomena,

where *phenomena* refers to anything that can be experienced (Seamon). Or, considered

more poetically:

> Phenomenology is a project of sober reflection on the lived experience of
> human existence- sober, in the sense that reflecting on experience must be
> thoughtful, and as much as possible, free from theoretical, prejudicial and
> suppositional intoxications. But, phenomenology is also a project that is driven
> by fascination: being swept up in a spell of wonder, a fascination with meaning.
> The reward phenomenology offers are the moments of seeing-meaning or "in-
> seeing" into "the heart of things" as Rilke so felicitously put it. Not unlike the
> poet, the phenomenologist directs the gaze toward the regions where meaning
> originates, wells up, percolates through the porous membranes of past
> sedimentations—and then infuses us, permeates us, infects us, touches us, stirs
> us, exercises a formative affect. (van Manen, "Phenomenology of Practice" 12)

Phenomenology is generally descriptive instead of explanatory, focusing on sensorial

experience. The goal is not to explain a phenomenon, as is the aim of positivist sciences, but

to return to taken-for-granted subjective experience and pay close attention to all its

subtleties – hence phenomenology's call for a return "to the things themselves." However, it

was never envisioned as a rejection of scientific endeavors, but rather an attempt to ground

them in the experiences from which value and meaning emerge (Abram, *The Spell of the*

Sensuous 33-6). Merleau-Ponty's comments, while describing the approach of the artist

Cézanne, encapsulates phenomenolgy's aim: "The task before him was, first, to forget all he

had ever learned from science and, second, *through* these sciences to recapture the

structure of the landscape as an emerging organism" ("Cézanne's Doubt" 67).

Of the diverse approaches to phenomenology, the method of close description in

search of underlying meaning serves as a unifying criterion. "Phenomenological researchers

generally agree that our central concern is to return to embodied, experiential meanings.

We aim for fresh, complex, rich descriptions of a phenomenon as it is concretely lived"

(Finlay 6). In order to achieve this goal, researchers employ the *phenomenological reduction*,

or "bracketing." In its most basic form, bracketing is an act of temporarily doubting an

object or event's existence, allowing one to isolate firsthand experience from conceptual abstractions. Evernden explains the method by stating, "Perhaps we may at first think of phenomenology as a kind of deliberate naivety through which it is possible to encounter a world unencumbered with presuppositions" (57). Through bracketing, the goal is to achieve a *phenomenological disclosure*, where the phenomenon in question reveals itself in a different or more complete way (Seamon). There is no punch line or summarizing thesis in phenomenological texts, but a gradual revealing through questioning, observing, and writing (van Manen, *Researching Lived Experience* 13). Seamon explains that, "The best phenomenological work breaks people free from their usual recognitions and moves them along new paths of understanding."[1]

Architectural Phenomenology

Phenomenological insights were integrated into architectural thought as early as the 1960s, and are even credited with helping form the academic discipline of architectural theory (Otero-Pailos xiii). The first generation of theorists, such as Norberg-Schulz, sought to expand architectural understandings to include elements of experiential and historical significance; these investigations were often Heideggarian and based on ideas of *dwelling* and *place*. Otero-Pailos' account of phenomenology within architecture, *Architecture's Historical Turn*, explains that phenomenology's popularity within architectural thought waned during the 1980s, superceded by post-modernism and deconstructivism (23). While some consider architectural phenomenology to be a "has-been" discipline, its description of experiences still offers an entry point for uncovering unexamined and significant aspects of human engagement with built environments (Rush 4-6). A small but strong contingent of

---

[1] See Appendix – "Research Method" for a detailed discussion of how I utilized phenomenology as my research method.

philosophers and academics now utilize phenomenology as a critical tool, more commonly than architects themselves.[2] There is also a small group of contemporary practioner-theorists utilizing phenomenology in their designs and writings, predominantly concerned with a "phenomenology of embodiment" rather than historical meaning (Otero-Pailos 12). Wang and Wagner define this approach as an "individual phenomenology," focusing on the immediate and subjective sensorial engagement of a person with their surrounding (11).

An early example of this embodied approach is Rasmussen's *Experiencing Architecture*, from 1959. Rasmussen provides a detailed and descriptive account of understanding built environments, exploring the diverse physical attributes one may encounter when confronted with an architectural space: hard vs. soft forms, heavy vs. light appearances, colours, lighting, sounds, scale and rhythm, etc. A more recent example is Pallasmaa's *The Eyes of the Skin*, which argues for an understanding of architecture that goes beyond visual prejudice and explores experience through all the senses. Pallasmaa's goal is to "reconstruct the experience of an undifferentiated interior world, in which we are not mere spectators, but to which we inseparably belong" (16). Zumthor's writing focuses on the atmospheric quality of buildings, and is concerned with aspects of architecture that can create a memorable or significant experience (*Atmospheres* 11). Holl is perhaps the most explicitly concerned with phenomenology, specifically the writings of Maurice Merleau-Ponty (*Parallax* 302-5). He writes mainly on incorporating an embodied design process into architecture, while also considering the experiential effects of built environments. These theorists all share a phenomenological focus, and therefore are concerned with how experiences can be described and interpreted.

Using the vocabulary and insights offered by writings within embodied architectural phenomenology can assist in closely and consciously examining firsthand experiences.

---

[2] The *Environmental & Architectural Phenomenology Newsletter*, in publication since 1990, acts as a clearinghouse for academics and professionals to explore phenomenology-related design issues.

Plummer, in *The Architecture of Natural Light*, explains the usefulness of the phenomenological method for examining lighting in architecture, stating, "By suspending judgment and grasping things in a kind of primal encounter, it becomes possible to discern the most elusive and subtle aspects of buildings, including aspects of light we fail often to consciously notice" (12). Great architects throughout the 20th century, explains Plummer, became interested in the immaterial aspects of buildings. Louis Kahn, Frank Lloyd Wright, Le Corbusier, and Alvar Aalto began to question whether light "exists in its own right," not merely a vehicle for making other things visible (10). This led to an exploration of lighting effects with profound experiential resonance. While the larger trajectory of modern architecture may have abandoned these phenomenological inquiries (see Chapter 2), Plummer believes that Pallasmaa, Zumthor, and Holl have revived the exploration of lighting from Kahn, et al through writing and designing (13).

Thus, the embodied stream of architectural phenomenology provides a strong framework for discovering significant experiences of light in built spaces. However, these descriptive tools predominately portray an ethical ambivalence towards environmental dilemmas or human-nature relations. To infuse environmental ethics into phenomenology, I have turned to ecophenomenology.

Ecophenomenology

Ecological phenomenology, or ecophenomenology, is a recent sub-discipline of both phenomenology and environmental philosophy. Its origins are often credited to Kohak's *The Embers and the Stars*, from 1984, and Evernden's *The Natural Alien*, from 1985. Evernden uses the tools of phenomenology to examine environmentalism and ecology, concluding that the very idea of an environment separate from humans is a fundamental problem. Instead, argues Evernden, environmentalism is not about an environment *out there*, but

about *relationships* (142). Abram's *The Spell of the Sensuous* is another major contribution, in which he undertakes a detailed phenomenological investigation of the relationship between language and the natural world. Brown and Toadvine's edited collection, *Eco-Phenomenology*, helped solidify the field as an emerging area of inquiry.[3]

Ecophenomenology is any phenomenological investigation infused with an environmental ethic. Phenomenology's purely descriptive focus poses a potential shortcoming (Langer 117), however the incorporation of an ethical stance from environmentalism offers it new directions. Likewise, environmental thought stands to benefit from phenomenology's central task, which is "to activate and reactivate the complex articulations and relations of things, restoring through description, through dramatization, a participatory engagement (bodily, imaginative, etc) with things" (Wood 215). Thus, ecophenomenology is a cross-disciplinary framework that is based on two claims:

> ...first, that an adequate account of our ecological situation requires the methods and insights of phenomenology; and, second, that phenomenology, led by its own momentum, becomes a philosophical ecology, that is, a study of the interrelationships between organism and world in its metaphysical and axiological dimensions. (Brown and Toadvine, xii-xiii)

A return to subjective, sensory experience, ecophenomenologists assert, can move beyond conceptual abstractions and foster moments of insight regarding our connectedness to the more-than-human world. Describing the relationship between environmentalism and phenomenology, Wood asserts that ecophenomenology is both an ecological phenomenology and a phenomenological ecology, offering a middle ground for reciprocal exploration (231).

Ecophenomenology has many pathways, but research originating with French phenomenologist Maurice Merleau-Ponty (1908-61) best complements the embodied approach to architectural phenomenology. Merleau-Ponty's writings on embodied

---

[3] Additionally, journals such as *Environmental Values*, *Environmental Ethics*, and *Environmental Philosophy* have featured contributions utilizing or discussing ecophenomenology.

experiences, and art, provide a relevant base for investigating the relationship between oneself and their built surroundings, including lighting. Merleau-Ponty's *Phenomenology of Perception* is often regarded as his "magnum opus." However, his last and unfinished work, *The Visible and the Invisible*, is often cited by ecophenomenologists. Of particular interest in this work is the chapter "The Intertwining – The Chiasm," in which Merleau-Ponty introduces the concepts *intertwining* and *flesh*. These terms are often surrounded by ambiguity, caused by the inadequate explanation given by Merleau-Ponty (because of his sudden death) and the radical nature of the ideas (Brook 354-5). However, some philosophers believe these ideas may be key for a transformation in environmental thinking, as Merleau-Ponty was attempting to overcome the division between person and environment present in his earlier writings (Hansen 234). He was attempting to describe our engagement with the world through an all-encompassing medium, or *flesh*, in which all things are interacting and reciprocating, or *intertwined*. These concepts can perhaps be best understood through Merleau-Ponty's usage of the word *chiasm*, which denotes a crossing over of two things (usually in an "X"). It is the point of convergence that Merleau-Ponty focuses on, the exchange between person and world (Merleau-Ponty, *The Visible and the Invisible* 215). It is important to note that *flesh* does not denote some new "stuff" apart from subjects and objects, but speaks to the interaction between things within a holistic medium (Brook 357). "The Flesh is the mysterious tissue or matrix that underlies and gives rise to both the perceiver and the perceived as interdependent aspects of its own spontaneous activity" (Abram, *The Spell of the Sensuous* 66). The chiasmic and participatory relationship itself becomes the focus of Merleau-Ponty-inspired environmental philosophy (Abram, *The Spell of the Sensuous* 128).

Langer sees Merleau-Ponty's relational philosophy as potentially having the most to offer environmentalism of any phenomenologist, but also feels that his philosophy can be

enhanced by environmental thought (117). As such, *Merleau-Ponty's concepts should not be treated as dogmatic, but as entry points for ecologically significant philosophical inquiries.* Many environmental philosophers work with Merleau-Ponty's phenomenology in a traditionally academic manner, but others, such as Abram, see a new direction within his work. "How might a writer deeply informed by Merleau-Ponty's investigations begin to address (in a manner accessible not only to philosophers and scientists, but to curious persons of any background) the fragmentation of human experience, and of nature, at the start of the twenty-first century" (Abram, "Earth in Eclipse" 150)? The insights offered by Merleau-Ponty, and those influenced by him, provide a useful framework for investigating ecological connectivity within built spaces. Merleau-Ponty offers a re-oriented understanding of humans and their existential setting, focusing on relationships and interconnections rather than separation and categorization. Paramount is the notion that engaging in a Merleau-Pontian investigation is to "*begin not with thoughts but with our body's engagements with the earth* – with inter-corporeal activities" (Liberman 41).

Questions of Scale

After comparing embodied architectural phenomenology to ecophenomenology, one may note the striking differences in scale. Embodied architectural phenomenology deals with intimate encounters in specific spaces, while ecophenomenology is concerned with large, existential questions focused on the relationship between humans and nature. The apparent disparity between these scales presents a difficult tension, but it also the source for an interpretive and ethical positioning. As noted in Chapter 2, a central aim is to uncover architecture's potential service as a site for reinforcing the connectedness between humans and nature. Embodied architectural phenomenology provides the tools for a detailed investigation of a particular site, and ecophenomenology can infuse this with an ethical

orientation. Ecophenomenology speaks about our inextricable relationship to nature;

embodied architectural phenomenology can assist in expressing and describing this idea.

Just as Wood conceived of ecophenomenology as both an ecological phenomenology and a

phenomenological ecology, my research can be envisioned as both environmentally

conscious architectural theory and architecturally relevant environmental thought. As such,

a hybrid of these two sub-disciplines provides an ideal domain for accessing our thinking

about thinking about architecture.

Architectural phenomenologists have alluded to connectedness and ecological

concsciousness arising from spatial investigations, and the possibility for an environmental

ethic in architectural theory. McCann believes that Merleau-Pontian thought can restructure

architectural design into an "intercorporeal act—an expression of deep carnal kinship in

which our engaged sensory experience of the world gives rise to an expressive carnal echo

of the experience" ("Wild Beauty" 5). Elsewhere, McCann states,

> All architecture entangles its designer and its inhabitants with the larger world,
> blurring subjective boundaries and intertwining vision and visibility, sensing
> and sensuousness, movement and spatiality. By understanding the implications
> of Merleau-Ponty's work for both the design and experience of architecture,
> recognizing in particular the importance of movement and materiality, we can
> establish a relationship with architecture that reveals the intertwined and
> intersubjective nature of the Flesh. ("Entwining the Body and the World" 278-9)

Likewise, ecophenomenologists have written on built environments and the boundaries

between built and natural spaces. Abram, in *Wood and Stone*, undertakes a poetic reading of

his home, exploring the sentience of materials and the constant interaction between himself

and his home. Abram concludes that, "One's relation to one's house… is not a relation

between a pure subject and a pure object – between an active intelligence, or mind, and a

passive chunk of matter" (181). Rather, it is one of reciprocity. Whether we choose to

acknowledge it or not, Abram alludes, we are influenced and informed by the materials

from which our buildings are constructed. Out of McCann and Abram's investigations, the

relational core of experience shines through, allowing new questions regarding

architectural theory to emerge.

  The task is to take a pragmatic approach with these theories. The following four

chapters will investigate the phenomenon of lighting in detail.

Finding the Light:
Experiential and Interpretive Understandings

We now turn to light itself. Before exploring the lighting at three different sites in Toronto, some discussion of our varied cultural understandings of light is required. After undertaking a phenomenological analysis of light, there is an exploration of metaphors and their application to comprehending light. My goal is not to present an exhaustive synthesis of the long and complex history and theories of light. Rather, I will be extrapolating from the insights and conclusions of various scholars, to help illustrate the interpretive quality that is present in our experiences of light. Three specific categories of "metaphorical overtones" will be elaborated on, as they serve to enrich discussions in later chapters. A phenomenological (re)analysis of light will conclude the chapter.

The following discussion is largely informed by two historical surveys on light, Arthur Zajonc's *Catching the Light* and David Park's *The Fire Within the Eye*. Furthermore, David Grandy's *The Speed of Light* has served as the primary source for my phenomenological analysis of light.

Seeing the Light

To begin a phenomenological investigation of light, the tools that phenomenology supplies must be applied, so as to bring unbiased attentiveness to light as it presents itself in daily experiences. However, this conceptually simple task quickly becomes complicated, when trying to operationalize a phenomenological methodology. It is not wholly possible to apply the phenomenological method of bracketing to light. As I sit here and type, I am trying to locate *light* in this space (a reading room in York's Scott Library). I know the light sources – the overhead fluorescent tubes and surrounding windows. I can see what is illuminated – the desk, my computer, my hands, etc. But I still have not focused on light itself. A room "full of light" is not envisioned as a space packed full of material substance, but a space where the surfaces are brightly lit. "Light is there, but you look through it without seeing it" (Park 50). Seeing light independently, as has been known since Plato, is no easy task; in fact, light is impossible to disentangle from our perception of the objects light illuminates (Grandy 89). "Light is such that we cannot see it without seeing *by* it, a fact that keeps us from separating light from our experience of light – the two are coincidental" (Grandy 49). An investigation into experiential light inevitably becomes a discussion of light*ing*, or light's characteristics, effects, and results. Light becomes an interaction between the world and us, unable to be isolated for examination through lived experience.

> ...light and eye are not sufficient for the experience of light. That experience registers only when material surfaces are thrown into the mix. So while it may be convenient to think of light as something apart from the experience of light, there is no empirical basis for such thinking. Light shows up or announces itself only at the interface of physical and perceptual reality. That no doubt is why light moves as horizons move – with our motion in mind, as it were, because our mindful awareness of the world is already implicated in the world's reality. (Grandy 43)

Light presents a visual paradox, being always present yet never an autonomous "thing." This elusiveness from direct experience has been a source of fascination for

millennia. The mysterious, otherworldly qualities of light have preoccupied religion, science, literature, and art in many societies throughout human history. When examining larger historic trends in our understanding of light, such as those by Zajonc and Park, a simple yet revelatory conclusion can be reached: light itself has not changed throughout the centuries, only our definitions have. As Zajonc states,

> Over millennia, cultures have embraced and discarded countless images of light. Within a single lifetime, likewise, we have lived within and shed successive understandings of light. Through research, artistic praxis, and quiet contemplation, light's elusive being constantly re-creates itself in our mind's eye, offering fresh epiphanies to every generation. (343)

Understood in this way, *light only ever "is" its interpretation*. There is difficulty bracketing presuppositions informing our understanding of light, since those pre-conceived notions, and not direct experience, shape our knowledge of light as an isolated phenomenon. The intertwining of light and experience cannot be unwound, therefore abstract concepts, often manifesting as analogies and metaphors, become necessary for explaining light.

Time and time again, there has been a final, true nature of light revealed by theologians, philosophers, and scientists. Yet, each theory has eventually been altered, forgotten, or discredited entirely. These numerous meanings placed onto light have been continually layered, creating an experience of light blurred by various connotations and symbolism. As Arnheim explains,

> Symbols could not rely on the expressive qualities of sensory experience if that experience were not endowed with metaphoric overtones in daily practice. Sunlight streaming through the windows when the shades are raised in the morning is not perceived as a mere change in brightness level. Only because it is received as a gift of life, exposing the world to us and us to the world, can illumination serve us as a broadly valid symbol. (209)

A phenomenological investigation of light becomes an attempt to disentangle firsthand experience from layers of interpretive and metaphoric overtones.

Some Thoughts on Light as Metaphor

Metaphors are effective at bringing forward ideas that would otherwise be difficult to articulate, helping to provide meaning to experience. When explaining something inaccessible, such as light as an isolated object, metaphors become particularly powerful. In the anthology *Poems for Architects*, Stoner describes metaphor as the tool that has "flourished inexorably" in poetry (4). By giving one thing the name of another, a metaphor confers a symmetrical reciprocity between two things and diminishes the conceptual distance between them. An idea and an object intermingle. Through the use of metaphors, cities, buildings, and life itself can become a "forest of symbols" (Stoner 4). In this sense, metaphors become a tool useful for interrogating architecture. In *Questions of Perception*, Holl discusses the importance of "extra-architectural" ideas, and specifically literary metaphors, for providing a unique meaning to architectural design. The effort of holding together these two incongruous things (a literary metaphor and a functional program) can create a dynamic tension and symbolism for the resulting design (119). Ideas move outwards from abstraction and into architecture.

McKay, in *Vis à Vis*, a collection of essays on poetry, meditates on the tension between language and experiences. He argues that language and writing are technologies used to access the world, a "remembering apparatus" (65). Of particular interest for McKay is the prevalence of metaphors in poetry. He believes they allow wilderness to re-enter our language, to show language's own inadequacy (85). A metaphor claims a falsity that poses as a truth, since the comparison is needed to explain the subject in question. "With a metaphor that works we're immediately convinced of the truth of the claim *because* it isn't rational" (69). With light, however, metaphorical understandings and light itself often become blurred; we loose sight of the irrationality of metaphors that McKay finds so effective. At this point, the metaphor becomes rational – it ceases to be a descriptive technique, or a tool for design, and becomes factual.

