Atmospheric Perceptions in the Making

An exploration of the implications of the immateriality of climate on our perception of space and in its making

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This thesis is submitted as partial fulfillment of the Masters of Architecture (Professional)

Victoria University of Wellington

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Date:	28 February 2011
Word count:	18,267

Acknowledgments

I wish to express sincere thanks and appreciation to Philippe Campays for all his guidance, attention, support and patience during the production of this thesis.

In addition, special thanks is due to others who took the time to review either the writing or design of this project - Jan, Jaq, Micah, Robin, Steph - I appreciate all the constructive comments and suggestions during the development of the design and theory.

I would also like to express thanks to those who indirectly supported me throughout this process, Dad, Mum, Miles, Thea, Ellie and Tookey, I appreciate all the check-ups, well wishes and distractions. An especially large thanks must be wished to Miles who was calm and collected in the hour technology threatened the completion of this project and my sanity, I am very grateful you are a computer nerd.

I would like to again thank Jaq, who has been my hero on many occassions and says all the right things, it is always greatly appreciated and this project has benefited from all her help.

Lastly, a big thank you to my patient, encouraging and supportive fiancée Nick... the best reason to finish this project.

"[...]climate can replace typology, function, and form of what we use and define as architecture."

Philippe Rahm (2008: accessed 11th March 2010)

To what extent should we consider the invisible atmospheric conditions in the design process of architecture? This project will

explore the implications of the immateriality of climate on both our perception of space and in its making.

Figure 1: Thick fog settles over the Wellington Harbour on a fine day
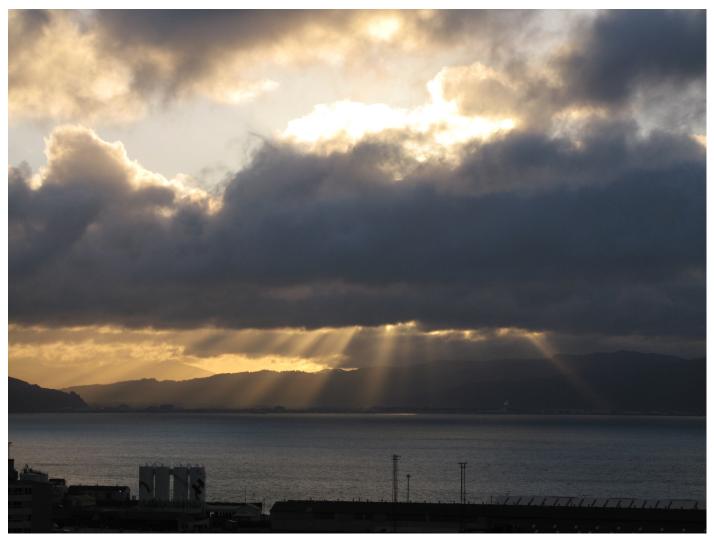
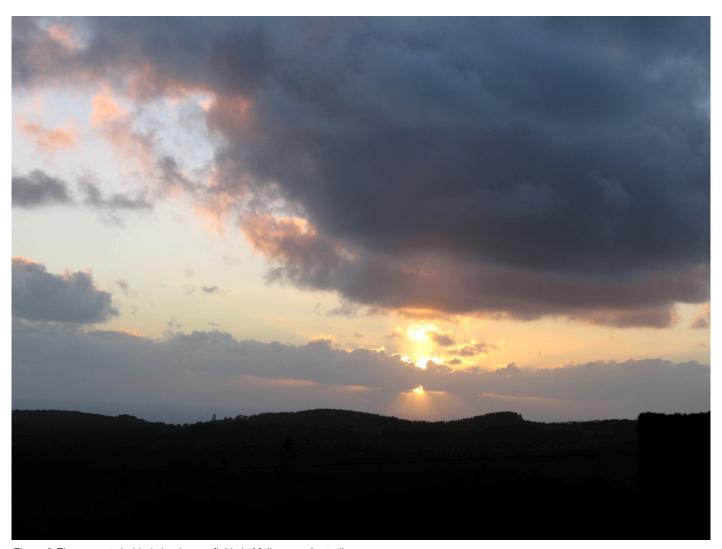*Figure 2:* Beams of sunlight penetrate heavy clouds over the Wellington Harbour, New Zealand

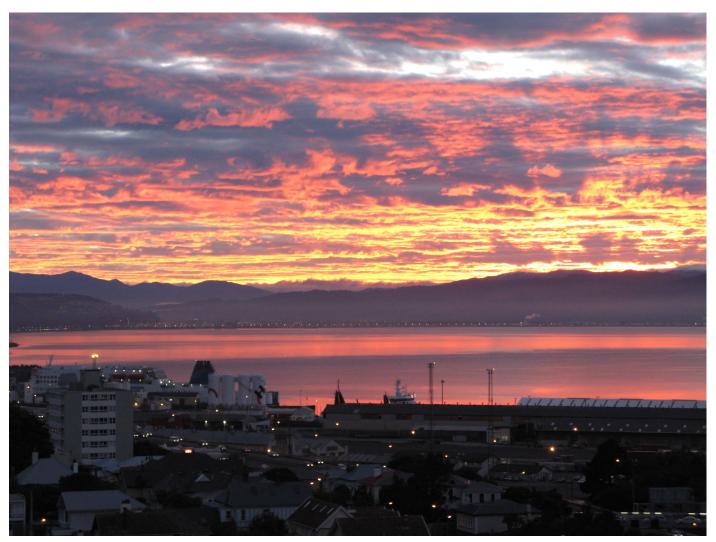*Figure 3:* The sun sets behind clouds over fields in Melbourne, Australia

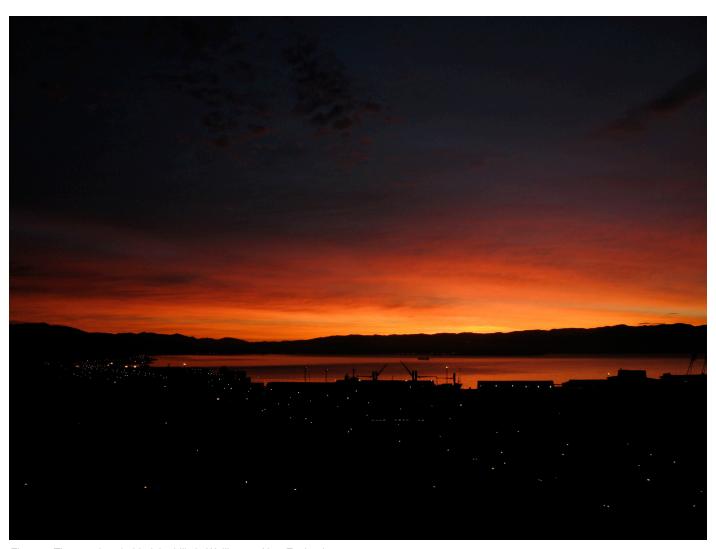*Figure 4:* A spectacluar sun rise over Wellington Harbour, New Zealand

Figure 5: The sun rises behind the hills in Wellington, New Zealand

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1.0 Introduction to research

1.1 Abstract

"[...] climate can replace typology, function, and form of what we use and define as architecture" (Rahm, 2008: accessed 11th March 2010, <http://www.philipperahm.com/3E.html>).