In *The Poetics of Space*, Bachelard dismisses the value of metaphors for a phenomenological study, calling their usage an ephemeral and "fabricated" image without genuine roots (74-5). In *The Flame of a Candle*, Bachelard reflects on the dangers of taking metaphors as fact. Generally, explains Bachelard, we contemplate reality by "metaphorizing" it (20). However, when irrational comparisons between familiar phenomena begin to create a symbol, the difference between what is perceived and what is imagined dissolves. A flame is no longer an *object of perception* but a *philosophical object*. At this point, concludes Bachelard, "anything is possible" (21). A flame, or light generally, is now open for interpretation.

Throughout *Catching the Light*, Zajonc stresses the troublesome issue of conceptual models morphing into factual accounts. Whether poetic or scientific, the various images of light have always been subjective. The intentionality directed towards light helps to give experiences meaning, but it is highly interpretive. When this is forgotten, images become false idols (37). Theories of light can aid reflection and assist in a fuller understanding of light, however when analogous theories are understood as truthful accounts they hinder insight rather than promoting it (306). What may begin as a conceptual model for clarity (*"light is like…"*) can mutate over time into something taken literally (*"light is…"*). Light becomes purely symbolic, a representation of an abstract idea. At this point, light is a *means to an end* – to its metaphorical representation – and no longer an end in itself. It becomes an attribute of the "other." Due to light's simultaneous commonness and elusiveness, it has fallen victim to this secondary categorization time and time again.

When metaphorical understandings are adopted without question, we pass too quickly over lived experience and the insights it can provide. This has manifested in our language, our ideas about light, and our built environments. To better confront our current

and potential understandings of light, we must first examine those images buried but not forgotten.

Metaphors Buried but Not Forgotten

The following is a brief analysis of three metaphorical understandings (cosmologies, mathematization, and ecology) that pervade our thinking about light and lighting, serving as the groundwork for discussion in the subsequent case studies. The validity of each is not the focus, but the inherent meaning that each carries. "It would be better if we asked not, were prior views of light *true*, but rather, what is the significance of the view" (Zajonc 184)? I have taken poetic liberties and omitted some specifics, in order to focus on underlying thematic threads. In the process, tangential metaphorical categorizations and related artistic and architectural theories have been incorporated into my discussion. Zajonc asserts that artistic and spiritual insights into light are as important as scientific ones (37), and I too take this stance – aesthetic and technological developments both contribute to architectural theory. Additionally, these categorizations should not be understood as distinct – each metaphor overlaps and intermingles with the others, as well as with metaphors not presented here.

* * *

Before moving into the three metaphors discussed below, some mention of light as *illumination* is necessary. Understandings of light as an illuminating agent permeate through all subsequent metaphors. Light, whether explicitly or implicitly, is somehow akin to knowledge, able to provide understanding and enable reflection. It is the least corporeal of all images of light, based solely on the capacity of the mind to produce rational insight.

As far back as Plato, sight was a metaphor for all knowledge (Zajonc 22). In the *Timaeus*, Plato states,

> ...our ability to see the periods of day-and-night, of months and of years, of equinoxes and solstices, has led to the invention of number and has given us the

> idea of time and opened the path to inquiry into the nature of the universe… I'm quite prepared to declare this to be the supreme good our eyesight offers… the cause and purpose of this supreme good is this: the god invented sight and gave it to us so that we might observe the orbits of intelligence in the heavens and apply them to the revolutions of our own understanding. (35-6)

Similarly, in the 6th book of Plato's *Republic*, goodness was equated with sunlight. While this could have been only a metaphor, explains von Simson, Neoplatonists gave it an existential meaning. "Light was now conceived as the transcendental reality that engenders the universe and illuminates our intellect for the perception of truth" (von Simson 52). This notion was further developed in Christian theology as "Divine Illumination," which asserted that special types knowledge require divine assistance (Pasnau). Augustine (354-430CE) stated that, "The mind needs to be enlightened by light from outside itself, so that it can participate in truth, because it is not itself the nature of truth. You will light my lamp, Lord" (qtd. in Pasnau). In this passage, one can observe an intermingling of light, knowledge, and God. By the 13th century, gaining knowledge through light was analogous to gaining it by God's revelation (Park 108). This understanding survived in various forms until the 17th century.

While notions of "Divine Illumination" have been superseded by empirical science, the underlying idea has endured. In language, "I see" is still synonymous with "I understand," the expression "enlightenment" has always been associated with the acquisition of knowledge, and even the imagery of a lightbulb as an idea echoes the metaphor of illumination. It also radiates throughout the present investigation – I am researching and writing on light to gain insight into ecological design. Metaphorical categorizations all have an implicit understanding of light as *a priori* to knowledge about the world, somehow acting as a formative agent. When light is explained, the world is understood. The following are three such explanations.

Cosmologies

"There is a sense, then, in which light, having once contained the cosmos in a dimensionless point, continues to hold it intact."

                                                                                    -Grandy 65-6

Light has always held a central position in creation stories, though it has adopted many forms. Importance is given to light and the sun in various cosmologies, and the Judeo-Christian tradition is no exception. The well-known passage from Genesis, "And God said *Let there be light*," explains light as the creator of the material world, while giving God agency over creation. God created light and separated it from the darkness, illuminating His universe. Over the centuries this belief mixed with theories from antiquity, and specifically Platonist philosophy. The universe Plato described consisted of mathematical forms, perfect proportions, and harmonious relationships (Park 90). The adoption of Platonic ideas into theology came easily, as theologians from Abrahamic traditions were searching for the underlying harmony of the cosmos created by God.

Following the fall of the Roman Empire and the rise of Christianity, Neoplatonism continually shaped cosmological understandings of light. Equating light to goodness (in Plato's *Republic*) raised it to a transcendental entity for Neoplatonists, who understood light and luminosity as an expression of God's creativity. The more something radiated light, the more pure it was (Ball 240). Pseudo-Dionysius, a 5th century theologian, stated, "… each object and creature received and transmitted divine illumination according to its rank and worth" (qtd. in Ball 240). Contemplation of the light emitted from material objects could bring one closer to understanding divine light. Worldly objects were given a hierarchal spiritual value, depending on their ability to radiate light (Ball 243).

The subsequent centuries saw little development within Europe, although theories of light continued to evolve in Islamic culture. Outside of the Christian tradition, but still important for the evolution of light in cosmologies, was the Arab philosopher Alkindi. His

work dates to the mid-9th century CE and evolved from Plato (as well as Aristotle and other thinkers from antiquity). In addition to a theory of vision, Alkindi had a theory of light that saw every material object emitting rays of light in every direction, not just light sources. Because of this, the whole universe is causally bound together in a web of radiation (Park 74). A link was established between light and existence that extended beyond the moments of creation, continually holding the world together.

By the 12th century, the mixing of Christian theology, theories from antiquity, and Arab philosophy codified light's primary role in creation. It was a universe interpreted through a Neoplatonic cosmology, in search of perfect order and proportion. Plato's *Timaeus*, which contains both his cosmology and theory of vision, was the only Platonic dialogue known in Europe before ca. 1150CE, and had an enormous influence on Christian thought before and during the medieval period (Park 40). In these years, Christian thought was shifting away from mysticism and towards rationalism; it was the dawn of Christian metaphysics (von Simson 39). Light, in this intellectual climate, was the source and essence of all things beautiful, and the most direct manifestation of God of all created things (von Simson 50-3). According to medieval theology, there were two aspects to light: *lux*, the essential light (and reflection) of God, and *lumen*, the sensible and corporeal light through which our perception of *lux* arises (Zajonc 97). von Simson explains that, "The distinction between physical nature and theological significance was bridged by the notion of corporeal light as an "analogy" to the divine light" (55). Christian theologians of this time, and for many centuries after, concluded that light was metaphorically equivalent to God. The distance between light as a product of creation, and light *as creation itself*, was minimized. "In the ideal world, God, truth, and light are the same" (Park 92).

Of the various medieval theologians, Robert Grosseteste (ca. 1170-1253CE) presented an intriguing (and somewhat prophetic) understanding of light's role in creation.

Grosseteste sought to explain Genesis through Platonism and Alkindi's theories, both of

which deeply influenced his thought. When God created the initial dimensionless point of

matter, according to Grosseteste, it was a point of light – the first corporeal form of the

universe (Lindberg 255; 288). Light then spread out in three dimensions, carrying

dimensionality with it and creating the material world in which we live (Park 100). Yet

physical light was only one pole for Grosseteste – "*Light there be light*" included both the

corporeal and spiritual light (Zajonc 54).

<p style="text-align:center">* * *</p>

Zajonc commented that architect Louis Kahn was "unwittingly paraphrasing"

Grosseteste when he described light as the maker of materials, and material as spent light

(54). Religious connotations aside, there is an undeniable relationship between light and the

objects of illumination. Kahn was meditating on the mysterious and creative force that light

plays in architecture, how any experience of a building (at least visually) necessitates light.

Zumthor, like Kahn, explores this idea, stating,

> When the sun comes up in the morning – which I always find so marvelous,
> absolutely fantastic the way it comes back every morning – and casts its light on
> things, it doesn't feel as if it quite belongs in this world. I don't understand light.
> It gives me the feeling there's something beyond me, something beyond all
> understanding. (*Atmospheres* 61)

Light carries an otherworldliness into built space, and each day we discover a world re-

created by sunlight.

<p style="text-align:center">* * *</p>

Aspects of Grosseteste's cosmology where contested and discarded, but for many

centuries the same question endured: what role did light – understood as God – play in the

creation of the cosmos? It was not until the 17th century, through the work of Galileo, Kepler,

Descartes, and Newton, that the development of a mathematical and mechanistic cosmology

emerged. A new way of understanding the cosmos was emerging through mathematical

insights, and light temporarily left its post as creator. It was now an actor in a Newtonian universe where gravity ruled, and space and time were mathematical constants within which light acted (Grandy 14-15). However, light still held its significance as the link between the material and spiritual world for many (Park 160-2).

The different explanations of light presented to this point vary greatly in detail, but share an analogical understanding – light was always viewed as *like something else* (Park 111). Park reminds readers that thinkers up to Descartes interpreted the world as a "system of analogies to teach humankind how to live," and believed that an argument based on analogy was sound because it related to a cosmos founded on analogy (179). Scientific modes of inquiry have since evolved, largely forwarded by Newton, yet it is still through guesses and analogies that scientists often uncover new ideas (Park 206).

In the early 20th century, a renewed cosmological importance was given to light through Einstein's theory of relativity. It asserted that the speed of light was independent of its source and a universal constant, meaning that the speed of light is unvarying compared to any observer at any speed (Zajonc 267-9). Within Einstein's theory, light was once again removed from the world of ordinary objects and given a primordial significance that preceded space and time (Grandy 27). Relativity theory regards light as giving rise to "spacetime" as it spreads, echoing Grosseteste's ideas from centuries earlier (Zajonc 266).

Out of developments in modern physics and astronomy our contemporary cosmology, the Big Bang theory, emerged. While the details and conceptual underpinnings of the Big Bang are vastly different than those informing Grosseteste's theory, the general story endures: the universe began as a single point and rapidly spread outwards, defining the parameters for what came after. According to the Big Bang theory, the early universe was extremely hot and dense plasma. About 300,000 years in, it cooled enough for light and matter to separate – those initial photons released are still visible as the "cosmic microwave

background" (Gross 7-10). At this point, light as we know it began. Grandy reflects on the

relationship between medieval and modern creation stories, stating,

> ...both modern cosmology and religious literature regard light as a first
> principle or primal reality. In the Judeo-Christian tradition God calls forth light
> before implementing the physical creation. Similarly, the big bang – modern
> science's creation narrative – is a flash of light within whose expansion physical
> bodies eventually coalesce. (64)

While Grandy qualifies his notion by explaining this is only a broad similarity, both still

emphasize light as an originary principle defining the possibilities that come after. Whether

spiritually or physically, light is considered to presuppose space and time, therefore setting

the boundaries on the universe (Grandy 65).

Research in quantum physics over the past century has made many discoveries

concerning the strange behaviour of light and its transcending, or perhaps preceding, of

conventional understanding. Einstein and Planck both supposed that light was finite and

existed in discrete units of energy (quanta) called photons. In a series of hypotheses tested

via experimentation throughout the 20th century, photons have displayed the characteristics

of a particle and a wave, resisting traditional categorization. Since the 1920s, quantum

mechanics has sought to address this wave-particle duality. However, the term "duality" is

misleading – *particle* and *wave* are only mental images to help describe light's characteristics

(Park 317). The "EPR" experiment, originally conceived as a thought experiment by Einstein,

has been performed since the 1970s. It shows that two polarized photons travelling away

from each other continually interact despite their distance – separability is lost and the

photons are considered "entangled." Theoretical explanations vary, but always rely on the

concept of *nonlocality*, which necessitates that we think of photons holistically (Zajonc 308-

19). "Perhaps for light, at least, the most fundamental feature is not to be found in smallness,

but rather in wholeness, its incorrigible capacity to be one and many, particle and wave, a

single thing with the universe inside" (Zajonc 299).

Mathematization

Light's true nature may still be unknown, but to physicists today it is not a spiritual mystery (Grandy 64). The puzzles of light are now being examined through a conception of light as something wholly quantifiable. The mechanistic contemporary view begins with the earliest theories of vision. Euclid, probably a student of Plato, proposed a geometrical theory of vision, where visual rays emerged from the observer's eye in the form of a cone. The details are unimportant, but the idea is paramount – Euclid laid the groundwork for a mathematization of nature and natural processes (Park 58). This meant a movement away from immediate, subjective experience and into abstraction. Zajonc understands Euclid's theory of vision as foreshadowing the "separation of sight as lived experience from sight as a formal object of investigation" (26). Vision could be explained through angles and lines, without any mention of the perceiver or perceived. Euclid's theory of a "bundle of rays," either emitted or received by the eye, persisted until the 1800s (Park 58).

Euclid, along with subsequent Greek, Roman, and Arab philosophers, laid the foundations for the invention of linear perspective in Renaissance painting – understanding vision as a set of straight lines allowed for a geometric depiction of the world (Zajonc 25). Brunelleschi's (1377-1446CE) painting of the Florence baptistery is considered to be the first work of linear perspective, and Alberti's (1402-1472CE) "*De pictura*," from 1435, gives a detailed description of the process. With the development of perspective there was a new artistic technique of representation, but also a new way of looking at space and volume (Park 135). "Brunelleschi did not see the sacred history of the baptistery, but rather a network of lines receding into an infinite horizon" (Zajonc 59). Centuries of subsequent paintings and drawings have sought to portray the world through a mathematical lens.

* * *

While linear perspective has certainly been the dominant technique of visual representation since the Renaissance, is has not been without criticism. In the essay "Cézanne's Doubt," Merleau-Ponty undertakes an exegesis of Cézanne's painting style, which did away with linear perspective in favour of subjective interpretation. Cézanne's style developed from Impressionism, and was one where "objects were depicted as they appear to instantaneous perception, without fixed contours, bound together by light and air" (61). Through close attention to visual experience, Cézanne's painting disregarded the geometrical and objective view of linear perspective. By refusing to separate the object "seen" from the object's appearance, the artist's investigations of perspective preceded 20th century psychological discoveries that our vision is not wholly geometrical (63-4).

Further artistic developments during the 20th century abandoned geometrical representation entirely, moving into complete abstraction. But the goal, at least originally, was to depict the underlying experience that geometrical re-production could not accomplish. At the same time that Einstein was re-defining light, artists like Klee and Kandinsky were exploring the light of "nature and mind." Following WWI, the metaphysics of light buried beneath 19th century science began to seep back up through art, literature, and philosophy (Zajonc 250-1).

* * *

In tandem with the geometrical understanding of vision has been the mathematization of the cosmos in its entirety. The search for order in the universe, which began with Plato, dissected nature into abstract, quantifiable pieces. This approach to knowledge, which developed through many European and Arab thinkers over centuries, laid the foundation for Kepler and Galileo to begin their interrogation of vision and the structure of the universe (Lindberg 320). When Galileo disproved the Sun orbited the Earth, he was doing more than challenging Catholic doctrine – he was also implying that "the principles

behind a scientific explanation of the solar system, and natural phenomena generally, were mathematical in nature" (Park 146). *Lux*, the divine pole of light so important to Grosseteste, was gone; now light was only a physical thing (Zajonc 78-9).

> Abstract perfection and substantial reality, these replaced the moral perfection and power of immortal gods. This was far more than an exchanging of ideas; it entailed a profound transformation in the West's very way of perceiving. A material and mechanical eye replaced the moral and spiritual one of earlier times. (Zajonc 95)

The old way of knowing, which relied on analogy, was slowly replaced by a mathematical rationality – a new metaphor that saw the cosmos as a complex equation to be solved. The Big Bang does not rely on God's omnipotence, but rather a complex set of mathematical evidence. As Park explains,

> No physicist today thinks of an atom as if it were a thing in the usual sense; there are, for example, experiments in which an atom seems to be in two places at once. This is not allowed for a thing, but we understand an atom very well as a mathematical form. And the curved space-time of the universe as a whole is beyond our imagining; it is grasped only with mathematics. (90)

Where once only theologians could truly grasp the esoteric nature of light, now mathematicians and physicists move forward with the torch.

With this new mode of thinking came a vast amount of discoveries. The experiments of Michael Faraday (1791-1867CE) and theorizing of James Clerk Maxwell (1831-79CE) saw the discovery of electromagnetism. In Maxwell's paper "A Dynamical Theory of the Electromagnetic Field," from 1864, he concludes, "*light is an electromagnetic disturbance propagating through the field according to electromagnetic laws*" (qtd. in Zajonc 149). At this point, explains Zajonc, our image of light became further mathematized, and entwined with electricity and magnetism. Light was an electromagnetic wave that rippled through space, the product of an electric charge (Zajonc 149; Park 314). Light was now a part of mathematics, with no readily visualizable model (Zajonc 152).

This new (and continued) metaphor for light, as a mathematical concept, has led to a vast array of technological innovations that have dramatically altered the built landscape of the 20th century. A few decades after Maxwell's paper, the first electric streetlights were switched on in New York and London.

Ecology

The notion that light is a mathematical "thing" certainly persists today, but the past few centuries have seen an alternative metaphor emerging. It perceives light as a life-giving energy sustaining Earth's biosphere, translating the abstract, mathematical light into material output. Vernadsky, who promoted the notion of Earth as a biosphere, described sunlight as an energy source. Additionally, Vernadsky stated that the biosphere is "at least as much a *creation* of the sun as a result of terrestrial processes," and that all living creatures are "*children of the sun*" (qtd. in Donleavy-Johnston 25). Similar to the above metaphors, ecological light looses much of its metaphysical counterweight, but takes on a new physicality.

The notion that sunlight carries a physical energy is not entirely recent – as far back as antiquity, there are legends of Archimedes using mirrors to burn a fleet of ships (Park 22-3). Nor is the image of light as a life-giving process entirely novel. In medieval thought, light was the creative force present in all things (and the most heavenly), therefore causing organic matter to grow (von Simson 51). Kepler's book on optics, from 1604, proposed that light was a form of heat, and since all animal life depends on heat every living thing contains some light (Park 162).

While these explanations where more analogical than scientific, they certainly foreshadowed later discoveries. Biologists were searching for the food source of plants since the 17th century, but it was not until the mid-20th century that Melvin Calvin (1911-97CE)

correctly identified the processes of photosynthesis at an atomic level (Gross 36-7; 40-1). Photosynthesis, the complex process whereby plants capture sunlight, converts solar energy into chemical energy. This, in turn, supplies the initial input for exchange cycles in ecosystems and our biosphere at large, providing energy for nearly all living things on Earth (Cunningham and Cunningham 33-7). Gross describes photosynthesis as a "major technological revolution," subsequently causing most life forms to become "addicted to sunlight" either directly or indirectly (27). In this new conceptual model, the sun is a giant nuclear reactor powering Earth (Gross 14-5).