To what extent should we consider the invisible atmospheric conditions in the design process of architecture? This project will explore the implications of the immateriality of climate on both perception of space and in its making.

The immaterial and material in architecture have long been regarded as a dichotomy; an opposing of ideas between governing architectural theory and practice. The immaterial is a popular discussion within contemporary architectural literature, yet has evidently not fully impacted within practice. Built examples of the immaterial remain few. Those that have been implemented have tended towards the temporal in nature, existing in the mode of installations or exhibitions, such as Diller + Scofidio's *Blur Pavillion,* with its harnessing of misty atmospheric conditions (Diller & Scofidio, 1994).

1.1 Abstract

This research will firstly necessitate an exploration of the effect of atmospheric conditions (such as heat, light, humidity, sound, smell, taste, air movement) on spatial perception. This study refers to the immaterial in terms of such conditions and looks at the impact they can have on experience of space. It is noteworthy that many artworks, such as that of Olafur Eliasson, explore ideas of affective atmospheres *"as an agent of human experience and social action, prompting a subjective transformation"* (Frichot, 2008: p. 31), suggesting that these environments can transform perception.

This research will secondly experiment with scenarios of dis-location where specific atmospheric conditions will be relocated to a site in which they might otherwise be foreign. This will be done in view of testing the qualities of the atmospheric that impact on perception and to challenge the notion of enhancement, detraction and of provocation of mood.

It is anticipated that the research will provoke the design of a series of experimental works which will lead to a process of translation from discourse to installation to architecture through

the development of design tools and strategies. Together with
supporting theory, this will form an inquiry as to what extent
we should consider the invisible atmospheric conditions in the
design process of architecture.

1.2 Introduction

This thesis aims to demonstrate that atmospheric conditions can be utilised within the design process that create opportunities to reconnect the body with the senses, and challenge the way in which architecture is made and therefore perceived.

The invisibles within the architectural profession are still taking second place to the built, to the material. Contemporary architecture has predominately been preoccupied with ocular satisfying forms (Barbara & Perliss, 2006) or function derived spaces (Pallasmaa, 1983), and relegates the invisibles and immaterials, such as atmospheric conditions, to background processes. Built examples that embrace atmospheric conditions as a design generator are few, and have tended towards the temporal in nature existing in the mode of installations or exhibitions, such as Diller + Scofidio's *Blur Pavilion* and Philippe Rahm's *Hormonorium.*

Defining atmosphere can be a difficult task, as it is a subject within architecture that is subjective and broadly interpreted. Atmosphere ranges from intangible emotive spatial

experiences, ambience and the mood of space, to the invisible and more physical processes that occur within air. The first chapter, Atmosphere + Definition, acknowledges atmosphere as this umbrella term, but the remainder of the research focuses on atmospheric conditions as the tangible invisibles within air, such as humidity, temperature and air movement. Other aspects such as smell, sound, taste and contaminants are also explored as a result of air composition. Just as Jonathan Hill argues for the combination of the immaterial and material in architecture (Hill, 2006a), I suggest that the collaboration between atmospheric conditions and the built is where the success lies as a means of making architecture.

The conditioning of internal environments is controlled by a uniform and standardised comfort level, that is deemed desirable as a projection of the civilised worlds progress (Mallinson, 2006). Atmosphere + Removal proposes that this desire for constant and normalised atmospheric conditions has desensitised the body from itself and its external environment, as internal conditions have become increasingly sensorily predictable (Pallasmaa, 2005). Philippe Rahm further suggests that this removal from climatic processes could indeed be a

factor into current global warming issues (Rahm, 2007). The chapter Atmosphere + Air separates the different invisible factors and uses existing research and precedents to identify how each of these can define spaces and cross boundaries.

Senses enable perception. The body situates itself in space, and understands space collectively, therefore should be considered more in the generation of architecture. Atmosphere + Perception briefly defines perception and identifies the importance of sensation as a means to perceive surroundings. This chapter also identifies the dislocation between visual perception and that which is perceived through the other senses.

In the chapter Boundaries, atmospheric conditions are viewed to question boundaries in three different ways - as a boundary within itself, by crossing bodily boundaries, and by changing existing material boundaries through interaction. All of these boundaries encourage design exploration.

Investigations using atmospheric conditions as a means to develop built design often tend to stay either in the theoretical, or as installation. Olafur Eliasson, Philippe Rahm, Diller + Scofidio, SANAA, Peter Zumthor, R&Sie, Ned Kahn and

Fujiko Nakaya are architects and artists who have contributed to the investigation of this neglected architectural element, with some achieving built works. These precedents for atmospheric translations can be split into two categories - the dislocating of atmospheres (which explores foreign atmospheres inhabiting space), and visually re-creating the atmospheric. Through the combination of both these strategies, I offer this as a solution for atmospheric being applied in everyday architecture. Installations are an appropriate means to test this hypothesis, but more importantly these ideas need to be tested within a built work. To experiment with this, an urban intervention in Amsterdam, The Netherlands, has been proposed in the existing metro system, spanning from Amstel Station through to Centraal Station. The emphasis of this intervention is to identify how architecture can be made when the atmospheric is the generator using dislocation and visual re-creation as design methods.

I wish to emphasise that the drawings reflect the experimental nature of the research, and are only a means to test some of the theories presented. They intend to reflect the theoretical approach adopted and have therefore not been detailed to a construction level.

Through testing atmospheric in the built, and in this case an underground station, could enlighten the everyday experience of catching the train and indulge the senses. The strategies used will be tested with this programme, but are not limited to it.

2.0   Atmosphere

This chapter will identify atmosphere within architecture, initially comparing it to the immaterial and material. It will attempt to clarify different uses of the term atmosphere, but will focus on it as atmospheric conditions, and the ways with which contemporary society views the treatment of built environments. Within atmospheric conditions are factors such as temperature, humidity, smell, sound, taste, air pressure and density. While atmosphere is broad, this chapter begins to suggest that atmospheric conditions are the external invisible stimuli that affects the senses, thus producing a perception of space obtained through the body.

Figure 6: Hill identifies this image as capturing the immaterial aspect of a body becoming fully active in space. Adapted from *Immaterial Architecture,* Jonathan Hill, 2006, Massachusetts: Routledge. p. 84. Yves Klein, Leap into the void, 1960. Photographer, Harry Shunk.

2.1.0 Atmosphere + Definition

2.1.1 Immaterial + Material

Within architecture and the built environment exist both material and immaterial aspects, which influence spatial perception. The material is that which can be touched, seen and identified with easily. It is the matter with which forms are constructed to create a physical and visible boundary between the external weather conditions and the inhabited interior. The material is therefore essential for survival and the foundation for architecture. The model of this can be traced back to Vitruvius, and the notion that primitive man needed to shelter from the harsh conditions, thus using physically barriers to do so, such as caves or tents made from animal hide (McEwen, 2003). The identification of this model from Vitruvius, that architecture should be permanant and solid, is now concreted within the profession, leaving no doubt that architecture should be positioned in the material world. *"Architecture is expected to be solid, stable and reassuring - physically, socially and psychologically. Bound to each other, the architectural and the material are considered inseparable"* (McEwen, 2003: p. 2). The Vitruvian dogma surrounding durability and materiality is no longer applicable,

argues Jeremy Till, and if architecture continues to follow this model, this bland starting point offers little hope to the future of architecture (Till, 2009).

The immaterial then becomes important. Even though more emphasis tends to be placed on the built and the material, the need for the invisible world is still there.[1] These immaterials, or invisibles, within architecture have long been relegated to theory, paper projects, or temporal works, due to their seemingly ethereal and intangible properties. It is an area of discourse that is substancially investigated, such as in the writings of Mark Wigley, Peter Zumthor and Jonathan Hill, but is not yet established heavily within architectural practice. Jonathan Hill's *"Immaterial Architecture"* suggests that the immaterial is actually a material itself, just as valid an aspect of architecture as matter (Hill, 2006a). While this is easy to suggest, the immaterial is difficult to define, and even more difficult to substantiate within the profession. *"The terms material and immaterial are blurred and slippery, hidden within one another and overlap with other terms such as form and formless, real and virtual. There are*

[1] While this research focuses on the immaterial and the need for embracing this within practice, the constructed and material aspects of architecture are considered the foundation, as a means of grounding the more ephemeral arguments.

Figure 7: The notion of habitation is questioned in Anton Ambrose's (Un) Natural History Society (2005), when the occupant of this building is the weather. Adapted from *Immaterial Architecture,* Jonathan Hill, 2006, Massachusetts: Routledge. p. 197.

many ways to understand immaterial architecture" (Hill, 2003: p. 176). Within the immaterial, Hill writes, are aspects such as experience, user definition, drawing and representation, emotions and atmosphere.[2] The immaterial starts to fill in the gaps the material world leaves, and also creates a relationship between the human body and the world it inhabits. For example, when an object is seen, the image is projected back through the eye for the brain to analyse. The subconscious has an immediate reaction, and the conscious then develops an emotional relationship to the object (Coren, Ward, & Enns, 2004).[3] This intangible link from the external world to the body starts to identify immaterial relationships to matter, that allow the user to perceive and associate emotion to the external environment. These links are not experienced purely through the visual world however, yet many architects still place dominance on ocular satisfaction over the other senses.

"A problem of our culture is that we are ocular centric. View

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[2] Often emotions are said to be within atmosphere, when atmosphere is used as a means to describe mood. However, they can also be used separate to atmosphere, so a distinct entity in architecture by themselves.

[3] This is true not just for vision, but for the stimulation of all senses, which have an immediate reaction followed by a conscious analysis of the sensation.

is often more satisfying than the other senses put together. A lot

of architects today are interested in creating special effects..."

Elizabeth Diller (Barbara & Perliss, 2006: p. 135).

It is actually the sum of all the senses that develop how space is perceived, and therefore all the senses determine relationships to the external environment (Sensation will be explored in further depth in the later chapter Boundaries). The solution then seems obvious, all sensations should be explored within design in order to satisfy holistically. The reality is different, as in order to complete projects on time and on budget, compromises are made. This is usually at the detriment of quality of materials or craftmanship, or the omission of certain design features such as immaterial aspects. In this regard, time and financial aspects could also be regarded as immaterial components to the architecture profession. This research identifies this as a negative aspect to exploring the immaterial in the professional realm, and it is also a contextual issue.[4] While this con is illustrated, it has not been regarded to full extent within this research which mainly focuses on the theory of the immaterial and atmosphere, in collaboration with built precedents.

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[4] Depending on the economy of the country, this may be more or less.

Diller + Scofidio see atmosphere as a blurring of two worlds or environments (Hill, 2006a), thus becoming a boundary between the material and immaterial. It is a means of investigating the boundary between. While some of the Vitruvian ideas are still relevant within contemprary culture, Till argues that in order to evolve architecture, less emphasis on these guidelines will be beneficial. Jonathan Hill follows a similar argument, although finds the immaterial *"slippery"* and difficult to define, giving a wide range of attributes to the term 'immaterial'. Elizabeth Diller argues for movement away from spectacular architecture and exploring more immaterial aspects to this craft, and through experimenting herself with various projects, suggests atmosphere as a boundary between the immaterial and material. Her view is adopted within this research, that this boundary can be explored to enhance architecture through manipulation of atmosphere that challenges spatial perception, and therefore questions the way architecture is made, and perhaps inhabited. Atmosphere is another term that is slippery and elusive, and will be defined from different points of argument within the next chapter.

Figure 8: WEATHERS, Amplification, part of the Gen(home) Project, MAK/Schindler House, Los Angeles, California, 2006. Photo: Joshua White. Adapted from The New Somatic Architecture, by C. Hight, 2009, *Harvard Design Magazine, 30(Spring/Summer)*, p. 30.