* * *

The categorization of sunlight as an energy source has been quickly adopted as a renewable solution to energy concerns. The amount of solar energy reaching the earth's surface is about 10,000 times the commercial energy used in a year, and new technologies are attempting to convert this into usable heat and power (Cunningham and Cunningham 291). This can be done through *passive* and *active* techniques. *Passive* techniques, such as utilizing materials that absorb and/or release heat, have been incorporated into vernacular design for millennia. The materiality and building orientation of traditional dwellings, once considered outside the scope of "architecture," are now seen to contain a wealth of knowledge. The re-discovery and dissemination of this design wisdom has been a goal for many green design theorists, such as Victor Papanek. *Active* techniques incorporate modern technologies, usually pumping a heat-absorbing fluid through a collector and circulating the heat. Additionally, parabolic mirrors are used to drive electric generators, and photovoltaic cells are being used to capture solar energy and convert it directly into electricity (Cunningham and Cunningham 291-3). These technologies are still young and have not been adopted on a large scale, but are widely supported in the environmental design industry.

* * *

In addition to the importance of photosynthesis, light actively participates in life and its many processes. In *Light and Life*, Gross spends an entire chapter detailing how plant and animal life – including humans – is shaped by sunlight, whether for food, nutrients, warmth, or leisure. He discusses phenomena such as: *phototropism*, how plants grow and bend towards light, *photoreceptors*, light-sensitive spots on the back of lizard's heads, and the *circadian rhythm*, the biological clock in many life forms that tracks daily and seasonal cycles. Gross also mentions the potential dangers of exposure to solar energy, namely skin cancer (78-101). Light is now understood as a significant biological factor, playing a central role in our understanding of ecological processes.

From this ecological vantage point, another contemporary metaphorical understanding of light emerges. Light is still abstracted and quantified, but carries a physical presence reliant on *interactions*. Spiritual connotations have been abandoned, but the ecological metaphor of light does imply a deeply entwined reciprocity between light and humans. Light acts as a life-support system we unceasingly rely on. It participates in our daily life, and it is through ecological processes that we encounter light as a physical "thing." Through this continued relationship, *light has provided us with the ability to see light*. When describing vision and perception, Gross concludes that, "much as life depends on light, our definition of light, conversely, depends on life" (137). Similarly, Zajonc states, "Light is formative. Under its influence plants grow, but also the eye was formed" (205). In an unending cyclical process, humans are physically entwined with light. Understood as imparting the physical boundaries onto life, light maintains an ever-central role.

Seeing the Light, Almost

Through abstraction and quantification, theories have narrowed in on the "true nature" light. Yet, just when light comes within grasping distance, it slips away again.

Realization occurs that the above metaphors are not actually explaining light, but *the actions,*

outputs, or results of light. Cosmologies maintain that light creates the universe,

mathematization can predict the movement of light, and ecology displays the resultant

processes that rely on light. The quest to discover light continually circles back to a quasi-

metaphysical explanation, reliant on unseen or unknown forces. As quantum mechanics has

conceded, examining light as something "out there" makes its discovery impossible. Instead,

a holistic understanding is required.

Light is inherently entwined in the world and ourselves. When speaking of

metaphorical understandings of light, it must be appreciated that metaphors do not begin

with an isolated picture of light. Rather, they rely on the interpretation of lived experiences

of light, inseparable from that very experience. *Theoretical light*, the light analyzed and

explained, is therefore *experiential light* at its roots, the light of immediate experience

(Grandy 6-7). Theoretical light evolves from a desire to explain light as a phenomenon, yet

the experiential core is often forgotten and superseded by the abstract conclusions that it

informs. Similarly, Arnheim explains that all genuine metaphors are derived from the

physical world, helping us to describe non-physical properties (208).

The task is to re-discover the phenomenological experience of light as an act of

reciprocity and interaction existing before, and subsequently informing, any metaphorical

overtones. Meditating on the *chiasmic* quality of light, or point of crossing between person,

world, and light, is the best way to understand the experience of light. I am an active

participant in my perception of light. Because I have functioning retinas, my body can

process the light entering my eyes. Light is always reflected from object onto me. In order to

interact with the world visually, light has to come to me and I have to accept that light.

Without one of those two actions, there is no *light*. A blind person's eyes are still being

bombarded with light, but unfortunately their eyes are no longer able to participate in this

reciprocal interaction. Light and I are in a perpetual give-and-take in order for vision to occur. Phenomenologically, light is an un-isolatable interaction; *the relationship between person and light is the light*. "At a level almost too elemental for ordinary comprehension, light is an opening or window on existence, and we *are* the opening" (Grandy 8).

Grandy uses two terms to describe light: *hereness* and *relationality*. *Hereness* refers to the constant and intimate presence of light in any visual experience, never remote from us. This hereness is absolute, and consistent with the quantum physics theory of nonseparability (56-7). *Relationality* understands light as never separate from what we see, always invisible to present the world (63). Grandy's ideas resonate with Merleau-Ponty's notions of *flesh* and *intertwining* (defined in Chapter 3). For Merleau-Ponty the invisible, underlying ideas of the world can only be understood through the visible, through *carnal experience*. "We do not see, do not hear the ideas, and not even with the mind's eye or with the third ear: and yet they are there... behind the lights or between them, recognizable through their always special, always unique manner of entrenching themselves behind them..." (*The Visible and The Invisible* 151). Light is interwoven through all things, a sort of connective tissue holding our perception of the world together. "... the muted reflection of the body upon itself is what we call natural light" (*The Vivible and The Invisible* 154).

Understood in this way, light can be explored through relationships, interactions, and interconnectivity. Lights relationality transposes any interpretation, experiential or theoretical or both, onto the object or space it participates in. The study of lighting in architecture becomes an extrapolation of our cultural understandings, reflected in the buildings we create. Thus, the built environment becomes a physical manifestation of our conceptions of light.

> Ever since we created the concept, space has held whatever we put into it. We have imagined space to be many things, and that act of imagination has had implications for our image of light. Endow space with divinity and light is godlike; discover its shape and light is geometrical; fill it with matter and light is

substantial. From Moses to Einstein, the history of light is also the history of space. (Zajonc 97)

* * *

This interpretation may seem to be overly reliant on a newly developed metaphor: light as "relationality" or light as "flesh." However, this understanding focuses on experiential light rather than theoretical light. Grandy reminds us that, while poetic interpretations appear metaphorical, every explanation of light provided relies on metaphorical roots (112). Danger arises when metaphor is taken as literal fact. By exploring the experience of light, we are able to loosen the tight grip our metaphors hold on our interpretations and uncover new insights. We can "let the light shine through," if only slightly. From this experiential base new understandings can grow, relevant interpretations illuminated by ecological awareness.

Dundas Square:
Big City Lights

A wall is built in hope that a light once observed may strike it even for but a rare moment in time. How can anyone think of a building of spaces not in natural light?
…The electric bulb fights the sun. Think of it.
-Kahn, "Silence and Light" 231

Dundas Square is in the midst of Toronto's downtown core, at the corner of Yonge Street and Dundas Street and between the Eaton Centre and Ryerson University. It is not literally a square, but a trapezoid that pinches in the southeastern corner. The western boundary is the facade of the Eaton Centre with an office tower rising high above; the northwest corner features a giant billboard; to the north is a commercial building housing restaurants, shops, and a movie theatre; the eastern side is composed of Ryerson buildings and the CityTV headquarters; the southern boundary is a combination of a Hard Rock Café and office building. The façade of the office building is the only area not plastered with ads, screens, and lights. Dundas Square creates a disjointed space, an amalgamation of several downtown structures. The heights, forms, materials, and colours of the various buildings are incongruous, each with their own distinct aesthetic goals. Particularly disjointed is the relation between the unadorned, grey-white office building, and the futuristic, *Bladerunner-esque* northern building, its metal skin covered with screens, signs, ads, and lights. Where

buildings are lower (particularly due east, southwest, and northwest), office towers rise up in the near distance. This adds a sense of depth, and when focusing on these sightlines the boundary of the square is disrupted.

At 3:00pm I arrive at Dundas Square via subway, emerging directly into the square's interior. I am immediately integrated into the space, immersed within the sights and sounds. The immediacy of this entrance is contrary to the gradual revealing as one approaches by street. The square's orientation, flanked by streets on all sides, hides the space, causing a feeling of openness upon entering – an unexpected void within the dense urban grid. As much as Dundas Square is a part of the city fabric, it is also a contained space. But how contained? Does it spill out into the surrounding cityscape, or does it have distinct thresholds? It is not a coherent or simple space for quick discovery, and not a sealed space. It is constantly invaded by extraneous sights and sounds, and likewise leaks out into the surrounding urban fabric. The square is quite obviously a conglomerate of different structures, buildings, and roads. But despite its embeddedness within the city fabric, it still can stand as a space in itself. It is this 'unclosed' spatiality that lends itself to the dynamism of an outdoor public space – it is simultaneously a destination and a street to travel along. It does not prescribe how it should be used, but leaves that to the participant. I have walked past or through the square many times. In those moments it was not a space in itself, but a point along a path. Large spaces are not always *spaces*; they shift in our perception depending upon our goals, distractions, and pre-conceived notions. If an opening is perceived as a space unto itself, a new understanding comes into focus.

Throughout the day, Dundas Square is a very busy, noisy, and colourful mix of pedestrian and vehicular traffic. The square's physical features are secondary to the programming within (making an examination of the space itself somewhat difficult). The space is never static. Even the "walls" (billboards and screens) are constantly changing.

There is certainly a great deal of marketing and advertising, but the square also functions as a public gathering space. There are benches and chairs throughout the square, as well as several small water fountains. There is also a stage, however today its front is utilized as seating. All throughout are meetings, lunch breaks, children playing, and shoppers passing by. Several buskers have set up along the Yonge St, attracting small crowds.

During the day, sun lights the square's dull gray concrete. It displays every possible surface without intention or prejudice. In sunlight, the square is not enveloping or inspiring. The pavement is flat, concrete, and also surrounded by concrete on all sides. There are a few small trees along the northern street, but the vast majority of surfaces (aside from billboards and screens) are concrete and metal. The structural components of Dundas Square are heavy and solid. It is weighed down, stuck firmly in its place. The sky pushes down on the space, while the skyscrapers push back up, attempting to puncture the pale-blue canopy above.

Compared to an indoor room, Dundas Square is never complete. The oscillation between openness and enclosure is a constant flux. If I move around the space, I am walking on streets in downtown Toronto, noticing others walking through without hesitation. If however, I sit and observe, the square begins to enclose and boundaries solidify. The pedestrians sitting or standing come into focus. Observing the square from different locations, I quickly appreciate that my immersion in the space makes an external and objective view impossible. My vantage point forces me to assume certain prejudices.

Is a public square inside or outside space? Literally Dundas Square is outdoors of course, but figuratively it can be considered an interior. There are no complete panoramas available from within the square at ground level, just a few gaps. Tall buildings and gigantic billboards block most sightlines. Today there is a clear sky; without clouds, the blue canvas reads with little depth, just a plane with a single light source (sun). In this way, the sky is

reminiscent of a ceiling. And the buildings are like walls on each side, with streets as open doorways – a giant cathedral with walls built up across generations.

During the afternoon, the sun easily overpowers the billboards, screens, and other artificial lights. They are operating within the sun's light, which is not contained within Dundas Square. The sunlight does not discriminate between the square and exterior spaces, shining down from above and connecting it to the surrounding city fabric. I realize that the "blue ceiling" continues beyond the square and any visible horizon, and is stretched over the entire city. Likewise, there is no change in ambient light as you arrive and move within the square. Shadows are uniform and monolithic during the afternoon, darkened masses contrasting the brightness all around.

Does the sun exert a level of "control" over an outside space during the day? Today began as relatively mild, so people mostly gathered in areas of direct sunlight. As the afternoon got warmer, people migrated to the few shaded regions in the square. As I sit on concrete steps in direct sunlight, I begin to *feel* the light as a heat radiating around the space. Surrounded by tall buildings, the square becomes a concrete valley for sunlight to pour into. Several children are using the fountains to cool off. There are few areas for shade – no grass and trees for repose, only an overhang along the northern end. To cool off, you must move into the mall or restaurants. A shaded bench opens, and I quickly move there for the afternoon.

By 7:00pm the sun has fallen behind buildings to the west, although sunlight still enters horizontally at some points and casts direct light on the eastern (and northern and southern) facades. As a result, the screens still in direct sunlight do not appear as bright as those within shadowed areas. They are still fighting a loosing battle with the sun.

The sun creeps back into the space momentarily, reflecting off a façade to the northwest. But this echo quickly disappears. Along the eastern façades shadows are

climbing fast – four stories in 15 minutes. Below the shadow line, electric lights are becoming visible inside buildings, just faintly at first. The shadow of dusk is enveloping the last of the space, with sunlight only illuminating the top floors. Soon it will be only ambient, atmospheric light without direct sun entering the square. The first sign of night is the elongation and diffusion of shadows, eventually uniting lit spaces with their shaded counterparts. A few lights have come on in the square, though they are insignificant before sunset.

As the last slivers of sunlight slowly crawl upwards and disappear, the space begins to reflect back upon itself. As sunlight becomes increasingly indirect, a dullish shade takes over – not darkness but a less complete light. Shadows previously confined to areas of indirect sunlight have now spread throughout the square. Windows have begun to reflect the colourful, rapid imagery of various screens – video and still. The slow, gradual clock that guides the sun through the sky is replaced with our self-prescribed clock. It is fast and disjointed, compared to the slow and rhythmic arc of the sun. Yet, this electric light is in tune with the rhythm of the people in the square.

The sunlight reflecting off a distant office building one block to the southwest has begun to change colour, from a vibrant yellow to a pinkish hue, then to a dull grey. That was the setting sun's last inclusion in Dundas Square today. Artificial lights have now taken over.

* * *

The City at Night

Living in a large North American city, it is easy to forget that the luxury of artificial lighting is a very recent phenomenon. Glowing urban skylines have only been possible for the last century, yet are rarely appreciated as a significant landscape of our own time (Dewdney 95). In *At Day's Close*, an exploration of nighttime throughout history, Ekirch concludes that artificial illumination is arguably the greatest symbol of modern progress

(337). Ekirch also explains that artificial lighting blurred the "boundaries between day and night" (332), and combined with the spread of scientific rationalism and skepticism gave way to a "nocturnal revolution" (325). As a result, we have witnessed a rapid conquering of the night, and an elimination of darkness, over the past 100 years.

With increased scientific understandings and technological advances, we have seen an unprecedented proliferation of outdoor lighting. A brief history by Dewdney (99-102) and a timeline created by Major, Speirs, and Tischhauser (2-9) explain the rapid acsension to our current city nights. Streets were lit as early as 1414 in London by the use of open oil containers, and by the late 1600s Paris had 6,500 candles burning along streets at night. In 1736 London saw 5,000 oil lamps installed; that number doubled within two years. From 1807-26 gas lighting was installed throughout Europe and the United States, ten to twelve times brighter than oil, and by 1823 London had 40,000 lamps on its streets (Ekirch 331). By the early 19th century, the night landscape of cities was changing dramatically. "Bright street lighting reinforced the linearity of streets, and cities began to develop into crystalline, luminescent lattices – at least when seen from above" (Dewdney 100). By the 1850s, attempts at creating an incandescent light bulb had begun, and in 1882 Edison installed the first public electric-lighting systems in New York and London. "The radical effect of the electric lightbulb cannot be overstated. More than any lighting technology that preceded it… the electric light revolutionized the night. Now the darkness, at least in cities, was in full retreat" (Dewdney 101).

By the 20th century, a new type of space had been created – the well-lit urban streetscape at night – and we have seldom recalled our dark past since. Today, the glow of Toronto is visible from 50 miles out, and within 25 miles that glow covers the entire horizon (Dewdney 95). The night is no longer dark in cities – you would be lucky to see 50 stars from an urban centre compared to 3,500 in a rural setting, due to the consistent background

glow of a city (Dewdney 103). Light pollution is increasing by 10% a year globally, and its production comes at high costs: approximately 30% of outdoor lighting in the United States is wasted, or about $2.2 billion annually (Henderson 19). Toronto alone spends nearly $40,000 a night on its electricity bill (Dewdney 102). There has been a proliferation of artificial lighting with far reaching social, economic, and ecological consequences.

<p style="text-align:center">* * *</p>

Dundas Square never entered the night, just a different type of day. It is 8:20pm and the square has begun to breathe, waking up with the disappearance of the sun's light. The sky is still a light blue, but at street level atmospheric light is becoming insignificant. The dull, imperfect, and heavy materiality is being superseded by the dancing electric lights. The square is no longer weighed down by the abundance of concrete and steel, anchoring it to the ground. Electric lights have quietly replaced sunlight as the dominant source. As I write, my page is moving from white to red along with the closest screen (a phone advertisement). The sun has been replaced. Artificial light enters the forefront of any experience in Dundas Square.

The transition that occurs in Dundas Square at dusk is a transition from heaviness to lightness. The square begins to float, adrift in a sea of its own light. The space now becomes a space of light itself. It is a world primarily of *light sources*, not *lit objects*. The focus has switched from the ambient solar illumination of (heavy) built surfaces to the individual and artificial light sources themselves. Beyond enabling our visual perception, as light always does, in darkness light creates space. The light sources become visible and prevalent. The space between the buildings takes form – a "lightspace" emerges.

However, as I sit in the square, another shift happens. As my eyes and body adjust to the night, a new weight encroaches. The dense weaving of artificial light begins to push down on me, as well as up against the darkening sky. It is a different heaviness in

comparison to the formless darkness above and beyond. The electric lights are pushing back the darkness all around, but its depth is a nothingness, and endless void. Light now takes on a weight – a required presence – as it keeps the darkness away. Dark does not push back though; it is just *out there*, just beyond the light. Surrounded by shadow, light acts as an opening.

<p style="text-align:center">* * *</p>

Light and Space, and Darkness

Nowhere is the relationship between light and space more obvious then at night, when ambient/atmospheric light is replaced by a seemingly impenetrable darkness. In understanding light as an agent of spatiality, a lack of light then creates aspatiality, a limitless expanse without form or depth. Merleau-Ponty describes the night as "pure depth" without foreground or background, and without any surfaces. In darkness, the distance between *it* and *me* vanishes; the depth touches you, and in turn you and the surrounding space become united (*Phenomenology of Perception* 330). Arnheim describes the experience of darkness as an "extreme emptiness," resulting from the lack of visual objects to create spatial awareness (21). However, objects alone are not able to create space – their surfaces must interact with a light source. Light must penetrate the depth before we can, creating space *out of darkness*. Darkness is the necessary counterpoint to light, the provider of meaning.

An illuminated space at night acts as a large-scale figure ground reversal. Perceptually, the figure-ground relationship consists of a visual object (*figure*) set within a background (*ground*) (Arnheim 68-9). During the day, the play of shadows within a world of light creates intrigue; at night, it is the pockets of light within darkness that draw one in. Daytime shadows on buildings create figures, like a black square on a white paper. The built

environment becomes the endless ground upon which figures take shape. But at night, in the three-dimensional ground of darkness, a point of light becomes the figural focus.

By using electric light to counteract the aspatiality of dark, we have undertaken the task of colonizing the night, and in the process have created a new experience of *night*. Light can create the effect of enclosed space, when immersed in the imposing depth darkness. When within a circle of light, such as a campfire, there is a feeling of enclosure and containment (Rasmussen 208-9). Our contemporary understanding of night, in urban settings at least, is as a large-scale, ever-burning campfire. "In a sense we are like miners, tunneling with light into the bedrock of darkness. Artificial lights carve tunnels and caverns out of the night, spaces in which we can operate as if it were day" (Dewdney 97).

Lighting at night was originally seen as an increase in temporal and spatial freedom in cities, freeing people from the dangers of thieves, vandals, or super-natural beings (Ekirch 332). Yet, have we truly increased our freedom, or have we created a dependence on artificial light?

> In another way, though, we are confined by light. We cannot wander outside of it, unless equipped with night vision… we require a larger colony (of people) to build the infrastructure, streetlights, and roads for individuals to use. We are prisoners of artificial light who cannot stray outside its perimeter unless we can take our "light tunnel" with us in the form of night vision or flashlights or the headlights of our cars. (Dewdney 97)

We have secured ourselves with light (and in the process created a new world of light), but at the expense of rarely straying into the darkness beyond. We have abandoned the notion that light is the exception in our universe – darkness is the universal ground upon which light exists. Even during winter in Toronto, which has upwards of 16 hours of darkness per day, light is the common and expected experience. Our world is conceived of as light. A re-focusing of our eyes on the figure-ground relationship between light and dark is required, in order to reveal the reciprocal relationship between light and dark.

* * *

By 9:15pm, I am in a new space. Dundas Square is very bright, fluid, and colourful, moving with the screens. It is a dynamic space now, more alive. The lights within the square that used to compete with the sun are now competing amongst themselves. Watching the façade of the Eaton Centre, it is almost like a campfire – flickering. Although perhaps the brilliant flashes of light are more akin to explosions in the distance. The lights within windows are very prevalent now. While they have not increased in brightness, the outside world is darker. The sky, save for the western horizon, is now a navy blue. The world beyond the square is quickly disappearing.

Once the sun has fallen behind the horizon, night moves in fast. Although the descending sun/rising shadows was gradual, the sky's shift from light to dark blue happens quickly. Perhaps this change is less noticeable because observing gradients of light is much harder than observing shadows climbing a building (or a sunset). Gradient shifts seem to deny observation as they occur; we can only conclude that the change has happened after the fact. It is always referred to in the past tense, only understandable in context of what colour/shade came before. As I sit in contemplation, I notice the sky has faded to nearly black.

More and more lights have been switching on as dusk transitions into night, carving out a habitable niche within the limitless darkness. Lights now fully contain the space – all the artificial light is pointed inwards and mostly downwards (save for a few flood lights). The cars make a moving red-white boundary at street-level. People, like buildings, have become shadowy backdrops, occasionally flashing in the colour of whatever screen is nearest. The artificial lights are more vibrant, more pronounced because the atmospheric light has left. Earlier, sunlight shone onto them and overpowered their brightness. At night, however, they project their colours onto the darkness.

Dundas Square shrinks, becoming more defined and intimate at night. The lack of connectivity with the night sky creates an isolating experience – the whole space is turned inward. The sky is becoming transparent, opening to a universe beyond ours. But the artificial lights are keeping my attention and imagination firmly on the ground, forcing my gaze downwards. Whenever I do venture a gaze upwards, it is redirected towards advertisements and stars of a different nature. Dundas Square is focused inward.

* * *

A Cosmos Unto Itself

"There is no surer way of dreaming well than to dream of somewhere else. But of all such places is not the place somewhere above us *the critical one?"*
                                                             -Bachelard, *The Flame of a Candl*e *39*

During the day the sky is opaque, but at night it opens into outerspace and becomes infinite (Dewdney 15). Earth's shadow darkens the sky, causing the land to rejoin the darkness beyond the atmosphere. If you look upwards during a clear night in the country you will instantly travel billions of light-years, into the furthest frontiers of human imagination. Unlike the day, when the sky acts as a ceiling (Arnheim 25-6), at night we rejoin the larger cosmos. Yet with these new spaces, our nighttime caverns of light, we have blinded ourselves to the infinity above and relieved the night of its mystery.

 In the *Poetics of Space*, Bachelard dismisses city dwellings as "oneirically incomplete" and lacking cosmicity.[1] For Bachelard, city homes are no longer set in natural surroundings, therefore altering the relationship between home and space. The "horizonless sky" encloses the entire city, shutting it off from the outside world (26-7). Further explaining a truly "immense cosmic house," Bachelard states that it "allows the poet to inhabit the universe. Or, to put it differently, the universe comes to inhabit his house"

---

[1] "Oneiric" can be defined as relating to dreams or dreaming. Bachelard uses this adjective to describe an imagined, ideal (dream) home.

(51). I admittedly found Bachelard's observations troubling, being a dedicated urbanite. Large cities posses the "attics," "cellars," and undiscovered corners Bachelard speaks so highly of (granted, on a larger and more communal scale). If Bachelard's discussion of intimate spaces can be expanded to an urban scale, then perhaps the lack of a night sky in cities creates this lack of cosmicity. Cities create their own internal cosmos of electric light, cutting themselves off from the eternal darkness beyond.

Let me further explain with a comparison between two paintings, similar in subject matter and style but with very different effects. The first is Georges De La Tour's "Christ with St. Joseph in the Carpenter's Shop" (image 5.6), the second Caravaggio's "Conversion of St. Paul" (image 5.7). Both portray Christian imagery, using light as symbolism for the divine. They are also very similar in their theatrical lighting effects, but the sources of light create two very different spaces. In De La Tour's, the only lighting comes from a candle on the canvas. The lack of outside influence creates an enclosed space on the canvas, an internal and self-contained cosmos. There is only darkness beyond the canvas, and the space essentially ends where the canvas ends. Anything extraneous to what is seen must rely on that candle for illumination, or else is irrelevant to the world displayed. However, in Caravaggio's work the light is falling in from off-canvas, giving the impression of something important just beyond the upper-left edge. It is not a self-contained picture, but one reliant on an outside source for its illumination. The picture, in one's mind, extends beyond the borders towards the light source. It is but one portion of a larger cosmos. They are similar pictures, but create very different moods.

In this sense, Dundas Square at night contains itself, letting little in or out. It exercises complete control over its space. It is worthwhile reflecting on the connectivity to the world outside our borders that can be fostered or denied through lighting at night.

* * *

By 9:45, the sky appears uniformly black. From a block away, at night, the space has a glow, a whitish-blue haze hovering around the square. Beside the Hard Rock Café along the south end of the square is an alleyway. It is dark except for a single lamp about 10 feet off the ground. It easily escapes notice, because without any light reaching in, the alley is cut off from the square. It seems to hold the darkness, pushed in by the square's lights.

In the darkness, the space takes on its new form, and one that fits more comfortably. Dundas Square seems to be made with this nighttime glow in mind. In this new "Dundas Square," there are many lights and many shadows. No single shadow is overly distinct or strong. Opposite walls display the flashing, pulsing lighting effects created by sources across the square, entwining the walls with one another and pulling them inward, weaving together opposite ends by reflecting the interiority of the square back upon itself endlessly. It feels as if the rays of light are almost perceivable, bouncing around within the square. The light sources and their effects are all around, shooting across the square in all directions. It is a web of light entangling anyone and anything in the square. I gaze upwards, but cannot reach the darkness beyond. It is after 10:00pm and a clear sky, but no stars are visible.

I descend back into the subway, underground tunnels created by artificial lights. I reach my local stop and emerge into a lit street, dotted with streetlights tracing my way home. I have been outside at night, yet I never entered the dark.

* * *

> Between sunset and sunrise, we furnish ourselves with illumination of our own making, lights that we can switch on at will. These lights cannot be compared to daylight; they are too weak and too breathless with their flickering intensities and swiftly spreading shadows. But when I do not think of these lights that we make ourselves as an attempt to eliminate darkness, when I think of them as night-time lights, as accentuated night, as intimate illuminated clearings that we carve out of the darkness, then they can become beautiful, then they can have a magic all their own. Which lights do we want to switch on between sunset and sunrise? What do we want to illuminate in our buildings, cities, and landscapes? How and for how long? (Zumthor, *Thinking Architecture* 93)

5.1. Shadows ascend the southern office building in Dundas Square.

5.2. Within Dundas Square, facing northwest.

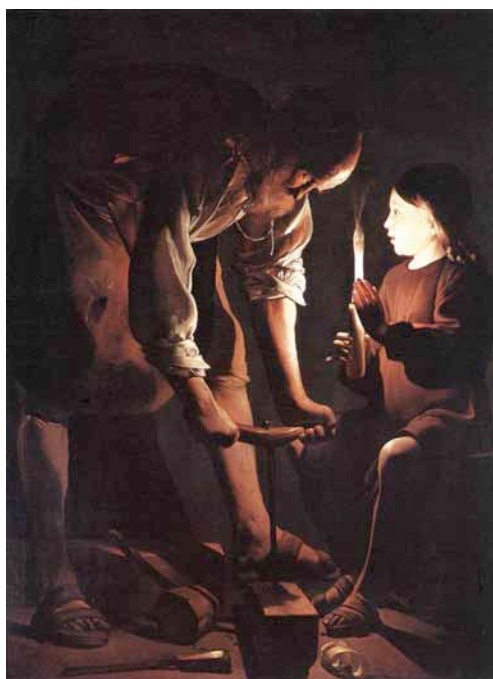**5.3.** Within Dundas Square, facing southeast.

5.4. Within Dundas Square, facing south.

5.5. Within Dundas Square, facing west.

5.6. Georges De La Tour's "Christ with St. Joseph in the Carpenter's Shop" (courtesy of *www.artclon.com/artist/georges-de-la-tour*).

5.7. Caravaggio's "Conversion of St. Paul" (courtesy of *fadis.library.utoronto.ca*).

The Terrence Donnelly Centre for Cellular and Biomolecular Research:
A World without Windows

*And the nightmare is simple, because it is radical. It would be
intellectualizing the experience if we were to say that the nightmare
is the result of a sudden doubt as to the certainty of inside and the
distinctness of outside… In this ambiguous space, the mind has lost its
geometrical homeland and the spirit is drifting.*
-Bachelard, The Poetics of Space 218

It is early in the morning, and I am passing along the northwestern edge of the

University of Toronto's downtown campus. I turn southeast, towards College Street (the

southern border of campus) and my destination: the Terrence Donnelly Centre for Cellular

and Biomolecular Research (CCBR). The CCBR was recently completed, built in a pedestrian

thoroughfare between College St and U of T's Front Campus. It is the recipient of several

design awards and has been lauded for its sustainable features. I am eager to reach the

CCBR and begin my investigation – I have previously attempted to write this chapter, but

with minimal success. I needed to return, to listen more carefully to the building, to find

some disclosure.

As I walk, my eagerness to reach the CCBR quickly fades. The morning light is bright

and warm, casting long shadows across various buildings. Beyond the layering of light and

dark, there is a temporal layering expressed in the architecture. Like many old universities,

U of T's campus is a walk back and forth through time. There are several buildings in Gothic

and Romanesque revival styles, composed of bricks, arches, and columns, and with attention paid to classical ideals of proportion and rhythm. Next, there is a layer of Modern buildings, stripped of ornamentation, simple forms with crisp lines. Now, there are a handful of sleek contemporary buildings, mostly glass and steel, and boasting something "state of the art." The CCBR is one of the newest.

I cut through Knox College, built in the Gothic revival style, and emerge into Front Campus. It is alive with activity: sports and fitness groups in the field, students, professors, and administrators on their way to work. I continue to the southern end, walking along Convocation Hall. Its large, ionic columns create monumental shadows across the porch and façade in a rhythmic monumentality. As I move south, the sun emerges from behind an eastern building. Just to its right, almost unseen amidst the sun's glare, stands the CCBR: a glass box floating effortlessly above the brick and stone around Front Campus. I continue south, and the CCBR disappears once more. Cutting left on College St, I know the CCBR is close, but it is not yet visible. It is recessed from the street, and flanked by large brick buildings on either side. As I round its western neighbour, I finally see the CCBR's façade, a glass curtain wall, through a cluster of trees. It is huge, several stories high, seemingly contrary to its hiddenness. Was it hidden, or did I stop looking, distracted by the monumental structures around the campus? After journeying across several decades of architectural history, I have finally arrived.

<p style="text-align:center">* * *</p>

A World of Glass

Glass facades are such common features today that we pass through them without concern for their technological, or philosophical, modern symbolism. The modern history of glass in architecture is representative of the larger divergence away from craftsmanship

and towards industrialization.[1] Mass manufacturing of glass, through industrial production, minimized glass refraction/distortion and kept "what is seen through its lens as conspicuously objective as if no glass were present" (Plummer 82). Iron appeared in bridge designs as early as 1770s, and began to appear in public buildings, in Paris, in the 1830s. French architects and theorists of the time advocated for iron and glass architecture due to its "dematerialized luminous effects," thought to be symbolic of the "new industrial era" (Bergdoll 182). The incorporation of iron in architecture helped free walls of any load-bearing responsibilities, allowing for larger expanses of glass.

By the mid-19th century, a new architectural experience was emerging. Joseph Paxton's Crystal Palace (image 6.3), from 1851, utilized these new industrial materials, in combination with greenhouse design, to create an unprecedented space of glass (Bergdoll 207). It was a symbolic 1,851 feet long, enclosed mature trees, and had no internal walls. With this new structure, explains Bergdoll, critics of the time recognized a new standard created for architecture. One newspaper correspondent felt that, due to the lack of shadows created by the Crystal Palace, perspective inside the building was disrupted, and "all materiality is blended into the atmosphere" (Bergdoll 209). The commonly understood dichotomy between *outside* and *inside* was challenged.

The incorporation of mass-produced steel and glass into architecture gave designers a new-found control over natural light, and it was quickly applied to all building types – houses, libraries, schools, factories, museums, churches, offices, etc. It allowed for a dramatic increase in natural light, providing health benefits for urban populations spending increasing amounts of time living and working indoors (Plummer 9). However, the physical benefits were only one aspect. Plummer explains that, "this revolution was not solely one of

---

[1] The discussion of glass presented is primarily concerned with the evolution leading to glass curtain walls. For an example of earlier experimentation with glass, see Chapter 7 – "The Light of God in the Dark Ages."

quantity, for the rise of new democratic systems and their concern for human individuality

brought architects an unprecedented freedom in the expression of light. Such ideas were no

longer merely for dogma or propaganda, but could now offer people a range of

undetermined experiences" (9). Walter Gropius, founder of the influential Bauhaus school,

stated, "We want a clear…architecture, whose inner logic will be radiant and naked,

unencumbered by lying facades or trickeries" (27). The age of the "glass box" was

approaching.

With the advent of the skyscraper in the early 20th century, new opportunities were

presented for glass. Early Modern structures still incorporated some traditional

ornamentation, creating skyscrapers in the likeness of classical columns. However, the

preeminent Modernist architects sought to do away with classical ornamentation, instead

adopting an industrial aesthetic. In a prophetic essay from 1928, Frank Lloyd Wright

discussed the potentials for glass in architecture. He observed that modern, machine-made

glass was so cheap and desirable that "our modern world is drifting toward structures of

glass and steel" (137). However, Wright felt that glass was not given proper attention yet in

architectural thought, being too new, and had no traditional guidelines explaining how to

use this modern material (137). Wright continues,

> But, the glass and bronze building is the most engaging of possibilities in
> modern architecture. Imagine a city iridescent by day, luminous by night,
> imperishable! Buildings – shimmering fabrics – woven of rich glass – glass all
> clear or part opaque and part clear – patterned in color or stamped to form the
> metal tracery that is to hold all together to be, in itself, a thing of delicate beauty
> consistent with slender steel construction – expressing the nature of that
> construction in the mathematics of structure, which are the mathematics of
> music as well. Such a city would clean itself in the rain, would know no fire
> alarms – nor any glooms… I dream of such a city, have worked enough on such a
> building to see definitely its desirability and its practicability. (140)

Additionally, Wright mentions how glass would solve heating and other issues in his

utopian future city. While we know today, through experience, that Wright's city of glass

does not hold the answer to our happiness, there has nevertheless been a proliferation of

Wright's vision on a global scale. Within our new world of glass, the existential

understanding of interior space has been transformed.

* * *

The CCBR is only steps away from the intersection of College St and University Ave,

where several gigantic, glass buildings stand. Yet, the CCBR stands in stark contrast to its

immediate surrounding – on either side is an ornamented, detailed, brick neo-classical

building. At quick glance, the CCBR presents a unified, glass façade to College St. With more

careful observation, however, the intricacies of the form emerge. The building is composed

of three large blocks: the lower atrium/thoroughfare, and two upper blocks separated by a

horizontal void with square support columns. The windows themselves feature a coherent

pattern, but with some irregularities. Three large squares disrupt the pattern, appearing as

distinct squares within the larger window. Within these squares two-storied atriums can be

seen, featuring green space and trees.

Closer inspection also reveals that the lower western wall is attached to the adjacent

building, the Rosebrugh Building. The glass façade of the CCBR appears to be crawling over

the older façade, slowly digesting the brick. The contrast between the two becomes

immediately apparent. Where they touch is a historical collapse; temporal distance is

eliminated, forcing the two styles into dialogue. The Rosebrugh Building presents a blonde

brick façade, dulled and dirtied over time, and full of detail and texture. Ivy is growing up its

surface, gently fluttering in the wind and adding dynamism to the façade. By comparison,

the glass façade of the CCBR appears uniform and simple. The rhythmic solid-void detailing

of the coarsely textured bricks creates an interplay of shadows and light. There are no

shadows on the glass façade, only shadows within – save for some subtle play of light and

shadow where blinds are drawn shut. Otherwise, the entire façade is uniform and

transparent, with the interior appearing as a single shadow. Light is touching the facade

freely, without manipulation. Further comparison of these two buildings reveals two different interior-exterior relationships. To my left are the windows sunken in brick, acting as holes in an otherwise impenetrable wall – small openings for exchange between outside an inside. To my right is a curtain wall of glass, allowing the outside to continue in without any significant threshold (and vice versa). A curtain wall contains no window – the entire wall *is only window*. The significant experience of looking out through a window has been super-sized.

I enter through the main doorway of the CCBR (which, of course, is made of glass). While the exterior form is simple and uniform, the interior is an amalgamation of rooms and floors, all different shapes, materials, and heights. Immediately to the left is a two-level bamboo garden, sloped towards College St (unfortunately the garden has recently been cut down – today it is only dirt with a few plants at the rear). The interior, like the exterior, is comprised of industrial materials: steel, concrete, and glass, with many smooth (polished) surfaces. The coolness of the materiality is contrasted by the warm, morning light entering. Additionally, the foliage throughout contrasts the otherwise white-and-gray, unornamented space. There is a set of steps straight ahead, to the second level of the thoroughfare. It passes classrooms, offices, and a cafeteria before reaching the campus beyond. While I am literally inside the CCBR, I do not feel completely "inside". There are many insides within this inside, a kind of multi-layered interior. I have moved from the exterior to within the glass skin. I am standing in the first layer of inside, and can now move into subsequent interior layers (classroom, office, etc).

As I walk around the lower levels, I attempt to orient myself. Discovering a scaled model of the CCBR on the second floor, I can pinpoint my position within this miniaturized building – a little speck on the second floor staring at a model. From this objective viewpoint, I am able to conceptually grasp the entirety of the space. An embodied

experience is quite different, as there is no single view that reveals the entire structure. In the actual CCBR, depending where I sit and which direction I look, the space presents itself anew. It is more akin to a small, vertically-oriented town then a unified structure. To fully grip the interior layout, I need to move. I continue to explore.

It is a bright morning in downtown Toronto, and despite the abundance of sunlight in the space, there are several electric lights on inside the CCBR: overhead spotlights, hanging lamps, and streetlamps. When set within the abundance of natural, atmospheric light, the electric lights offer a negligible contribution to the interior brightness. They are merely spots of light in an already bright space.

My explorations have returned me to the large bamboo garden in the thoroughfare, near the entrance. The garden is actually situated just beyond the CCBR's perceived edge, occupying the space between the CCBR and the Rosebrugh Building. A glass ceiling contains the garden, extending to the Rosebrugh's adjacent façade. The western wall of the CCBR, just beyond the garden, is actually the eastern, formerly exterior façade of the Rosebrugh Building. The aged surface has been preserved, and now resides inside the CCBR. The weathered beige bricks and classical detailing continue from the exterior façade, bringing along the play of shadows across the brick. A strange moment confronts me: windows looking *out* from the Rosebrugh Building are looking *into* the CCBR. My notions of inside and outside are disrupted – how can a window looking out of a building be inside another building? I feel as if I am only half way inside.