2.1.2 Defining Atmosphere

The word "Atmosphere" is derived from the mid-17th century modern Latin *atmosphaera,* which is derived from Greek *atmos (vapor)* and *sphaira* (*ball* or *globe)* (Fowler, Fowler & Thompson, 1995: p. 78)*.* It is commonly associated with the enveloping of gases surrounding earth or another planet, and also *"the air in any particular place"* (Folwer, et al., 1995: p. 78)*.* Atmosphere can also be used to describe "*the pervading tone or mood of a place or situation,"* or *" emotion evoked by a work of art"* (Folwer, et al., 1995: p. 78). The meaning of the word often has architects and theorists divided, and tends to escape a singular definition.

Atmosphere is elusive. It eludes definition just as air eludes grasp. Due to the nature of this umbrella term, atmosphere, it is used to describe many aspects within architecture from ambience and emotion, to air conditions and atmospheric phenomena. It seems to be plastic in nature and has an *"[...] ability to assume multifarious ambient forms or influence spatial perception and experience"* (Preston, 2008: p. 7)*.* The common definition of atmosphere is the *'envelope of gases surrounding earth, any another planet, or any substance"* (Folwer, et al.,

1995: p. 78). This can further be broken down into multiple gases[5] which protect earth's living organisms from UV rays and provides oxygen. This atmosphere allows humans to live and inhabit the world, where the other planets seem unable to sustain life. In this sense, atmosphere starts to become defined as specific gases surrounding an object. This definition is similar to that of Mark Wigley's. He suggests that just as the earth has its own atmosphere, so too do pieces of architecture. The body of work is enveloped in its own *"swirling climate of intangible effects generated by a stationary object"* (Wigley, 1998: p. 18). Within this climate are substances comprised of the non-visual - smells, sounds, heat, moisture, pressures - invisible physical attributes. However non-physical attributes are also evident, such as mood and ambience, and these become the other invisible and intangible conditions of architecture. Therefore the atmospheric can be divided into physical atmospheric and emotional atmospheric. I will further discuss the emotional atmospheric within this chapter, but the main focus for the remainder of this research will be on the physical atmospheric conditions or invisibles.

Wigley states that all stationary objects generate

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5 Oxygen, carbon dioxide, argon, nitrogen, neon, helium, methane, krypton, hydrogen and some water vapor depending on location.

atmosphere. Therefore it can be assumed that all architects are creators of atmospheres, and subsequently the atmospheres are what are experienced, not the built form or matter (Wigley, 1998: p. 18). So atmosphere results from the built, and this invisible aspect of architecture is what will effect inhabitants on multiple sensory levels. Yet there is a paradox; as without form and materials would there be atmosphere? Can atmosphere and the physical even be separated? Wigley further states that architecture as a "*discipline is based on the apparent removal of atmosphere, the clearing away of all sensuous effects by reason. When atmosphere returns, it is meant to be subordinate to reason, controlled by the line*" (1998: p. 20). What is being suggested here is that architecture has commonly become the conditioning of atmosphere, the controlling of the invisible in order for the visible to dominate.[6] It is a means to manipulate the environment and exert dominance over atmospheric conditions. Often these conditions are afterthoughts, secondary to traditional priorities such as form and function. The physical can be easily manipulated and understood. The invisible is harder to grasp, and indeed, design.

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6 This statement from Wigley can also be interpreted as a critique of the position of the genius architect in regards to atmosphere and aspects of architecture difficult to control.

Defining a term as slippery as atmosphere provokes various definitions and understandings. The two readily available definitions are ambience (mood) and climate. Somehow these seem to overlap, as previously suggested by Hill (2003: p. 176). Wigley suggests that every piece of architecture has atmosphere surrounding it, just as it surrounds planets, and is more often removed than embraced by the architect. The next chapter, Atmosphere + Ambience, explores the first definition of atmosphere.

2.1.3 Atmosphere + Ambience

"The atmospheric effect of a space is essential to human wellbeing - yet it is difficult to precisely define or to gauge, and can only be partially justified using analytical methods. Its diffuse qualities make it difficult to plan, present, or understand."

Basic Spatial Design (Exner & Pressel, 2009: p. 15).

"...the pervading mood of a place, situation, or work of art" (Folwer, et al., 1995: p. 78) refers to ambience. Atmosphere can be used to describe the ambience of a space, an intangible essence that connects the user to space. Atmosphere as mood is evident in all spaces occupied. Ambience can be lively, depressing, overwhelming, cheerful, dreary, extravagant; ambience begins to describe these invisibles in terms of how the mood is being perceived in relation to the emotional body situated in space. Many people will describe places in this way. In fact, the ambience can usually be the overriding factor in recalling a certain spatial experience. *The bar was lively, the house was mysterious, the hall was overwhelming.* This definition of atmosphere is used by people as a means of describing the spaces inhabited without

recalling specific details about form or materials. Therefore, the collective atmospheric conditions are a major factor in describing the invisible conditions of space. *"The atmosphere of a place [...] is difficult to describe in detail, because various aspects come together simultaneously to make an impression; they are not perceived and analysed individually"* (Exner & Pressel, 2009: p. 9). Peter Zumthor is an architect who celebrates atmosphere in this way and defines it through nine ambient qualities, which provoke an immediate response through emotions. *"His system of atmospheric factors dwells on material presence coupled with an actual and sensing body to include sound, light, temperature and objects operating within a spatiotemporal context hinged on a tension between interior and exterior"* (Preston, 2008: p. 9). This treatment of atmosphere and architecture identifies the body as the point of importance. This links atmosphere and experience closely together. *"For him [Zumthor] atmosphere is an experience that is more complex than architecture alone, as there can be no perception without body, without being physically present in a place"* (Barbara & Perliss, 2006: p. 157).

Experiencing the form, which is ocular focused, is not through the whole body. Atmosphere, however, can be

Figure 9: A photograph of Peter Zumthor's *Vals Bathhouse,* where the architect uses materials with ambient qualities to produce emotive spaces. Photo: Helene Binet. Adapted from *The Pritzker Architecture Prize 2009 awarded to Peter Zumthor,* Award booklet, 2009, Retrieved on 16 June 2010 from: *http://www.pritzkerprize.com/laureates/2009/photobooklet2009.pdf:* The Hyatt Foundation.

experienced through all senses. An atmospheric architecture suggests the investigation into all the body's senses and how they can enrich its experience of space. This suggests that atmosphere, experience and space are all inextricably linked, and unfortunately, all are difficult to exactly define. Every architect and theorist have their own position on the matter. Perhaps this is the reason architectural investigations into atmosphere have often tended to remain in the temporal or paper realm.[7]

Further dissecting Wigley's account of atmosphere, words such as *climate* and *intangible effects* are encountered (Wigley, 1998: p.20). *Climate* can be defined as *"the prevailing weather conditions of an area"* (Fowler, et al., 1995: p. 246). In this case weather conditions and atmospheric conditions can be interchangeable,[8] and therefore reiterates the notion that atmosphere is associated to an object. *Intangible effects* assumes the changes occurring due to the operation of another body, by something non-physical, that cannot be touched or grasped, and possibly, not understood (Fowler, et al., 1995). *"This hyper-*

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[7] Within the last 20 years, there has been an increase in the amount of architects dealing with atmosphere in a very tangible way, such as Zumthor, Rahm, R&Sie and Sean Lally.

[8] Weather can be defined as *"the state of the atmosphere at a place and time as regards heat, cloudiness, dryness, sunshine, wind, rain etc."*(Fowler, et al., 1995: p.1587).

2.1.3 Atmosphere + Ambience

charged surface actually wraps the atmosphere rather than the building. It is the outer visible layer of the invisible climate. The building is seemingly moulded by the atmosphere rather than the other way around" (Wigley, 1998: p. 20). Here Wigley is suggesting that the atmosphere is what presents itself to the user, not the building itself, and in fact shapes the perception of the building. Exner and Pressel's *"Basic Spatial Design"* follows Wigley's argument, the perception on space is largely based on the invisibles.

"The particular spatial effect is determined by several physical and chemical conditions, including temperature, humidity, room acoustics, light and smell. All of these conditions are typical spatial attributes that work together, change with time, and, most importantly, are all perceived by the close senses" (Exner & Pressel, 2009: p. 42)*.*

This reiterates the notion mentioned previously about atmosphere and experience being inextricably linked together. This would mean that the atmosphere is an important aspect of architecture, especially for the inhabitants or users, as this is what is being interpreted and experienced. *"Basic Spatial Design,"* further identifies atmosphere both as ambience and a

holistic bodily experience.

"A room lit with candles is generally considered "cozy."
Yet the flickering flame of the candle, the colourful glow, and the
diffuse darkness of the spatial borders' surfaces are not the only
reasons behind this atmospheric spatial impression. In addition
to these visual aspects, other sensory stimuli such as the scent
of wax, the warmth of the flame, and its occasional, quiet sizzling
sound all account for the inviting atmosphere" (Exner & Pressel,
2009: p. 15)*.*

The importance of atmosphere upon spatial perception
becomes evident as a device to describe the invisible conditions
(Perception is further explored in a later chapter), and also how
the body reacts with space. Defining atmosphere as ambience
allows people to recall details with emotive connotations,
and is commonly the way spaces are experienced. Zumthor
uses ambient qualities to drive his architecture, and believes
"atmosphere is an experience that is more complex than
architecture alone". This aligns atmosphere, ambience and
experience together, with ambience being neither physical nor
visible, yet still presents itself to the user, accoding to Wigley.
Exner and Pressel follow this argument, that ambience is what

is used to describe spatial details that allude to other immaterial aspects. With regards to the invisible stimuli such as the *"scent of wax, the warmth of the the flame"* etc, it is suggested these are qualities found within air,[9] as even though they are (majority) invisible, they are physical. This introduces the argument that atmospheric conditions within air have many components which influence the way each individual perceives the built world around them, and this is explored in Atmosphere + Air.

9 These will be further regarded within the research as atmospheric conditions. By using the term atmospheric conditions begins to separate different aspects of *atmosphere,* as previously mentioned, as that term is too broadly referred to.
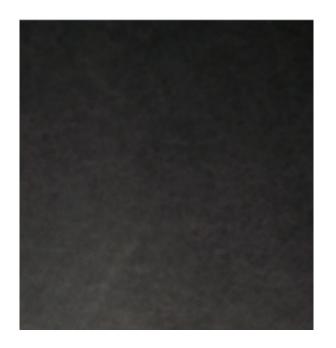
2.2   Atmosphere + Air
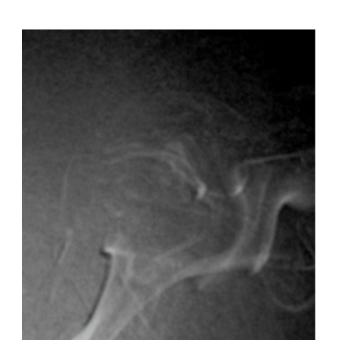
"It's in the air. The first thing that the term atmosphere evokes is in the air, the intangibility of air....remaining ever visible" (Osoni, 1998: p. 9).

For the purpose of this research, I am suggesting that atmospheric conditions can be defined as *"the air in any particular place"* (Folwer, et al., 1995: p. 78), or the invisible climatic conditions existing within and around built forms. These invisibles in turn define mood, activity and experience of space.

Air is complex. Air holds a variety of odours, sounds, temperatures, humidities, movements, tastes, densities and pressures. Air is breath. Air holds life. All the invisibles contained in air challenge the senses, and therefore spatial perception. When the air is humid, the body reacts by producing sweat. When the air is hot, bodily activity lessens and a slower pace is adopted to regulate the body relative to the surrounding climate. Essentially, the human body and its actions are governed by the conditions of air.

The notion of air having weight can be attributed to Galileo and Giovanni Battista Baliani (Walker, 2007). Opposing

Figures 10, 11, 12, 13: Still frames from a motion camera capturing the dynamic qualities inherent in wisps of smoke. By the author.

the church, both men believed that air had to have weight just as water and earth did, and conducted simple experiments to achieve this. The results showed that air pushes and is always present, therefore is a physical substance. There began the idea that there was an *"ocean of air"* (Walker, 2007: p. 11) above, protecting earth's organisms' from the rest of the universe. This ocean of air is acting like a roof, ensuring the exterior world does not penetrate the internal environment. *"Not only is it vital for breathing, but it also touches us inside and out every day of our lives"* (Walker, 2007: p. 22). The notion that air can cross bodily boundaries is intriguing. It is one of the only aspects of architecture that can be both within the built, and within the body simultaneously. It is an invisible aspect of the world, yet also physically present. Therefore atmospheric conditions have a way of affecting bodies. Science and nature has proven that external conditions affect the processes within the body (Herschong, 1979). However, simultaneously, bodies can also interrupt air through movement, temperature, odours etc. It becomes apparent that there is a constant dialogue between body and air, a continuous affective relationship that cannot be separated. Firstly, the manipulation of atmospheric conditions by the body will be explored in this chapter, followed by identifying

Figures 14 & 15: A laser light showing breathe and the effect upon occupying space, by Malte Wagenfeld, Parmington, Ayyar, de Gruchy, Watkins 2007. Adapted from *The Phenomenology of Air,* by Malte Wagenfeld, 2009, Paper presented at the Architecture and Phenomenology Conference, Japan.

the different factors of air in relation to space, as can be seen in *Figures 10 - 13* (p. 39).