As I sit within the garden, direct sunlight streams in through the glass overhead. Streaks of bright green emerge on the leaves of ferns beside me. Like the trees outside curtain wall, they are in direct sunlight. Bringing sunlight into the CCBR means ecological processes can also enter. The outside light is reaching in, through the glass, and interacting with the plants. Simultaneously, the plants are reaching up to the light, trying to participate

with the outside, through sunlight. The plants are in communication with the world beyond

the glass, unhindered by their "interior" location. There is a continuity of light present,

made explicit by the interior garden. However, the interior of the CCBR is sealed, save for

the doors. I am surrounded by glass, yet the only *openings* visible are those on the

Rosebrugh Building's façade.

* * *

Allan Gardens

As mentioned earlier, the Crystal Palace (and the subsequent evolution of glass

buildings) borrowed its structure and materiality from greenhouse design. I visited Allan

Gardens to better understand this horticultural heritage. It is a large greenhouse

conservatory several blocks east of the CCBR in downtown Toronto, built and re-built since

the 1870s. The form of Allan Garden is reminiscent of classical buildings, built around a

large central dome with a symmetrical façade. However, the materiality is industrial, mainly

glass and metal scaffolding. It is low, with many wings sprawling out in the surrounding

landscape. The greenhouse is set within a park, with mowed grass and a few trees.

I enter the garden, expecting a similar experience to the CCBR, but am surprised by

how *closed* the interior feels. A large amount of light enters, of course, making the interior

very bright without any electric lighting. Yet, due to the dense foliage and metal scaffolding,

the interior feels isolated from the surrounding park. Each wing, depending on the flora, has

its own climatic regulations, requiring physical and mechanical separation between rooms.

While sunlight is integral to Allan Gardens, the interior creates an atmosphere separate

from the exterior. Light enters, but nothing else – only in a few places, where interior foliage

is sparse and outside trees are very close, are any exterior forms identifiable. Otherwise,

this is a space where light enters without any visual accompaniment. It is an inside full of

natural light and an abundance of greenery, but the boundary between inside and outside

remains distinct.

Allan Garden does not portray any of the atmospheric confusion supposedly found

at the Crystal Palace (or the CCBR). Contemporary glass buildings have evolved from

greenhouses, and the inside-outside relationship has evolved alongside. The introduction of

the mass production of glass and steel has deemed the inside-outside threshold

unnecessary. Yet, just as greenhouses work to contain a functional indoor climate, glass

skyscrapers must rely on mechanical regulatory systems (which are huge energy burdens)

for climate control. In summer months the heat entering via sunlight must be combated; in

the winter, cold temperatures must be kept out despite minimal insulation.

* * *

After some wandering, I find myself on the second level of the CCBR, sitting on a

bench overlooking College Street. The afternoon has brought clouds, threatening to rain. A

few drops come down, striking the glass façade/ceiling, yet no rain can enter. Outside,

leaves and branches are swaying in the wind. I look around – inside, the plants remain still.

Glass keeps out the atmosphere, but allows light to reach in. I see layers of buildings across

the street and beyond, city blocks seemingly painting on the façade. They are physically

distant yet visually present. By virtue of the unique properties of glass, I am both separate

and entwined with the outside. The interior climate is separate from the exterior, but the

light is not. I am inside, yet simultaneously reaching out through space, visually touching the

distant buildings. My sight wanders out, while the light is simultaneously coming in. There

is an echo, a reverberation between me and the world beyond the glass. Light is somehow

transcendent of our inside-outside distinction, resisting physical categorization. Where does

"outside" end, and where does "inside" begin? Encased in glass, my boundary recognition is

in flux.

I continue to reflect on the relationship between inside and outside, open and closed. In my previous field writing, I had found this tension fascinating, a result of contemporary design. What, though, is the benefit of blurring this distinction? In a world of glass, there is no such thing as a window. When everything is open, there can be no opening. In a built space comprised of glass, there is a participatory relationship between the interior and exterior, through lighting. The CCBR's glass façade is transparent, meaning the wall of the interior is an exterior vista. When it is a bright day, the wall is bright. When night comes, the wall becomes black with spots of light. The inside is *almost* outside. The polarity of the interior-exterior relationship evaporates into one continuous experience.

* * *

Inside Out, Outside In

The complex relationship between inside and outside space represents a tension between openness and closedness. In *The Poetics of Space*, Bachelard devotes an entire chapter to this topic ("The Dialectics of Outside and Inside" 211-31). Outside and inside, explains Bachelard, often become dialectical, an absolute "yes or no" division (211-2). When this commonly held distinction is lost, intimate spaces lose clarity and exterior spaces loose their void and possibility (218). Bachelard sees the metaphor of *open vs. closed* as "fossilized" in language, yet his phenomenological investigation of poetic imagination questions this separation (221-2). "All language bears within itself the dialectics of open and closed. Through *meaning* it encloses, while through poetic expression, it opens up" (222). We can conclude that a glass box is closed, but a poetic imagination of vision re-opens it. Bachelard explains that, "there exists a play of values, which makes everything in the category of simple determinations fall into second place. The opposition of outside and inside ceases to have as coefficient its geometrical evidence" (230). Movements between opened and closed are so frequently inverted that "man is half-open being" (222), and Just

as light and space are perpetually entwined, inside and outside (or, open and closed) rely on their reciprocity for existence.

In glass structures, vision becomes a connecting force to the outside, working to dissolve the open-closed division. Light is forever central to our sight, and hence our understanding of the world - as discussed in Chapter 4, we only see light (or the world) *by light*. The intertwining of light and sight brings forth the world, *opens* it up the world for interrogation. The oldest known theory of vision belongs to Empedocles (ca. 495-35BCE). He conceived of light as a kind of touch, with the eye projecting a visual ray that somehow feel object's radiation (Park 34-5). Plato's theory of vision was similar, proposing that a visual fire issues from the eye and interacts with external light (Lindberg 41; Park 39). Theories of vision have evolved greatly since then, and we now understand that eyes only receive light, they do not project rays. Yet, some semblance of this idea has endured, that the coalescing of our eyes and light makes the world visible, creates the world for us whenever we open our eyes. Through vision, we are able reach out into the world. In a glass building, our reach extends to the horizon, beyond the boundary of *inside*.

Plummer spends a chapter examining "veils of glass" and their usage in contemporary architecture. Beyond increases in transparent glass, there is also experimentation with the opposite, "diaphanous" or translucent effect of glass. "Set against the rational urge to make glass almost disappear is an irrational desire for the opposite, to heighten the optic complications of glass and bring into play astigmatic qualities – both refractions and reflections – which induce glass to sparkle and glow, and exhibit its own ravishing presence" (82). Diaphanous films allow one to *look at as well as through* glass, giving it the function of veiling rather than fully revealing (83). Plummer continues,

> Wherever bent light produces images that are softened and only partially
> seen, as if glimpsed through an intervening mist, room is opened up for the
> eye to become creative in the *act* of seeing. The data perception is replaced
> by fleeting sketches of things, which evade the full grasp of eye or mind. (83)

We become immersed in the space when we become aware of light entering, re-capturing the important, dynamic threshold between exterior and interior. Lighting effects can both enforce or question the inside-outside boundary. As Rasmussen explains, "… to most people a good light means only much light. If we do not see a thing well enough we simply demand *more* light. And very often we find that it does not help because the *quantity* of light is not nearly as important as its *quality*" (189).

<div align="center">* * *</div>

I journey to an upper floor of the CCBR, to one the atriums seen from outside. There is a small deciduous tree planted, and just above it are vents and pipes. The vibrant green overpowers the dullness of the surrounding materials. The organic form contrasts with the precise geometry of its encasing. In a way, the tree participates more with the outside, just beyond the glass, than its immediate surrounding. The Rosebrugh Building façade is only feet away – I feel obtrusive, so near to someone's window. Looking over the railing, I can see the Rosebrugh façade jutting against the large garden in the lower atrium. Again, I am not so sure this is an inside. During this second visit, I have been trying to discover the CCBR itself; I now understand that the lack of any boundary *is* a defining characteristic. Paradoxically, a glass building contains without having any barriers. Phenomenologically, the experience is neither inside nor outside, open or closed.

 As I sit and reflect, I find myself wanting to re-concretize the inside-outside distinction. I feel trapped, able to look past the glass walls while contained within them. I head back to the atrium and exit through the main doors. While my visual perception of the streetscape is unaltered, I am confronted by the heat and humidity of a July afternoon. I realize that the CCBR's interior, apparently transparent to the exterior, had been partly a charade – light was brought in, yet the climate was forcefully kept out. Back on College St, I am confident that this is outside.

I walk north, back through Front Campus, but now my gaze ventures beyond the immediate setting. To the east, above and beyond the surrounding brick buildings, several glass skyscrapers are under construction.

* * *

In our time light has turned into mere quantitative matter and the window has lost its significance as mediator between two worlds, between enclosed and open, interiority and exteriority, private and public, shadow and light. The window has turned into a mere absence of the wall, having lost its ontological meaning. (Pallasmaa 33)

6.1. Front Campus at the University of Toronto, with Convocation Hall in the foreground.

6.2. Façade of the Terrence Donnelly Centre for Cellular and Biomolecular Research (CCBR), as seen from College Street.

6.3. The Crystal Palace (courtesy of *fadis.library.utoronto.ca*).

6.4. Adjacent façades of the CCBR and Rosebrugh Building.

6.5. View south in the CCBR's thoroughfare, with the garden in the foreground and College Street entrance in the background.

6.6. Skylights above the thoroughfare garden, and the interior façade of the Rosebrugh Building.

6.7. Trees and ceiling in an upper-level atrium of the CCBR.

6.8. Exterior of Allan Gardens.

6.9. Interior of Allan Gardens.

St. Gabriel's Passionist Parish:
In Light of Religious Experience

…a spiritual space, natural or built, or both, is a space, not that enables
spirituality, but in which spirituality is enacted.
                    -Di Cicco, *"Notes on Spirituality and Sacred Space"*

After a long subway ride to northeast Toronto, I ascend from a long subway ride to Bayview Station into a cloudy early afternoon. It is a ten-minute walk east along Sheppard Avenue to St. Gabriel's Passionist Parish, Canada's first ever LEED-certified church. Beyond its many technical green design components, it features a unique re-interpretation of stained glass lighting. The walk is relatively unpleasant – Sheppard Ave is a six-lane-wide arterial road with constant traffic. I move hastily eastward along Sheppard Ave, through a sea of urbanity: shopping malls, condos, high rises, and busy intersections. The mass of concrete, combined with the overcast day, creates a drearily lit scene. One of these brown, unornamented buildings is "The Terrace of St. Gabriel's," a mixed-use low-rise building. Behind the terraces and set back from the road stands St. Gabriel's. Save for the name and location, these two buildings share little else – one a forward-looking "eco-church," the other a cookie-cutter suburban development.

Given its recession from the street, St. Gabriel's could easily be overlooked by a passerby. From a distance it could be mistake it for a school, library, or any other institutional structure, due to its simple and unassuming rectilinear form. There is no tower or spire, no extravagant entrance, and looming stone sculpture to communicate the church's function. Instead, one is presented with a simple white box. Closer inspection is required to notice the biblical statue near the parking garage entrance, or the simple cross attached to a dead tree's trunk. As I approach, the garden draws my attention. It covers half the front property (the rest is a driveway), and features indigenous plants and trees. It is a welcome site, compared to the well-manicured and fertilized grass boulevards along Sheppard Ave. The garden touches the southern wall of the church, a full-length glass curtain wall. Yet, little is visible inside, beyond the glass. As I approach from Sheppard Ave, the interior of St. Gabriel's remains dark and silent. The church, and its colourful stained glass, hides from the busy street.

I enter St. Gabriel's through the narthex (*entrance hall*), flanking the eastern side of the chapel. The floorplan is unconventional, essentially a large rectangle. The entire rear of the building (north end) houses all offices, event rooms, etc. The rest of the parish is divided between the narrow narthex, running along the east, and a large rectilinear chapel. The narthex features a living wall, one of St. Gabriel's prominent ecological features. Through a skylight, direct sunlight is running down the living wall, creating an interplay of bright greens and shadows. The sight and sounds of the living wall, combined with large windows and skylights, contribute to a pleasant ambience. The narthex is a welcomed transitionary zone between commercial-heavy Sheppard Ave and St. Gabriel's spiritual space.

I progress into the chapel through one of three large wooden doors. Inside, there is a muted silence; my footsteps sound obtrusive. There is a fountain in the chapel emitting a soothing background noise, but it is not loud enough to block out footsteps or whispers.

This acoustic characteristic of churches – a reverberating silence – seems unavoidable. The pews are arranged unconventionally, with eastern and western rows facing inwards towards the nave. I sit down in an eastern pew, facing the west wall. In contrast to the warmth of the wooden pews, the rest of the chapel is comprised of very clean and crisp materials: concrete floors and walls, and a white plaster ceiling and confessional rooms, and white marble fountain and altar. A black piano stands out amidst the whites and grays.

I have been sitting quietly for twenty minutes. When I arrived, there was a group of students in the chapel. Now I am alone save for one other individual, who is silently praying to my right. The space is calm and still. I feel restless. Because of the walk along Sheppard Ave I have not adjusted to the pace of St. Gabriel's. My restlessness may be caused by the discomfort of being in a church (it's been many years since I attended a service, and feelings of guilt are ruminating). Perhaps my experience differs from the intended/conventional effect, because it is more solitary than communal. Then again, quiet meditation is a central function of sacred spaces. The lack of tranquility may also be because I have previously studied St. Gabriel's. Last year I visited the church a handful of times, to critically analyze the building as a whole. As such, I knew what to expect, what to experience. Do these biases and expectations make my current experience any less genuine? I am not sure.

We live in spaces, but what does it mean to *truly experience* a space, to pay close attention to its nuances and its effect on our bodies and moods? That task is never complete. My eyes have been scanning the chapel, my hands examining the pews. I have been searching for light and its unnoticed qualities in this space, but I find it difficult to separate light from the whole of my experience. To my left, the polished seat of a pew reflects sunlight, creating a white blotch on the otherwise brown surface. Is it the pew I am observing, or sunlight? My feeling is that disentangling the pew from the sunlight it reflects is troublesome, as it denies the pew of its participation in my experience of that light.

There are no artificial lights on inside St. Gabriel's – everything is softly lit by indirect sunlight from the south-facing curtain wall and the doorways to the narthex along the eastern wall. It is a consistent and soft light, very pleasant. Little shadow is present. For such a large and open space, conscious design efforts had to be made to ensure natural lighting reached every corner so evenly. Not only does this help with energy conservation, but this also contributes to a blurring of exterior and interior space. The light enters subtly and permeates the space, giving life to the surfaces it touches. It becomes apparent that I have not simply been observing the concrete walls, but that the light has been presenting the walls to me. The light is acting upon my clothes, my notebook, and myself. It is a medium in which the walls, the pews, and I are immersed, and also a medium in which the outside world is simultaneously participating.

There is a horizontality to the space that becomes apparent as you sit, in contrast to the verticality you expect to find in churches. The low ceiling, orientation of pews, and exposed horizontal lines of the poured concrete along the walls pull your eyes laterally. This directs your gaze towards the southern wall, and beyond into the garden. The curtain wall allows the interior to visually extend into the garden, however the lighting remains separate. The garden is basking in direct sunlight, a small haven of un-mowed greenery along Sheppard Ave. The interior is hidden from direct sun, visually connected to the garden while remaining distinct. Just beyond the garden, "Terraces of St. Gabriel's" are looming. They act as a sound and visual barrier to Sheppard Ave. The seclusion of St. Gabriel's helps facilitate the interior mood.

I continue to sit and examine the plane surfaces, simple layout, and monochromatic materiality of the chapel. It strikes me that the space itself is not only cold but also plain. It is certainly not offensive, and the garden view is pleasant, but the aesthetic is very industrial and impersonal. The exposed concrete makes the chapel seem very heavy and

grounded. However, the concrete is not meant to be the focus. Along the east, west, and

north walls of the chapel are special hidden skylights fitted with various coloured glass

panels, a contemporary interpretation of stained-glass windows. As the sun rises and moves

over the building, a colourful mosaic made entirely of light stretches down the walls – first

on the western wall as the sun rises, and later on the eastern wall as the sun begins its

descent. As such, the grey concrete acts as a canvas upon which the coloured light creates

vibrant patterns.

* * *

Light, Materialization, Colour

As discussed in Chapter 4, our understanding of light and space is experientially

inseparable. Kahn poetically stated, "I sense light as the giver of presences, and material as

spent light" ("Silence and Light" 229). Yet, there exists the possibility of molding space to

create a heightened experience of light. Kahn also stated, "Structure is the maker of light"

("Silence and Light" 231). Plummer explains that, throughout history, materials have been

manipulated to increase sensitivity to light, such as fluting on Greek columns or the stained

glass of Gothic cathedrals (218). While the craftwork of those styles is nearly impossible to

replicate today, industrial processes do offer new potentials. Materials normally opaque,

such as concrete, can be made receptive to light. Kahn's experimentation with concrete

forms

> Revealed in his work a constant awareness of the simplicity required for
> buildings to transcend their physical limitations, while avoiding busy surface
> effects that might interfere with light's subtle and marvelous, yet tenuous,
> appearance. (Plummer 180)

In resonating experiences, we paradoxically look beyond the materials and observe the

light, although the lighting is a direct result of the materiality. Thus, the concrete becomes

entwined with the lighting experience, an agent bringing forth the lighting effect.

At St. Gabriel's, the lighting effect is not only light on concrete, but also *coloured* light

on concrete. We are further removed from the materiality, and instead are appreciating the

light as we would a painting. McCann, in "Entwining the Body and the World," applies

Merleau-Ponty's discussion of painting in "Eye and Mind" to architectural experience.

McCann explains that the categorization of qualities proposed by Descartes saw length,

height, and form as primary, while texture, color and luster were secondary qualities,

unquantifiable and unreliable. Merleau-Ponty's focus on the dynamic relationship between

painter and world inverted Descartes' categories:

> ...in a world whose most fundamental characteristic is interconnected flux, these "secondary qualities" become central... Painting's exploration of the complex and changing interrelationships among form, light, texture, and color sheds light on our interconnected state in a way that representation of form and outline can never achieve. (266)

Discussing Cézanne's interpretation of painting, Merleau-Ponty states that he "simply

wanted to capture it emerging from the color" ("Cézanne's Doubt" 66). Understanding the

coloured lighting of St. Gabriel's in this way, our traditional categorization is inverted – *the*

wall is created by the colour. We are engaged by the colours, and not the height or length, of

the wall.

Unlike a painting, which is static, the lighting of an architectural space necessitates a

dynamic experience. "Where the painter looks at the world and perceives its color, light, and

form, an architect sees a place, a set of materials, or a changing quality of light... To the

architect, it is not simply line, color, and form, but also sun, wind, gravity, materiality, and

motility that gain expression" (McCann, "Entwining the Body and the World" 268-9). At St.

Gabriel's, the fourth dimension (time) becomes an active process, using the movement of

the sun to refocus experience on "secondary" qualities. As Plummer explains,

> Buildings shaped to reveal and celebrate the flux of energy found in the sky destabilize some of the most fundamental aspects of conventional architecture. As the finality of architecture dissolves into a state of impermanence, attention is drawn away from a traditional emphasis on form and object, the rational and

the measurable. But equally intriguing is the way fluid light constructs a greater world of space, drawing the sky into rooms and painting its distant presence on walls. Terrestrial buildings are inscribed with a celestial domain, and allowed, in Bachelard's words, to 'inhabit the universe,' just as the universe comes to inhabit the building. (18)[1]

Such a usage of light creates a picture of reality that is no longer Euclidean or in a steady state, but constantly changing. It is an exploration of architectural processes, not states. Visitors are required to stay for minutes, or even hours, to observe the movement of colours through time. The experience becomes a blend of "thought and imagination, feeling and perception," relating St. Gabriel's interior "intimately to life" (Plummer 23).