Air can be manipulated with the addition of bodies and other forms, and also with other invisibles (light, smoke, fog). Malte Wagenfeld's experiment with qualities of air is a conceptual glimpse into how it can be utilised in space, how it can become a building medium and how it inhabits both internal and external environments. Through observing the encounters that occur within the external environment, Wagenfeld hypothesises that these rich and dramatic climatic encounters can become a means to design interiors (Wagenfeld, 2009). One question Wagenfeld raised was how to make visible the invisible. Through the use of photography, air movement from a fan was captured with a time lapse camera. Another used laser light to observe the travel capacity of breath (*Figures 14 & 15*) .Observations made were that air is unpredictable and also location specific. It can be hugely different in various parts of a space and is highly sensitive to external factors (Wagenfeld, 1998). In this sense air becomes material.

"The perpetual nuances of outside air movement are both spatial and temporal" (Wagenfeld, 2009: p. 5). Air, or

2.2 Atmosphere + Air

atmospheric conditions, can literally define spaces through the

different qualities that exist within it. These qualities or conditions

that can be utilised for architecture are:

- temperature

- humidity or saturation

- pressures, movements and densities

- acoustics

- odour

- taste

- light[10]

- chemical components and debris[11]

The above factors all contribute to spatial experience;

either in a way that ensures a desired comfort level is achieved;

through disturbing or creating awareness of the atmosphere

within space; and through the creation of spatial boundaries. An

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10 An important aspect of architecture and also relative to air quality.
However intangible light is, it is argued to be in the visible realm.

11 Chemical components and debris are not explored in great depth
within this chapter or the remainder of the project.

example of this is the everyday experience of entering a retail store. Upon crossing the threshold to the store, a blast of either coolth or warmth meets the skin (relative to external conditions), along with the pressure that is needed for it to circulate the interior. Artificial humidity or dryness is injected or extracted depending on the function of the space. What is important is that the body immediately experiences a change in sensation from the exterior to interior, and the experience whilst in that space is a moderated *comfort zone* that remains constant and separate from the external world. The argument here is that air can be seen to act as a boundary, similar to the physical act of walking through a doorway. This air then starts to define the space, and how the space activates the body within it. Depending on the condition, the space will be perceived in relation to the external environment as desirable or undesirable, relative to the individual. Almost every store will have the same temperature ejected from the air conditioning unit, the common 70°, and these units are installed after the space is designed. As will be discussed using various precedents in the section Atmosphere + Removal, these internal spaces are usually defined formally through atmospheric conditions. The air remains a constant, controlled condition that does not engage holistically with the sensory body.

The conditioning of space cannot rely on form alone. To engage with form only engages vision. Juhani Pallasmaa and Steven Holl both write extensively around this issue. *"We behold, touch, listen and measure the world with our entire bodily existence and the experiential world is organised and articulated around the centre of the body* (Pallasmaa, 1993: p. 35)*."* Air, or atmospheric conditions, can be seen to be a tool with which the entire body is engaged, therefore temperature can be a means of deriving both form and programme.

"*Room temperature has a direct effect on users and is both planned and perceived according to human body temperature and activities. For example, office work would be extremely impaired in temperatures under 18°C, yet physical work at this temperature is much more pleasant. High temperature even make certain forms of physical work impossible. Even clothing, as an additional skin, influences the effect spatial conditions have on the body"* (Exner & Pressel, 2009: p. 42)*.*

Basic Spatial Design illustrates the close relationship between temperature, body and spatial perception and how activity is governed around this (Exner & Pressel, 2009). Philippe Rahm's *Interior Gulf Stream* is an interior experiment into

Figure 16: Philippe Rahm's *Interior Gulf Stream,* 2008, identifies how the internal climate of this building is constantly shifting, unlike the standardised and controlled climate of traditional models. Adapted from The New Somatic Architecture, by C. Hight, 2009, *Harvard Design Magazine, 30(Spring/Summer)*, p. 29.
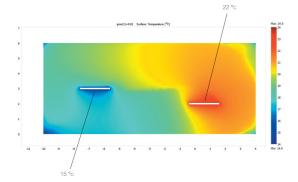

Figure 17: The temperature in flux is the driver for programme and form in Philippe Rahm's *Interior Gulf Stream,* 2008. Adapted from The New Somatic Architecture, by C. Hight, 2009, *Harvard Design Magazine, 30(Spring/Summer)*, p. 29.

temperature and habitation. The spaces are derived around the results of polar opposite temperatures at either side of the house, *"creating a thermodynamic tension"* (Rahm, 2009c: p. 184) (*Figures 16 & 17)*. The two extreme temperatures encourage air movement around the space, allowing the habitants to use this air stream to encourage their activities, as opposed to living in a moderated, and constant climate where form or function may determine activities. *"The aim here is to restore diversity to the relation the body maintains with space, with its temperature, to allow seasonal movement within the house"* (Rahm, 2009c: p. 184). The model Rahm is using is opposite to traditional models of producing architecture, where form and function are at the forefront of the production, and the conditions of the air are inserted last, almost as an afterthought. Here, however, the climate determines how the inhabitant uses the spaces; the warmer spaces for activites that require less movement and clothing, therefore becoming private areas such as bedrooms and bathrooms; and the cooler areas are where activity is high and people are fully clothed, such as in the kitchen. Another of Rahm's buildings that uses a model like this is *Convective Apartment* (Rahm, 2009b) *(Figure 18)*. The form of the building is

2.2 Atmosphere + Air

determined (to a certain extent) by the desired temperature.[12] An area that needs to be warmer will have a lower ceiling height than an area that is to be cooler. This starts to create levels of comfort that are actually reflected visually. By shifting away from the traditional form and function driven architectural design and into that of the atmospheric, Rahm is suggesting the way space is inhabited, and indeed perceived, will encourage a more sensual relationship to both the external and internal environment.