* * *

Today it is cloudy, with spots of sunlight, and the coloured lighting is generally diffused and weak. The colours only reach a few feet down the wall, quickly fading. However, when the sun comes out the lighting quickly changes. Colours begin to saturate. Linear shadows segment the blocks of colour, created by the steel support system.[2] The light no longer gradually diffuses down the wall, but the swaths of saturated colour end in an abrupt horizontal line, communicating the height of the sun. The exterior weather has a perceivable effect on the interior atmosphere. I find myself drawn away from my page whenever the sun begins to shine through. I notice this not through the southern curtain wall, but by the growing intensity of colours on the western wall in front of me. My eyes are inextricably drawn to the walls when direct sunlight enters. Yellow, orange, blue, and red intermingle along the wall. They stretch out at odd angles, like shards of stained glass falling onto the wall. The walls themselves are not the focus; they are heavy and industrial, but the light makes them appear "light" and dynamic. Because the curtain wall illuminates the space

---

[1] For a discussion of Bachelard's notion of *cosmicity*, see Chapter 5 – "A Cosmos Unto Itself."
[2] The white plaster wall appears to be floating, because it held by a steel support truss. The beams are incorporated into the lighting effect.

for visibility, the coloured light is allowed to exist as a visual object. Aside from the walls, the surfaces do not participate – they are still and silent.

As quickly as the colours come into focus, they fade away. Another few minutes of diffused colour pass, then again clouds part and direct sunlight re-enters the chapel. The sun solidifies the coloured lighting again, only for a few seconds. The light has now moved down the entire length of the wall, and also a few feet along the floor – the sun must be directly overhead. The coloured lighting is in motion, albeit to gradual rhythm of the moving sun.

The sun continues to come in and out of focus quickly, leaving me wanting more. It is fascinating to watch the shadows darken and the colours saturate, incredible how bright the walls become when the sun shines through the stained glass. This rhythmic intensification and manipulation of natural light invites contemplation of the sun's presence. The mutating colours act out the sun's movement, a "creativity" simultaneously abstract and tangible.

It is moments where we almost perceive *light itself* that light, *as light*, gains significance. When brought to the forefront of experience, such as in St. Gabriel's, light is seen as the foreground and the objects illuminated as the background.[3] You feel, if only for a few moments, as if you are able to see light as a thing in itself. The stained glass is hidden above the roofline, only visible from directly below. It tricks you into focusing exclusively on the lighting effect and not the lighting source. The concrete walls become a secondary canvas upon which colours move. In these moments, we fool ourselves into believing we are actually seeing light itself, able to perceive what is ephemeral, able to physically grasp the metaphysical if only for an instant.

* * *

---

[3] See discussion of figure-ground in Chapter 5 – "Light and Space, and Darkness."

The Light of God in the Dark Ages

Perhaps in no other era of architecture was the symbolism of light as prominent as during the ironically labeled Dark Ages (ca. 400-1400CE), specifically in the Gothic cathedral. The development of medieval theology, which understood light as a substantiation of God, helped to shape cathedral design.[4] "The idea behind the importance of light in Gothic architecture is that as the most noble of natural phenomena, the least material, the closest approximation of pure form, light can mediate between what is bodiless and what is corporeal" (Scott 133). Through a conscious molding of the experiences of the *lumen* in everyday life, one may catch a glimpse of *lux*, the true light of the universe.

The Gothic cathedral was conceived as a space where visitors would experience heaven on earth; glimpse the underlying *lux* that gave the world meaning and order. Cathedrals were not meant to be a literal imitation of heaven, however – that would be considered blasphemous. Instead, they were envisioned as a set of relationships and symbols that mapped out the universe and evoked Jerusalem (in heaven). Cathedrals were meant to draw you beyond the phenomenal world and represent an abstract notion, namely the logic of God's creation (Ball 56-7). Light, explains Ball, was meant to "draw men and women into contemplation of this divine light so that it might enter and illuminate their hearts" (239). Anything that interrupted the flow of light was removed, as light had to penetrate every corner of the interior space. Stained glass was not understood as an opening in the wall, but a "transparent wall" that received its energy from a higher, transcendent power (von Simpson 4). The quest to increase lighting, through incorporating more stained glass, created a need for more windows, which led to concerns over cathedral structure. The resultant technical innovations were ribbed vaults, pointed arches, and flying

---

[4] See discussion of medieval theology in Chapter 4 – "Cosmologies."

buttresses, which characterize the Gothic style. "The light and height of the Gothic cathedrals suggested to many the merging of heaven and earth: lofty ceilings reached to heaven, their great piers planted firmly in earth" (Nielsen, Hein and Reynolds 382). Hence, these new structural solutions were invented to address theological concerns. The result was a great number of beautiful cathedrals across Europe, and inspiration for subsequent churches built during Gothic revival periods throughout the Western world.

After reflecting upon the importance of lighting in Gothic cathedrals, one may note the actual *lack of light* within them. There are vibrant colours, but little direct light. Ball attempts to explains this apparent contradiction in two ways (238): firstly, too much light was seen as distracting – twilight was considered best for worship. Secondly, they only seem dim compared to the glass and steel structures we inhabit today. In the medieval period, there was no electricity and very often house windows had no glass. As a result, windows were made as small as possible for functional reasons (rain, theft, etc). Most interiors were actually quite dark compared to the magnificent colours witnessed in cathedrals.

Some theorists, such as von Simson in *The Gothic Cathedral*, directly credit the theological climate of the 12th and 13th centuries for the development of the Gothic style. Others do not see a direct causation. For example, Dodwell explains that light and luminosity had been a preoccupation of theologians for centuries, but stained glass was difficult to obtain. He credits economic factors and the availability of resources for the sudden increase in stained glass (375-6). Similarly, Ball feels the claims of von Simson, identifying founders of the Gothic style as Neoplatonists and subsequently connecting abstract theological writings to architectural design, may be somewhat mythisized (244). Architects of the time may not have been concerned with such theories, and it is dangerous to reduce cathedral design to a single influence or meaning. However, Ball does not dismiss

the importance of medieval theology entirely. He states that "we could scarcely understand the wider predilection for experiments with coloured glass in Gothic churches if it had not coincided with an intellectual climate in which Platonic philosophy, scientific speculation and Christian theology seemed to unite in giving primacy to light" (245).

From the history of Gothic cathedrals, two ideas are important: the connection between theoretical understandings of light and resultant built manifestations, and the long and storied tradition of using light to connect people with a metaphysical belief. In sacred spaces, light holds a prominent role in our experiences.

* * *

Unlike the Gothic cathedral, St. Gabriel's is very well lit. It is clean, bright and open, visually and physically. My mind is allowed to wander through the chapel and out into the garden. It is not ominous or mysterious, as churches tend to feel, yet an atmospheric quality does quietly envelop you. Restlessness can dissolve into tranquility, which can grow toward reverie. Here, you can daydream about what is given, what is present – a tempered form of reverie characteristic of contemporary buildings. When the sky is overcast and the coloured light is diffused, I find my focus drift out to the garden, or amongst the pews. Without the stained glass effect, the garden and pews serve as colourful and textural focal points.

Compared to the ambient natural light, the coloured light projects only onto the walls, where it seems painted onto the concrete. It is something "over there" to observe while you sit in the softly lit pews. When one is exposed to direct light-sources, there is an enveloping pressure. The coloured light is on the chapel walls, however, is separate from the indirect and ambient illumination – it does exert any pressure. Instead, this condition invites you to move about within the stillness.

After a while of sitting, I leave my eastern pew and walk to the west wall, where the coloured light still touches the floor. I am once again alone, and my footsteps reverberate

throughout the chapel. I feel very conspicuous. I walk along the wall within the downcast coloured lighting. Because the sun is now directly above St. Gabriel's, it follows my movement beneath the narrow slit of multi-coloured glass. My hands and shoes are awash in a subtle sequence of colours. In this moment I have entered into the lighting effect, and am part of it. *I am in a lit space within a lit space*. The colours are no longer flat figures *over there*, but they are all around me. I have become a part of the canvas, meaning I can no longer perceive the full projection of coloured light, save for my coloured extremities. To experience the lighting in this way feels somehow wrong, like intruding into a painting or a stage set. I have abandoned my role as a viewer… I entered the figure, and the figure became my ground… I returned to my seat.

The colours are now ascending up the western wall, while simultaneously descending down the eastern wall. The upper portion of the northern wall is now saturated with vibrant blues and reds. The coloured light is in no rush, but its migration will not stop until it disappears for the day, leaving the space to prepare for tomorrow. As the colours ascend from the western wall, it once again becomes mere concrete – only a faint, diffused reminder of colour along the very top. Without the colours, I am staring at a blank canvas again, a dull, industrial material without ornamentation.

As I leave the chapel, an interesting moment occurs after passing through the threshold of the doorway. From inside the chapel, the colours felt confined to the walls. Yet when I look back in from the narthex, the whole chapel appears coloured. The afternoon sun has flooded the eastern wall with colour, filtering my view into the chapel. I am looking through the cascading lighting effect. If the soft light encompasses the chapel space, from this vantage point the coloured light contains it.

I exit St. Gabriel's feeling calm, and walked through the garden. Looking back into the chapel, I recall how dim it appears from outside. The curtain wall appears before me as a

physical barrier now, not an inviting vista. The interior moves out through the garden, yet the outside does not move inwards. The chapel has its own *light*, connected to the sky yet not shared with the surrounding urban fabric.

I walk back to Sheppard Ave and rejoined the busy and staccato urban flow. The rhythm of St. Gabriel's is so different from the streetscape just beyond its walls. Along Sheppard Ave, you cannot hear yourself think. Inside St. Gabriel's, that is all you can hear. It is a space of one dramatic lighting effect and many subtleties, a quiet place for reflection that forces your consciousness and spatial awareness. Comparatively, the lighting on Sheppard Ave feels almost excessive, given little attention beyond utility. Perhaps it is best if Sheppard Ave does not enter St. Gabriel's.

* * *

A New Religious Experience

The previous touchstone, concerning Gothic cathedrals, illustrates the notion that cultural values manifest in built form, and that in sacred spaces light is an especially prominent experience. While it is still a significant experience, visitors today may not feel the same religious awakening evoked in the 12th century. Sunlight through stained glass, in particular, is very different for a contemporary audience. In the middle ages, the worldview acknowledged a divine meaning in light. Today, we perceive the light as either a physical or aesthetic phenomenon that may or may not have religious connotations (von Simson 55). "The morning light falling through the choir windows onto the altar carries with strong immediacy a sense of enlightenment and blessing. Instead of transmitting the specific message of, say, Neoplatonist metaphysics, it conveys a broader, more generic experience, of which that doctrine is but one application" (Arnheim 208). The experience of a Gothic Cathedral, or a more recent iteration such as St. James (see below), has lost the rigidity of its meaning.

The task for designers today is to create sacred spaces that resonate with our contemporary worldview, rather than merely replicating past styles. Over the last century, many designers have begun such experimentation. Le Corbusier's *Notre Dame du Haut* in Ronchamp (image 7.8), 1954, re-imagines the use of light as a gateway to religious experience. He molds the interior natural light by creating intense and irregular focal points within a large, hollow wall, and by using a hidden skylight to illuminate the altar. Within the dim interior, the skylights "shed a magic light over the curved walls of the apse so that the worshipper's attention is drawn towards it, towards its altar and up above where the light is brightest" (Rasmussen 214). For Rasmussen, Le Corbusier's church shows the expressive potentials in daylight and its distribution. A more recent example is Fay Jones' *Mildred Cooper Memorial Chapel* in Arkansas (image 7.9), 1987-8. While the form is influenced by Gothic cathedrals (Jodidio 58), walls are entirely transparent, to maximize natural light and frame vistas of the surrounding landscape. Jones creates a synthesis of the natural setting and Gothic symbolism, allowing the landscape to participate in the interior experience. At St. Gabriel's, the stained glass does not depict a biblical scene, but re-presents sunlight, weather, and season. In these modern churches we can see a re-conceptualization of traditional lighting techniques. Where as in Gothic cathedrals light revealed God, now light can also be utilized to connect us to the larger cosmos.

A prominent figure that sought to re-situate the Catholic tradition within an ecological focus was Passionist priest Thomas Berry (1914-2009). Berry felt that modern culture was missing a comprehensive creation story, and his writings attempted to synthesize contemporary science with spirituality. Roberto Chiotti, the designer of St. Gabriel's, was influenced greatly by Berry's eco-theology. Namely, that Christianity's message is one of "responsible stewardship" instead of dominion, and that humans share an intrinsic value with all of Earth in the eyes of God (Chiotti, "St. Gabriel's Church: A LEED™

church building project #1"). These beliefs are incorporated into the design of St. Gabriel's, meant to be a celebration of our connectedness to the more-than-human world. "Unlike most churches built to inspire a sense of other-worldliness, the new St. Gabriel's is designed to emphasize that when we gather to worship, we do so within the greater context of creation" (Chiotti, "St. Gabriel's Church: A LEED™ church building project #1"). Chiotti incorporated a wide range of ecological design interventions into St. Gabriel's, such as the living wall, the indigenous garden, and passive solar heating. However, what makes St. Gabriel's a successful LEED building is its adaptation of building technologies to a pre-existing theoretical framework. Just as Gothic cathedrals saw a reciprocity between theology and building technology, St. Gabriel's has coupled ecological design strategies with an eco-theological underpinning. It is not a "LEED building" per se, but an eco-spiritual space that utilizes LEED building tools to achieve its predetermined goals. St. Gabriel's represents an authentic attempt to create an inspiring experience based on our present ecological concerns, and our contemporary understanding of the meaning of light.

* * *

Cathedral Church of St. James

The following day I visited the Cathedral Church of St. James, at the corner of King Street and Church Street in "Old Toronto". Built between 1849 and 1874 in the English Gothic Revival tradition, St. James features the tallest church tower and spire in Canada (McHugh 30). I sought to compare St. Gabriel's to a Gothic church, to better understand the differences in the experience of light. Although built in the 19th century, St. James emulates the Gothic interiors of times past.

It was a bright and clear day, and nearly noon, when I arrived at the entrance to St. James. Moving into the cathedral from the bright June sunlight, the dim church interior immediately confronts my senses. Once I sit down, my eyes begin to adjust, allowing the

sources of light to gain prominence. The brightness and intensity of colour produced by the stained glass, especially in the apse behind the altar, increases dramatically in these first few minutes. An organ player is performing extremely loudly, in preparation for a recital later in the day. This overwhelming sound, combined with the dim lighting, envelops me immediately and completely. The atmosphere is powerful and intimidating. However, as I remain still in the space and my eyes and body adjust, the mood mellows. Perhaps this is because the stained glass, which is strikingly colourful at first, produces a still and consistent lighting effect. This is very different than St. Gabriel's, in which the atmosphere is very subtle at first but grows in intensity as the lighting descends along the walls. St. Gabriel's is never as overwhelming as St. James. It gradually invites your involvement.

The materiality and form of St. Gabriel's appears industrial, cold, and un-ornamented, especially in contrast to the rich tones/textures and intricate detailing throughout St. James. St. Gabriel's chapel is an open and simple space that you can immediately grasp, whereas St. James' interior is a complex arrangement of solids and voids, which creates intrigue. St. James features many corners, concaves, and crevices for light to reach into, creating opportunities for shadows to hide and linger. There are many places to let loose your imagination.

There are only a few electric lights on inside St. James: a set near the altar, a few overheads in each aisle, and one above the organ player in the apse. Otherwise, the main sources of light are the open doorways and the stained glass. Along the clerestory stained-glass windows there is a multi-coloured projection on the windowsills. It exists only for a few minutes, reminding me of St. Gabriel's. A cluster of votive candles near the altar is flickering, swaying, dancing to the rhythm of the organ.

While seated, it is difficult to divert my attention from the front of the cathedral. The pew orientation, vaulted ceilings, and stained glass beyond the altar pull my gaze forward.

Simultaneously, the tall windows and lofty columns around the altar emphasize a sense of verticality – the whole space thrusts upwards. This contrasts the horizontality created in St. Gabriel's. The forward-upward visual tendency at St. James is in tension with the otherwise inward focus of the space. The light penetrating through the stained glass enters uni-directionally. It does not venture back outside. While in St. James, I am unaware of anything beyond the stained glass. The effect of the lighting creates a strong sense of interiority, unlike the merging of interior and exterior at St. Gabriel's. I am reminded of comments by Park regarding the stained glass at Chartres Cathedral, that "There are almost two hundred of them: "windows," they are called; but windows let us see the world outside, whereas these are walls that enclose space, walls of colored figures of men and women and animals" (96).

It is worth considering what is lost and gained in a new interpretation of a sacred space. St. James is a Gothic *revival* cathedral, a copy of the original style recycled in the 19th century so as to revive the notion of *church*. As such, St. James fulfills my expectations of the archetypal church exactly. The exterior Gothic form stands out against the urban setting, symbolizing its function clearly. The interior mood, coloured lighting, and atmosphere exemplify the drama and otherworldliness of churches. It attempts to bring the sacred back into the world, to return to the Gothic understanding of light – that *lux* is somewhere just behind or between the *lumen* I am experiencing. I immediately interpret the interior as a space of worship, which fits comfortably.

Conversely, St. Gabriel's, a 21st century design, challenges the conventional notion of *church*, forcing me to consciously examine its features and layout (instead of slipping into some form of far-reaching reverie). It is a contemporary structure imbued with a spiritual significance. St. Gabriel's is a less intense space than St. James, but one that fosters a different sort of awareness of the connection between the interior space of worship and the

larger cosmos. The relationship between St. Gabriel's and our Earthly inhabitance becomes

explicit. Just as medieval theologians saw the presence of God's perfection in light, we can

witness the movement and fragility of Earth through light… or at least a cloud passing

overhead.

The organist finishes his set and turns off the light above the organ. The vibrant

stained glass behind the altar seems to pale before me, more closely resembling the sunlight

outside. An open door to my left reminds me of the pleasant day outside. Packing up my

notebook, I move toward the (sun)light.

* * *

> No architect can rebuild a cathedral of another epoch embodying the desires, the aspirations, the love and hate of the people whose heritage it became. Therefore the images we have before us of monumental structures of the past cannot live again with the same intensity and meaning. Their faithful duplication is unreconcilable. But we dare not discard the lessons these buildings teach for they have the common characteristics of greatness upon which the buildings of our future must, in one sense or another, rely.
> (Louis Kahn, "Monumentality" 22-3)

7.1. Exterior of St. Gabriel's Passionist Parish.
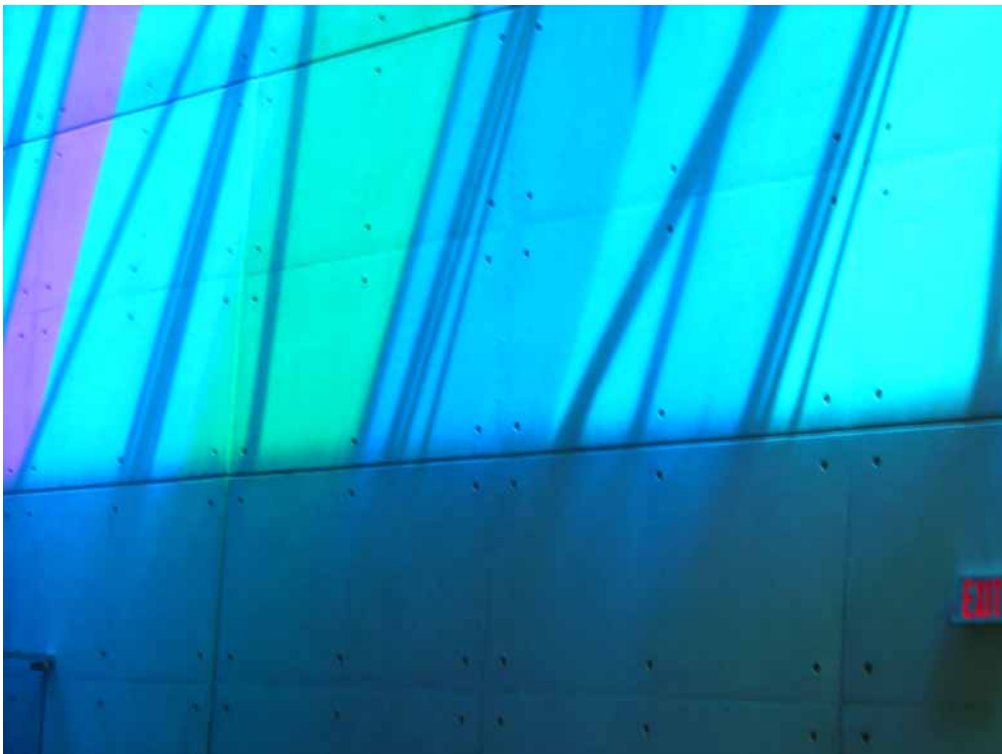

7.2. Glass curtain wall of St. Gabriel's, viewed from inside the chapel.
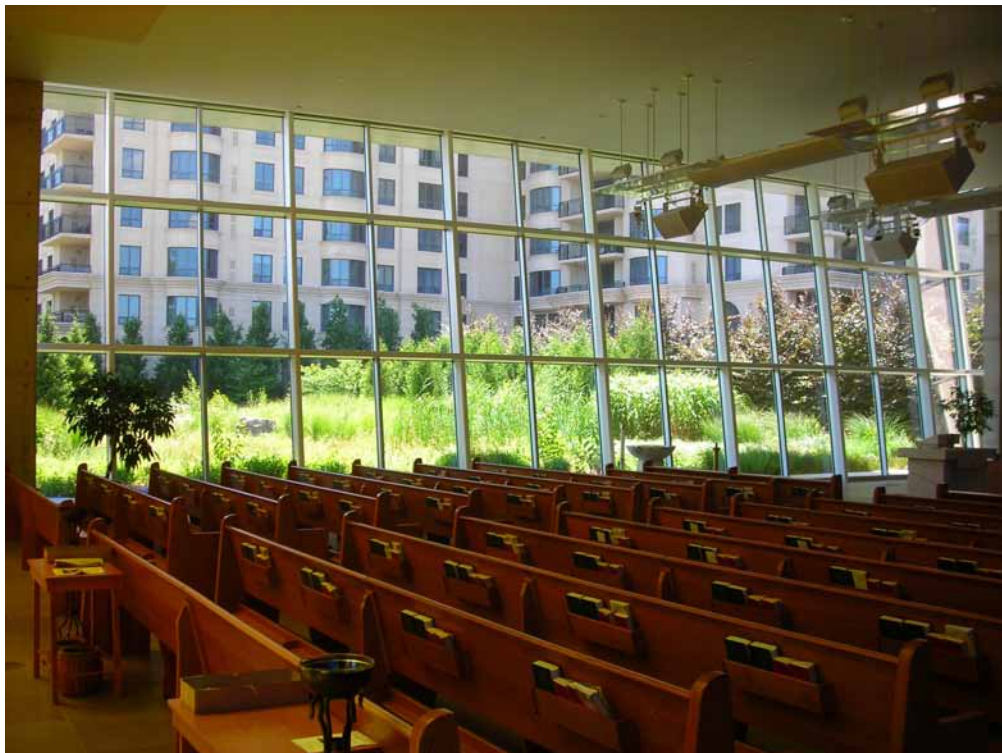
7.3. Diffused coloured light on the western wall of St. Gabriel's chapel.

7.4. Coloured light descending western wall of St. Gabriel's chapel.

7.5. Western wall of St. Gabriel's chapel saturated in coloured light.

7.6. View of hidden stained glass panels in St. Gabriel's chapel.

7.7. Interior of St. Gabriel's chapel, observing coloured lighting while within the diffused, natural light from the curtain wall.
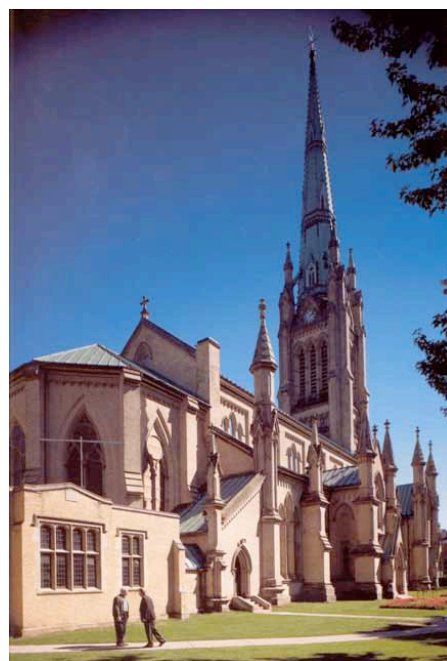

7.8. Interior of Le Corbusier's Notre Dame du Haut (courtesy of *fadis.library.utoronto.ca*).

7.9. Inerior of Fay Jones' Mildred Cooper Memorial Chapel (courtesy of *www.flickr.com/photos/bharding56/4767818834*).

7.10. Exterior of the Cathedral Church of St. James (courtesy of *www.stjamescathedral.on.ca*).

7.11. Interior of the Cathedral Church of St. James.

Conclusion:
Reflections

Light's transcendence is not delegated to a reading mind which deciphers the impacts of the light-thing upon the brain and which could do this quite as well if it had never lived in a body. No more is it a question of speaking of space and light; the question is to make space and light, which are there, speak to us. There is no end to this question, since the vision to which it addresses itself is itself a question. The inquiries we believed closed have been reopened.
-Merleau-Ponty, "Eye and Mind" 178

Summary and Concluding Remarks

The task presented in the introduction – to search for epiphanies and moments of insight into light – guided the three case studies. In my search for light, what did I see? Generally, an outdoor space stripped of any cosmological connectedness, a contemporary understanding of the relationship between "inside" and "outside," and a re-interpreted spiritual light. In each case the relationship between the built site and its larger setting, or between the *built* and *natural* environment, was a central theme. Dundas Square, an outdoor public space, seals itself from the larger cosmos every night, ostensibly creating an interior. It is a symbol of modernity, as a site created by electric lighting. The Terrence Donnelly Centre for Cellular and Biomolecular Research (CCBR) creates an interior-exterior tension constantly in flux, causing undefined (or perhaps uncultivated) boundaries. It represents the all-too-common glass skyscraper of contemporary practice, giving little attention to the importance of thresholds. St. Gabriel's Passionist Parish is an indoor space

that creatively brings the exterior world in, connecting the inside to the larger cosmos. It does so by re-thinking religious metaphors of light, thereby creating a unique experience that questions presuppositions. Understood in sequence, the three sites represent a movement away from a "closed" built environment and towards one thoughtfully "opened" to the more-than-human world.

Throughout the case studies, the tension between direct experience and metaphorical overtones was consistently evident. Each case study (as well as Chapter 4) worked to uncover the relational *experiential* and *theoretical* lights, through combining phenomenological writing with various touchstones on historic and philosophical influences. A fundamental realization is that we cannot perceive this thing called *light* as something apart from the spaces we inhabit, and ourselves. An inquiry into light, such as was carried out here, reveals its deeply entwined nature – light and dark, inside and outside, material and light – that is unavoidable. *Light* is an entanglement of experience, theoretical assumptions, and metaphorical overtones, to the degree that an objective vantage point is impossible. Instead of a pure "phenomenology of light," I investigated the *relationality* of light – the intertwining of light and experience, and experience and interpretation. The danger is not inherent in metaphorical understandings of light *per se* – as Zajonc explains, conceptual models (spiritual, scientific, or otherwise) can serve as aids to reflection and help foster insight (306). However, when concepts are understood as truth, they risk overshadowing the firsthand experience informing their very conception. Metaphors of past eras can be observed with clarity, but we cannot step back from contemporary interpretations so easily. With careful reflection, however, we can let experiential light shine through, if only for brief instances.

The quote that prefaced the introduction was the final paragraph of Zajonc's *Catching the Light*: "Seeing light is a metaphor for seeing the invisible in the visible, for

detecting the fragile imaginal garment that holds our planet and all existence together. Once we have learned to see light, surely everything else will follow" (343). Of course, "learning to see light" is a rhetorical statement - perhaps a final conclusion will be reached regarding the true nature light, but for now "seeing light" is understanding our interpretations, and our values reflected therein. The task ahead is not to "see" light literally, but rather admit we can only observe the relationship between experiences and interpretations more clearly. As such, an investigation of the three sites presented, or any other, is never complete; they may offer many more insights and epiphanous moments. As our cultural values, philosophies, and sciences develop, so too does the relationship between experiences and conceptual abstractions. The built environment will continually offer new insights, if we take the time to look.

To conclude Chapter 2, I asked if the concept of an embodied experience of architecture, when combined with environmental thought, could engender a shift in values towards a raised ecological awareness. To address this question, I utilized the methods and writings of phenomenology, and more specifically architectural and ecological phenomenology. Interrogating a built site, using phenomenology, can help to reveal the connectedness embedded within, or hindered by, that space. Recall Plummer's remarks on the usefulness of phenomenology for examining lighting: "By suspending judgment and grasping things in a kind of primal encounter, it becomes possible to discern the most elusive and subtle aspects of buildings, including aspects of light we fail often to consciously notice" (12). Through phenomenological analysis, we can become more attuned to the intricacies of lighting effects and how they shape our experiences. Close examination of light reveals, if only for brief moments, the reciprocity between our built environments and our values. An environmental ethic concerning light, and subsequent ecological design informed by such an understanding, must consistently return to experiential light for examination.

Through attention to experience, those "fragile threads of connectedness" (Wines 18) can be discovered and reinforced. From this starting point, new interpretations of light and lighting can arise. Light can be controlled and quantified, or its mysterious and elusive qualities can be explored. Seeing this second type of light can offer new epiphanies, and allow the more-than-human back into our spaces and us. Each time we open our eyes, we can see that primordial and unfathomable light, existing before space and time, always sustaining the world. We can move away from old metaphors of light and begin to see a reciprocity between the larger cosmos, our built environments, and ourselves.

In the writing by Frank Lloyd Wright discussed in Chapter 6 – "A World of Glass," he states that glass opens new possibilities for architects. However, the use of glass should not be bound by traditional ideas of what a building must look like; new materials are often conformed to preconceived ideas without due thought (138). While Wright's imagined glass utopia is troublesome, this notion is useful: today, the preconceived ideas inherited from old styles are what architecture must evolve from. Green technologies cannot simply be applied to a pre-existing theoretical framework – Modern buildings have their own philosophical goals. Ecological design needs new goals, and therefore new questions. Yet, before and during the establishment of a new design paradigm, our architectural heritage also requires continued questioning. An explicit break with the past is not necessary; many great writers and practitioners of architecture have much to offer future ecological design theory and practice. The lessons from prominent Modernists concerned with the poetic aspects of architecture, such as Louis Kahn, are still relevant.

"The task of architecture," concluded Pallasmaa, "is to create embodied existential metaphors that concretise and structure man's being in the world" (50). Therefore, a new design precedent should be the search for connectedness between humans and the more-than-human world. The function of architectural theory, in this framework, is to question

our presuppositions informing design thinking. There is a need to move away from manifestos and towards contemplation as a framework for inquiry. Engaging with the subject of light, or any other phenomenon, can reveal the layers of metaphorical meaning and their varied usage. It can also inform future design theory of past successes and shortcomings. Stoner, in her discussion of poetry's usefulness for design, explains that poems can provide inspiration, and a way to transcend programmatic requirements and reflect on something more profound. Poems give up control in favour of exploration and immersion within a subject (not unlike the goals of phenomenology) – this is what Stoner proposes is needed in architecture (117). I agree.

* * *

Looking Back

Using phenomenology as a conceptual framework and research method, I sought to understand light (and the three case studies) in a different, or more complete, way. For my personal development, this paper largely served to refine a research methodology (see Appendix). I found the process difficult, but rewarding in the end. It was a process of careful and creative writing and re-writing, in search of new questions that must be asked of architectural theory and practice. The three case studies utilized my two-fold hermeneutic and first person phenomenological research method, developed from the conceptual framework presented in Chapter 3, to address the qualitative discourse needed in ecological design (discussed in Chapter 2). Chapter 4 represented my "literature review." It was both an initial phenomenological investigation of light, and a summary of extensive background research into the history and theories of light. Chapter 4 served as the base upon which my investigations of specific sites were developed. An important theme that emerged was the inescapable intermingling of experiential and theoretical understandings of light. Hence, the output for case studies became a combination of close description, through immersion

within the spaces, and *touchstones*, background information concerning historical/philosophical influences.

Looking Forward

My Major Paper was not a comprehensive investigation into light and lighting, but rather was meant to foster a discourse concerning light's usage in ecological design. There are many adjacent and tangential pathways that could be opened for research: further inquiry into any single metaphor, more detailed research into specific buildings or building types, greater analysis of the impacts of electric lighting, Western vs. alternative worldviews of light and their subsequent manifestations in architecture,[1] etc. Additionally, the polarity of light and dark, or the relationship between materiality and colour, could be further developed. Likewise, Dundas Square, the CCBR, or St. Gabriel's could be further investigated for philosophical presuppositions informing their usage of light, and possible new directions for architectural theory contained within.

The hope is that aspiring or established designers, and philosophers of architecture, can draw inspiration from my investigation. When designing, precedents are an important consideration – I have examined three contemporary structures to assess their positive and negative contributions to green architectural theory. As phenomenology is an inductive research method, the present insights can be applied to, or considered for, any design with similar programmatic characteristics. I also believe that my research method can be further developed, and continually utilized to investigate built environments. It is a template for myself (and others) to approach architectural questions in a different way, and help progress any dialogue regarding ecological design. I chose to examine light, but one could

---

[1] For example, Jun'ichiro Tanizaki's *In Praise of Shadows* offers an entry point for the comparison of Japanese and Western lighting design, which could be considered from an eco-critical viewpoint.

use this method to approach any phenomenon, or even to explore a single building as a holistic experience.

* * *

Coda: Still Searching

The desk in my apartment is beside a bay window facing northwest. During the summer months, a slit of direct sunlight enters for a few evening hours. It is never more than a foot wide, just barely angling in. As I write, the direct sunlight streams in across my desk, eventually climbing halfway up the wall. The intensity and brightness of the direct sunlight reflecting off the desk, compared to the surrounding indirect light, always seems more *real*. A bit closer to *light itself*. I reached out to touch the light, yet no material substance was there. I felt the heat, but could not find the light. Sitting in contemplation, what did I see? God, the Big Bang, geometry, a wave-particle hybrid, a life-giving energy – or have I tricked myself into "seeing" something beyond what is seen, just beyond my vision?

As the sun sets, the last of the sunlight crawls back out the window. Once again, I am left reflecting on light, this strange thing too well known to ever be fully experienced, always fading just as it comes into focus…

Appendix

1) Research Method

As opposed to being a philosophical position ("I am a phenomenologist"), it is more useful to view phenomenology as a style of thinking or mode of inquiry – this was actually the stance of both Heidegger and Merleau-Ponty (Matthews 13). It is, to quote Seamon, "a way of study whereby the researcher seeks to be open to the phenomenon and to allow it to show itself in its fullness and complexity *through his or her own direct involvement and understanding*." In order to achieve this, I am combining hermeneutic and first person phenomenological methods, as defined by Seamon. While different researchers vary in their opinion of whether phenomenological research should involve an interpretive (or hermeneutic) aspect, Finlay notes that there are no hard boundaries between description and interpretation. Rather, there is a continuum based on subject matter and researcher – the more mediated the description is, the more interpretation is involved (11). In reference to architecture, Pallasmaa stated, "All experience implies the acts of recollecting, remembering and comparing" (50). Hence, comingling hermeneutic and first person approaches can lead to a richer and fuller investigation (see chart below, displaying my research process).

Hermeneutic phenomenology

Beyond purely descriptive investigations, I am actively subjecting my observations and experiences to an interpretation shaped by environmental thought. My embodied descriptions of built spaces are being viewed through an ecophenomenological lens (see Chapter 3 – "Questions of Scale") and scrutinized for their potential environmental relevance. Hermeneutic phenomenology involves the interpretation of *texts*, where text

refers to any object imbued with meaning (Seamon). In *Researching Lived Experience*, van

Manen states,

> Hermeneutic phenomenology tries to be attentive to both terms of its methodology: its is a *descriptive* (phenomenological) methodology because it wants to be attentive to how things appear, it wants to let things speak for themselves; it is an *interpretive* (hermeneutic) methodology because it claims that there are no such things as uninterpreted phenomena. The implied contradiction may be resolved if one acknowledges that the (phenomenological) "facts" of lived experience are always already meaningfully (hermeneutically) experienced. Moreover, even the "facts" of lived experience need to be captured in language (the human science text) and this is inevitably an interpretive process. (180-1)

There are many ways to interpret a text, so the task is never complete and always under

way (Seamon). While outside the boundaries of phenomenological research, Dewdney's

Acquainted with the Night provides a useful example of a hermeneutic investigation in

action. Dewdney imagined he was a stranger to the concept of "night," exploring it for the

first time. This way, he (and the reader) could see something ordinary in a new way (5). He

does not only rely on firsthand experiences, but also moves through science, art, literature,

myths, dreams, cities, insomnia, and nocturnal animals, arriving at more meaningful

understanding of night. Many writings on embodied architectural phenomenology contain a

hermeneutic component, such as Pallasmaa's criticism of our vision-biased society.

First Person Phenomenology

First person phenomenological research utilizes the researcher's firsthand experiences as a

basis for understanding the phenomenon (Seamon). This encompasses the descriptive

aspect of my research, as I am examining the embodied experience of light within various

built spaces. These descriptive writings are inspired by the observations and terminology of

the architectural theorists outlined in Chapter 3 – "Architectural Phenomenology." That

being said, there are few writings that actually undertake a detailed, first person analysis of

a specific phenomenon. For inspiration, I have turned to works such as Hull's *Touching the*

Rock. Structured as journal entries over three years, Hull writes on the experience of going blind. He searches for the personal meaning of his blindness, detailing various physical difficulties, relationships, questions of faith, etc. Throughout, he reflects on both extremely personal situations and larger societal concerns surrounding blindness. There is no tightly wound overarching narrative and no concrete conclusion; instead Hull carefully details his experience of blindness, leaving the reader with a fuller understanding of an otherwise unknown phenomenon. Reflecting in his project, Hull states, "This must include some effort to understand blindness itself, as well as my own blindness. In seeking understanding, I am seeking meaning… Of course, the quest for full significance… will never be ended. It will never be a finished product. Nevertheless, the quest remains worthwhile" (163).