Along with temperature, air holds different humidities in various climates. These could be seen as creating zones, ranging from humid to dry. An identifiable example of this is that moment when stepping off an air conditioned plane into a tropical environmemnt *(Figure 19)*. Humidity hits the body like a wall. Not only is the body stepping through different forms, geographical and time zones, but also through different atmospheric zones. Humidity can act in very visual ways, such as with precipitation, condensation,[13] hail, mist, snow and fog. *"Mist shows itself to the viewer, it is a weather condition that makes*
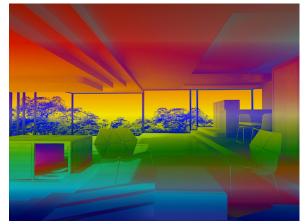

Figure 18: Philippe Rahm's *Convective Apartment* uses temperature to create form in a vertical manner. Adapted from *Convective Apartments,* 2009, Retrieved 5 April, 2010, from http://www.philipperahm.com/data/projects/convectiveapartments/

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12 While the height is indicative of the temperature within the space and aids this process, other aspects of form are not so heavily defined around the atmospheric.

13 Condensation shows a reciprocity between atmosphere and material. This is discussed in the chapter Material Boundaries.

Figure 19: Hans Haacke, Condensation Cube, 1963-1965, illustrates how condensation becomes the result of a physical reaction of materiality and humidity. Adapted from *Immaterial Architecture* by Jonathan Hill, 2006, Massachusetts, Routledge. p.101.

visible the atmosphere of a microclimate" (Preston, 2008: p. 7). Only in its vapour form is it invisible. Christine McCarthy states that this invisible humidity can challenge and perhaps reverse the roles of interior and exterior, as high humidity can create its own enclosing and enveloping space, subjective to the individual (McCarthy, 2003). It also has the ability to remove the barrier between skin and climate. *"Enclosure via humidity encroaches past the physchological boundaries of personal space and into the suffocation of claustrophobia"* (McCarthy, 2003: p. 332). The effects on bodily perception are such that an experience of claustrophobia and panic can occur. Due to the weight of an extremely humid climate, the space can appear to materialise as a solid, yet remains invisible and inescapable. McCarthy writes: *"In humid conditions, heat and moisture become invasive, and space becomes close. Inescapable, humidity gets in everywhere"* (McCarthy, 2003: p. 335). In this example, the invisible conditions take on solid form, becoming mass instead of void, and existing both internally and externally. However, any humdity sitting outside the human comfort zone is considered undesirable, which makes it difficult to experiment with this as a buliding material. Humidity as a function is used within everday living however, with the seperation of wet and dry zones in domestic dwellings. Wet

zones, such as bathrooms and kitchens, will (most usually) utilise harder, denser materials to ensure mould and mildew doesn't form and to ensure surfaces can be easily cleaned.

All air carries odours, and both good and bad odours create different perceptions towards inhabited environments. In fact, odours can create boundaries directly around the body. When a strong perfume is applied, the smell can enter others proximities, thus intreating on their personal boundary. *"Someone who wears a strong perfume invades the space of others"* (Barbara & Perliss, 2006: p. 140). With relation to architecture, odours have not particularly been explored as design generators. They tend to be afterthoughts, and often thought about in terms of the removal of odours. The evolution of ideas towards odours has perhaps been the reason they are now not being experienced to the full extent within architecture. Associated with disease, epidemics and death, strong and foul odours have a negative stigma attached. Bad smells meant bad hygiene.[14] Scent could also be associated with class, where the lower classes often smelt rotten, carrying

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14 During the Industrial age in Europe, mismanaged waste systems and close living quarters caused disease outbreaks and the plague. The conclusion being that bad hygiene was the cause, and that bad smells were often the result of bad hygiene. Hence the attitude toward odour resulted, with the remedy being the removal of odours within the built environment (A. Barbara & Perliss, 2006: p.168).

the scent of disease, poverty and filth, while the upper classes would spray themselves with florally scented perfumes and bath in rose oil (Barbara & Perliss, 2006). The desire to remove the bad smells has now conditioned societies perception of smell. Modernism promotes no odour as being desirable.

"In its material dryness and dehydration, Modernism achieved an ideal that was at times aseptic, a clinical and medical aesthetic devoid of emotion and corporality. But in a place without odour the body is lost, it loses one of its fundamental compasses and is left feeling vulnerable. The urgency of smelling the odour of the air becomes not only a means for judging its quality, but also a way of determining the setting in which one finds itself" (Barbara & Perliss, 2006: p. 178).

There are architects, artists and perfumers who are trying to bring back the spatial qualities of smell within architecture, such as Elizabeth Diller, Anna Barbara and Anthony Perliss (with their work *Invisible Architecture)*, Gaetano Pesce and Peter Zumthor. Pesce and Zumthor use materials that provide certain scents, thus triggering memory and experience through the sense of smell within the inhabitant. *"Perhaps even more important, although it is very difficult to recall or to name smells,*

the experience of a particular smell at a particular moment can stimulate a flood of memories or episodes in which that smell was present" (Proust, 1912; Hertz & Engen, 1996; cited by S. W. Coren, Lawrence M; Enns, James T., 2004: p. 187). These memories of past experiences are often rich in emotional tones. It is often that smell and taste can be associated together. There are two different ways of perceiving smells, at a distance or through ingestion (S. W. Coren, Lawrence M; Enns, James T., 2004: p. 188). These can create varied responses, as sometimes things will smell better at a distance but not when injested, and vice versa. The body can also become conditioned to smells, therefore will not experience them the same over time. This can also be true for smells associated with an illness past; the body may recall and dislike the smell of something that was ingested prior to vomiting, therefore automatically creating that discomfort again when it is smelt and experienced another time. Rahm's *Digestible Gulfstream* explores spatial creation through digestion and inhaling *(Figures 20 & 21)*. Along different temperate plates, either mint or chilli are added, involving both gastronomic and atmospheric planes. "*A 'Digestible Gulf Stream' is the prototype for architecture that works between the neurologic and the atmospheric, developing like a landscape that is simultaneously*