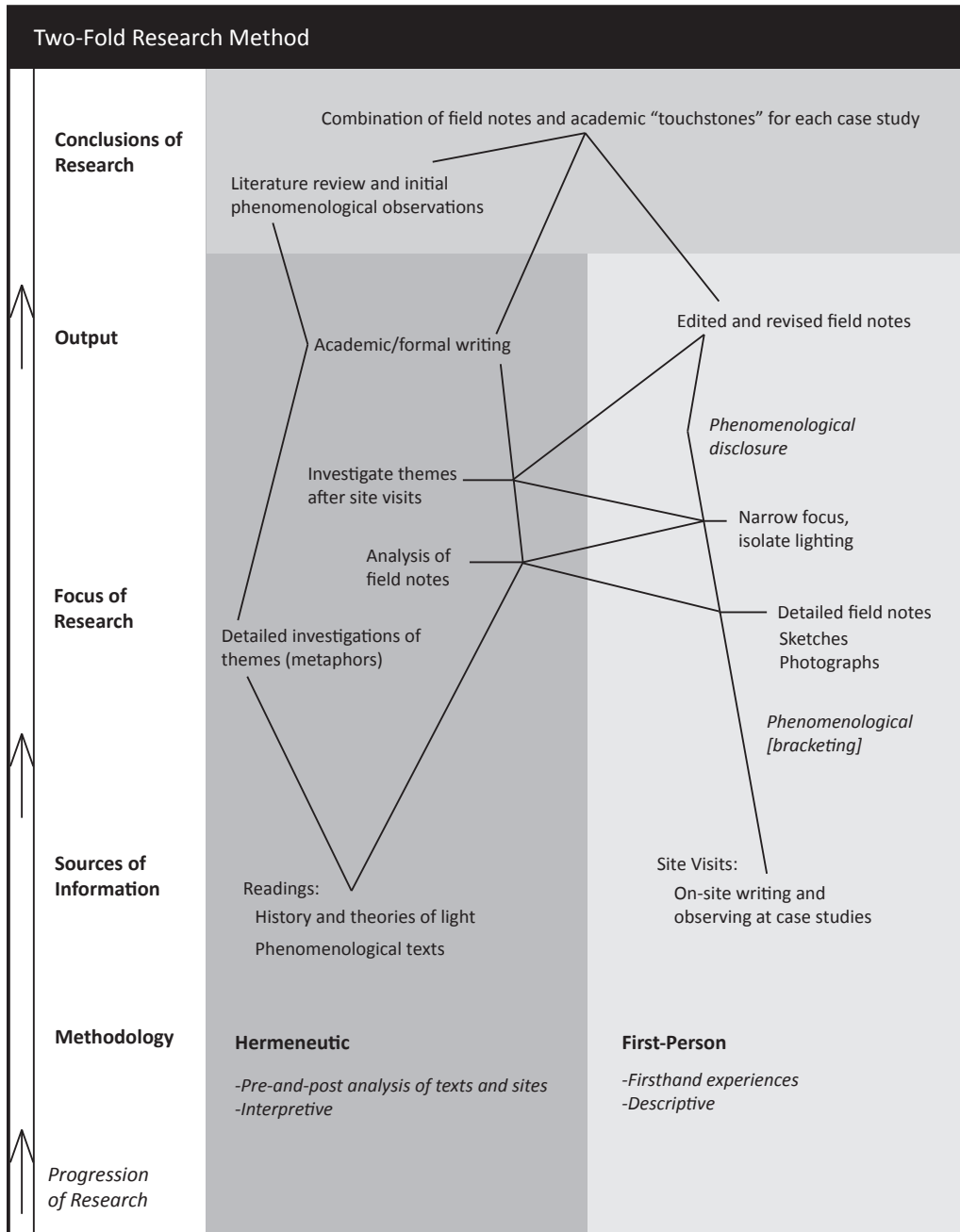### Questions of Language – The Importance of Reflective Writing

Writing is a central component of research within a phenomenological framework. In *Researching Lived Experience*, van Manen explains that, in phenomenology, research and writing are "practically inseparable" activities (4), and that "Creating a phenomenological text is the object of the research process" (111). As such, research and writing become aspects of one holistic undertaking. Writing is not something done as a final stage, but very much a part of the search for meaning. To this point, Colyar's "Becoming Writing, Becoming Writers" makes a similar argument for the usefulness of writing in qualitative research generally. For Colyar, writing is a research methodology in itself, a generative process that goes beyond simply transcribing ideas. It both helps to present the topic effectively and helps the researcher make sense of the topic. "Writing *is* inquiry. Writing is a kind of data collection" (423). Research in phenomenology aims to go beyond explicit meanings, and read between the lines to access implicit dimensions and intuitions (Finlay 10). Thoughtful and reflexive writing (and rewriting) becomes the primary research task.

On the topic of phenomenological writing, we return to the embodied architectural phenomenologists mentioned in Chapter 3 (i.e. Holl, Pallasmaa, Rasmussen, and Zumthor). Examining Rasmussen's *Experiencing Architecture*, it is important to note that his descriptions, reliant primarily on formal analysis, refer mainly to physical attributes – ideas, analogies, and feelings are not present. He is very literal in his treatment of built spaces, leaving out what could be considered the underlying meaning of the space, thus betraying the primary task of a phenomenological investigation. As van Manen explains, "… we may describe an architectural or physical space… in terms of its dimensional properties and measures. But such spaces also have their atmospheric, sensual, and felt aspects. Moreover, these qualities are not fixed but subject to change like moods of a landscape" ("Phenomenology of Practice" 21). Elsewhere, van Manen notes that a phenomenological writing succeeds only when it "lets us see that which shines through, that which tends to hide itself" (*Researching Lived Experience* 130).

There is an interesting tension emerging, namely the ability to write about a phenomenon through its literal experiencing as a gateway into its underlying essence. "Language that authentically speaks the world rather than abstractly speaking *of* it is a language that reverberates the world, as Merleau-Ponty says, a language that sings the world" (van Manen, *Researching Lived Experience* 13). To access underlying meaning, some phenomenologists recommend engaging modes of research beyond scientific endeavors, such as art, literature, and poetry (Finlay 14). Similarly, in *Questions of Perception: Phenomenology of Architecture*, Holl discusses the importance of "extra-architectural" ideas, and specifically literary metaphors, for providing a unique meaning to architectural design (119). Zumthor notes this relationship as well, stating that poetry "is concerned with insights and understanding, and above all with truth. Perhaps poetry is unexpected truth. It lives in stillness. Architecture's artistic task is to give this still expectancy a form" (*Thinking*

Architecture 19). I will add that literature can also help us *understand* and *articulate* those experiences, of spaces designed or otherwise.

Holl proposes the use of literary sources, but does not explain how this could be achieved. The writings by Stoner, which accompany and organize her anthology *Poems for Architects*, more intricately investigate the "dynamic tension" between literature and architecture that Holl alludes to. For Stoner, poems can provide inspiration, and a way to transcend programmatic requirements and reflect on the profound implications of built spaces (117). Rasmussen gives an excellent vocabulary for investigating what is explicitly presented; poetry and literature help to reveal what is hidden beneath, relinquishing control in favour of exploration. A central theme throughout is the difficultly in accessing light through lived experience, making the poetic understandings discussed by Stoner as valuable as the vocabulary provided by Rasmussen.

Two-Fold Research Method

Conclusions of Research

Combination of field notes and academic "touchstones" for each case study

Literature review and initial phenomenological observations

Output

Edited and revised field notes

Academic/formal writing

Phenomenological disclosure

Investigate themes after site visits

Narrow focus, isolate lighting

Analysis of field notes

Focus of Research

Detailed field notes
Sketches
Photographs

Detailed investigations of themes (metaphors)

Phenomenological [bracketing]

Sources of Information

Site Visits:
On-site writing and observing at case studies

Readings:
History and theories of light

Phenomenological texts

Methodology

Hermeneutic

-Pre-and-post analysis of texts and sites
-Interpretive

First-Person

-Firsthand experiences
-Descriptive

Progression of Research

2) Building Credits

Allan Gardens
Completed: 1910 (latest rebuild); additions in 1920s and 1950s
Architect: Robert McCallum
Address: 19 Horticultural Avenue, Toronto, ON

Cathedral Church of St. James
Completed: 1853 (latest rebuild); 1874 (additions); 1900 (stained glass)
Architect: Cumberland & Ridout; additions by Langley Langley & Burke; stained glass by Tiffany & Co.
Address: 65 Church Street, Toronto, ON

Dundas Square
Opened: 2002
Architect: Brown + Storey Architects
Address: Intersection of Yonge Street and Dundas Street, Toronto, ON

St. Gabriel's Passionist Parish
Completed: 2006
Architect: Roberto Chiotti (Larkin Architect Limited)
Address: 670 Sheppard Avenue East, Toronto, ON

The Terrence Donnelly Centre for Cellular and Biomolecular Research, University of Toronto
Completed: 2005
Architect: Behnisch Architekten with architectsAlliance
Address: 160 College Street, Toronto, ON

Works Cited

Abram, David. "Earth in Eclipse." *Merleau-Ponty and Environmental Philosophy: Dwelling on the Landscapes of Thought*. Ed. Suzanne Cataldi and William Hamrick. Albany: State University of New York Press, 2007. 149-176.

—. *The Spell of the Sensuous: Perception and Language in a More-Than-Human World*. New York: Vintage Books, 1996.

—. "Wood and Stone: Some Thoughts on the Sentience of Matter." *Architecture, Ethics, and the Personhood of Place*. Ed. Gregory Caicco. Lebanon: University Press of New England, 2007. 173-183.

Arnheim, Rudolf. *The Dynamics of Architectural Form*. Los Angeles: University of California Press, 2009.

Bachelard, Gaston. *The Flame of a Candle*. Trans. Joni Caldwell. Dallas: The Dallas Institute Publications, 1988.

—. *The Poetics of Space*. Trans. Maria Jolas. Boston: Beacon Press, 1994.

Ball, Philip. *Universe of Stone: Chartres Cathedral and the Invention of the Gothic*. New York: HarperCollins Publishers, 2008.

Bergdoll, Barry. *European Architecture 1750-1890*. Oxford: Oxford University Press, 2000.

Brook, Isis. "Can Merleau-Ponty's Notion of 'Flesh' Inform or even Transform Environmental Thinking?" *Environmental Values* 14 (2005): 353-62.

Brown, Charles and Ted Toadvine. "Eco-Phenomenology: An Introduction." *Eco-Phenomenology: Back to the Earth Itself*. Ed. Charles Brown and Ted Toadvine. Albany: State University of New York Press, 2003. ix-xxi.

Buchanan, Peter. *Ten Shades of Green: Architecture and the Natural World*. New York: The Architectural League of New York, 2005.

Canada Green Building Council. *LEED Canada: what is LEED?* 30 November 2009

    <http://www.cagbc.org/leed/what/index.php>.

Chiotti, Roberto. "St. Gabriel's Church: A LEED™ church building project #1." 2007. *St.*

    Gabriel's Passionist Parish. 19 July 2010

    <http://www.stgabrielsparish.ca/New_church/church_building_project_1.php>.

—. "St. Gabriel's Church: A LEED™ church building project #2." 2007. *St. Gabriel's Passionist*

    Parish. 19 July 2010

    <http://www.stgabrielsparish.ca/New_church/church_building_project_2.php>.

Colyar, Julia. "Becoming Writing, Becoming Writers." *Qualitative Inquiry* 15.2 (2009): 421-

    436.

Cunningham, William and Mary Ann Cunningham. *Principles of Environmental Science:*

    Inquiry and Applications. 3rd. New York: McGraw-Hill, 2006.

Deluca, K.M. "Thinking With Heidegger: Rethinking Environmental Theory and Practice."

    Ethics and the Environment 10.1 (2005): 67-88.

Dewdney, Christopher. *Acquainted with the Night: Excursions Through the World After Dark*.

    Toronto: HarperCollins Publishers Ltd, 2004.

Di Cicco, Pier Giorgio. "Notes on Spirituality and Sacred Space." 2008. 10 July 2010

    <http://www.toronto.ca/culture/pdf/poet/2008/feb2008_notes_spirit.pdf>.

Dodwell, C.R. *The Pictorial Arts of the West 800-1200*. New Haven: Yale University Press,

    1993.

Donleavy-Johnston, Suzan. "Festivals of the Fire and Flame." *Parabola* 26.2 (2001): 22-26.

Earth Pledge. *Sustainable Architecture White Papers*. New York: Earth Pledge, 2005.

Ekirch, Roger. *At Day's Close: Night in Times Past*. New York: W. W. Norton & Company, Inc.,

    2005.

Evernden, Neil. *The Natural Alien: Humankind and Environment*. 2nd. Toronto: University of

Toronto Press, 1993.

Finlay, Linda. "Debating Phenomenological Research Methods." *Phenomenology & Practice*

3.1 (2009): 6-25.

Grandy, David. *The Speed of Light: Constancy + Cosmos*. Bloomington: Indiana University

Press, 2009.

Gropius, Walter. "The Theory and Organization of the Bauhaus." *Bauhaus 1919-1928*. Ed.

Herbert Bayer, Walter Gropius and Ise Gropius. New York: Museum of Modern Art,

1938. 20-29.

Gross, Michael. *Light and Life*. Oxford: Oxford University Press, 2002.

Hansen, Mark. "The Embryology and the (In)visible." *The Cambridge Companion to Merleau-*

Ponty. Ed. Taylor Carman and Mark Hansen. New York: Cambridge University Press,

2005. 231-264.

Harries, Karsten. "The Need for Architecture." *Environmental & Architectural*

Phenomenology Newsletter 20.3 (2009): 11-18.

Henderson, David. "Valuing the Stars: On the Economics of Light Pollution." *Environmental*

Philosophy 7.2 (2009): 17-26.

Holl, Steven. *Parallax*. New York: Princeton Architectural Press, 2000.

Holl, Steven, Juhani Pallasmaa and Alberto Perez-Gomez. *Questions of Perception:*

Phenomenology of Architecture. 2nd. San Francisco: William Stout Publishers, 2006.

Hull, John M. *Touching the Rock: An Experience of Blindness*. New York: Pantheon Books,

1990.

Jodidio, Philip. *Architecture: Nature.* New York: Prestel, 2006.

Kahn, Louis. "Monumentality (1944)." *Louis Kahn: Essential Texts*. Ed. Robert Twombly. New

York: W.W. Norton & Company, 2003. 21-31.

Kahn, Louis. "Silence and Light (1968, 1969)." *Louis Kahn: Essential Texts*. Ed. Robert

Twombly. New York: W.W. Norton & Company, 2003. 228-251.

Kellert, Stephen. *Building for Life: Designing and Understanding the Human-Nature Connection*. Washington: Island Press, 2005.

King, Roger. "Environmental Ethics and the Built Environment." *Environmental Ethics* 22 (2000): 115-131.

Kohak, Erazim. *The Embers and the Stars: A Philosophical Inquiry into the Moral Sense of Nature*. Chicago: University of Chicago Press, 1984.

Langer, Monika. "Nietzche, Heidegger, and Merleau-Ponty: Some of their Contributions and Limitations for Environmentalism." *Eco-Phenomenology: Back to the Earth Itself*. Ed. Charles Brown and Ted Toadvine. Albany: State University of New York Press, 2003. 103-120.

Leopold, Aldo. *A Sand County Almanac: And Sketches Here and There*. New York: Oxford University Press, 1949.

Liberman, Kenneth. "An Inquiry into the Intercorporeal Relations Between Humans and the Earth." *Merleau-Ponty and Environmental Philosophy: Dwelling on the Landscapes of Thought*. Ed. Suzanne Cataldi and William Hamrick. Albany: State University of New York Press, 2007. 37-49.

Light, Andrew and Aurora Wallace. "Not Out of the Woods: Preserving the Human in Enviornmental Architecture." *Environmental Values* 14 (2005): 3-20.

Lindberg, David. *The Beginnings of Western Science*. 2nd. Chicago: University of Chicago Press, 2007.

Major, Mark, Jonathan Speirs and Anthony Tischhauser. *Made of Light: The Art of Light and Architecture*. Berlin: Birkhauser - Publishers for Architecture, 2005.

Matthews, Eric. *Merleau-Ponty: A Guide for the Perplexed*. London: Continuum, 2006.

McCann, Rachel. "Entwining the Body and the World: Architectural Design and Experience

in the Light of "Eye and Mind"." *Intertwinings: Interdisciplinary Encounters with Merleau-Ponty*. Albany: State University of New York Press, 2008. 265-281.

—. "Wild Beauty: A Sensuous Ethics of Architecture." 2007. *Reconciling Poetics and Ethics in Architecture*. 30 August 2010 <http://www.arch.mcgill.ca/theory/conference/papers.htm>.

McDonough, William and Michael Braungart. *Cradle to Cradle*. New York: North Point Press, 2002.

McHugh, Patricia. *Toronto Architecture: A City Guide*. 2nd. Toronto: McClelland & Stewart Inc., 1989.

McKay, Don. *Vis a Vis: Field Notes on Poetry & Wilderness*. Kentville: Gaspereau Press, 2001.

Merleau-Ponty, Maurice. "Cézanne's Doubt." *The Merleau-Ponty Aesthetics Reader: Philosophy and Painting*. Ed. Galen Johnson. Trans. Michael Smith. Evanston: Northwestern University Press, 1993. 59-75.

—. "Eye and Mind." *The Primacy of Perception: And Other Essays on Phenomenological Psychology, the Philosophy of Art, History and Politics.* Ed. James Edie. Trans. Carleton Dallery. Evanston: Northwestern University Press, 1964. 159-90.

—. *Phenomenology of Perception*. New York: Routledge Classics, 2002.

—. *The Visible and the Invisible*. Ed. Claude Lefort. Trans. Alphonso Lingis. Evanston: Northwestern University Press, 1968.

Nielsen, Niels, et al. *Religions of the World*. 3rd. New York: St. Martin's Press, 1993.

Norberg-Schulz, Christian. *Genius Loci: Towards a Phenomenology of Architecture*. New York: Rizzoli International Publications, Inc., 1979.

Otero-Pailos, Jorge. *Architecture's Historical Turn: Phenomenology and the Rise of the Postmodern*. Minneapolis: University of Minnesota Press, 2010.

Pallasmaa, Juhani. *The eyes of the skin: architecture and the senses*. London: Academy

Editions, 1996.

Papanek, Victor. *The Green Imperative: Natural Design for the Real World*. New York:

Thames and Hudson Inc., 1995.

Park, David. *The Fire Within the Eye: A Historical Essay on the Nature and Meaning of Light*.

Princeton: Princeton University Press, 1997.

Pasnau, Robert. *Divine Illumination*. Ed. Edward Zalta. 4 April 2011. 12 July 2011

<http://plato.stanford.edu/entries/illumination/ >.

Plato. *Timaeus*. Trans. Donald J. Zeyl. Indianapolis: Hackett Publishing Company, Inc., 2000.

Plummer, Henry. *The Architecture of Natural Light*. New York: The Monacelli Press, 2009.

Rasmussen, Steen. *Experiencing Architecture*. Cambridge: The MIT Press, 1959.

Rush, Fred. *On Architecture*. New York: Routledge, 2009.

Scott, Robert. *The Gothic Enterprise: A Guide to Understanding the Medieval Cathedral*. Los

Angeles: University of California Press, Ltd., 2003.

Seamon, David. "Phenomenology, Place, Environment, and Architecture: A Review." 2000.

Environmental and Architectural Phenomenology Newsletter. 19 March 2010

<http://www.arch.ksu.edu/seamon/Seamon_reviewEAP.htm>.

Stoner, Jill. *Poems for Architects: An Anthology*. San Francisco: William Stout Publishers,

2001.

Tanizaki, Jun'ichiro. *In Praise of Shadows*. Trans. Thomas J. Harper and Edward G.

Seidensticker. Stony Creek: Leete's Island Books, Inc., 1977.

van Manen, Max. "Phenomenology of Practice." *Phenomenology & Practice* 1.1 (2007): 11-

30.

—. *Researching Lived Experience: Human Science for an Action Sensitive Pedagogy*. 2nd.

London: The Althouse Press, 1997.

von Simson, Otto. *The Gothic Cathedral: Origins of Gothic Architecture and the Medieval*

Concept of Order. 3rd. Princeton: Princeton University Press, 1988.

Wang, David and Sarah Wagner. "A Map of Phenomenology for the Design Disciplines."

Environmental & Architectural Phenomenology Newsletter 18.3 (2007): 10-15.

Wines, James. "The Art of Architecture in the Age of Ecology." *Sustainable Architecture White*

Papers. New York: Earth Pledge, 2005. 12-19.

Wood, David. "What is Eco-Phenomenology?" *Eco-Phenomenology: Back to the Earth Itself*.

Ed. Charles Brown and Ted Toadvine. Albany: State University of New York Press,

2003. 211-233.

Wright, Frank Lloyd. "In the Cause of Architecture VI: The Meaning of Materials - Glass." *The*

Essential Frank Lloyd Wright: Critical Writings on Architecture. Ed. Bruce Brooks

Pfeiffer. Princeton: Princeton University Press, 2008. 137-140.

Zajonc, Arthur. *Catching the Light: The Entwined History of Light and Mind*. New York:

Oxford University Press, 1993.

Zumthor, Peter. *Atmospheres. Architectural Environments. Surrounding Objects*. Basel:

Birkhauser, 2006.

—. *Thinking Architecture*. 3rd. Basel: Birkhauser, 2010.