Figure 20: *Digestible Gulf Stream* encompasses multiple levels of architecture, from atmosphere to biological. Drawing: Piero Marcola. Adapted from *Digestible Gulf Stream,* 2009, Retrieved 5 April 2010, from http://www.philipperahm.com/data/projects/digestiblegulfstream/

Figure 21: *Digestible Gulf Stream* at the 2008 Venice Biennale. Adapted from *Digestible Gulf Stream,* 2009, Retrieved 5 April 2010, from http://www.philipperahm.com/data/projects/digestiblegulfstream/
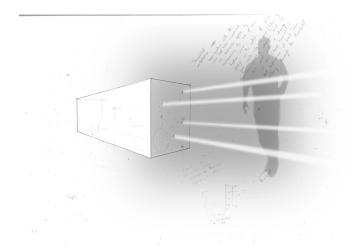
Figure 22: Threshold external installation concept, to inhibit or restrict movement. By the author.
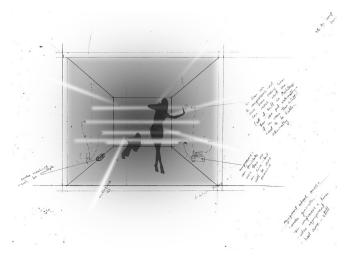

Figure 23: Threshold internal installation concept explored how movement may be altered or shaped in relation to air pressure. By the author.
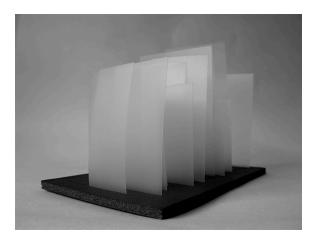
gastronomic and thermal" (Rahm, 2008).

It is interesting to see how far air can travel in a space. One of Wagenfeld's experiments looked at how far a breath of air travelled. When the conditions are still, one breath can travel up to 25 meters. Ultimately, one person could affect another at this distance (Wagenfeld, 2008). Air pressure can physically define space through the means of pushing air to create boundaries. Olafur Eliasson has experimented with this by setting up an installation that consists of fans blowing at various intensities around a room. An everyday example of this is the air conditioner or fan in the office or at home. If the blast is too strong, the proximity to the unit will be changed as the user moves further away, and if the blast is too weak, the user moves closer. This simple act is effecting the layout of the space. An initial investigation into this idea was an installation, *Thresholds, (Figures 22 & 23)* that experimented with the notion of air pressure defining physical space by restricting or inhibiting movement, thus challenging perceptions of that space. *"The skin reads the texture, weight, density and temperature of matter"* (Pallasmaa, 1993: p. 33). Through these positions of changes in air movement, skin will perceive the space differently to that of the eye, as the pressures
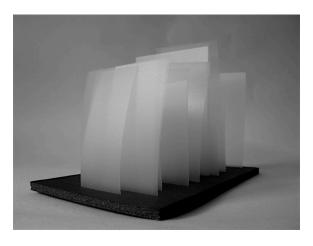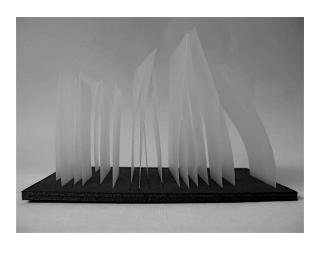
Figures 24 - 29: A photographic experiment with air movement and the effect upon material. The focused direction creates new spaces and forms, as well as sounds and lighting effects. By the author.
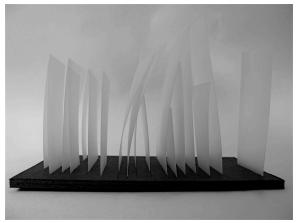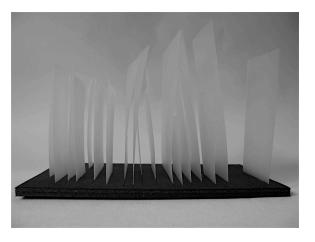
Figures 30 - 35: A photographic experiment with air movement and the effect upon a stiffer material. Different visual effects can be recorded and new forms and spaces created depending on material. By the author.

would be nearly invisible. This installation therefore becomes about dislocation rather than visual representation, whereas the effect of air pressure against material results in a very visual manner (figure).

Of all the qualities of air, perhaps sound is the second most commonly investigated within architecture and used for the making of architecture.[15] From theatres and cinemas, to the separation between living and sleeping space, sound begins to become important in how space is inhabited. "*Our universe defines itself with the interaction of masses and forces, both visible and invisible, physical and emotional*" (Sonnenschein, 2001: p. 63)*.* All the interactions within our environments create vibrations and waves of motion that seek equilibrium. These frequencies create sound (Sonnenschein, 2001). The atmosphere usually transmits sounds at approximately 600 feet per second. This accounts for the phenomena of seeing lightning before hearing thunder. Different physical states determine how fast sound will travel. For example, waves of sound travel four times faster in water than air, and even faster through solids (Sonnenschein, 2001: p. 64). Because sound can travel around corners, this assumes it gives

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15 The visual realm is the first (Diller & Scofidio, c. 1994).

Figure 36 & 37: Christopher Janney's *Reach: New York* installation in the subway encourages participation by the commuters. By waving a hand in front of the sensor, different sounds are activated. The waving motion opens up dialogue between the people on different platforms. Adapted from *Architecture of the Air: The Sound and Light Instruments of Christopher Janney* by B. Dunlop & S. G. Martin, 2006, New York: PhenomenArts, Inc & Sideshow Media. p. 37.

less privacy than light, which provides vision (Sonnenschein, 2001: p. 64). Even though spaces may be separated by matter, sound can continue to effect the space due to vibrations through the material, thus invisibly creating a larger space. Christopher Janney has worked wth sound sculptures throughout his career, changing dynamics of space through activating sounds through passerby participation. In *Reach: New York,* commuters activate different sounds by waving hands over sensors (Dunlop & Martin, 2006). This motion not only creates an audio sensation that is not usually apparent in the subway, but also begins to bridge the gap between platforms, as strangers wave to each other across the rails *(Figures 36 & 37)*. Surfaces also reflect and absorb sound, adding dynamism within a space. This means that material properties and positioning in space can be designed around desired acoustics, such as in theatres and concert halls. Form and function are designed around an invisible condition. It can be assumed that sound has been associated with architecture for as long as the term was coined. Importantly, sound portrays time. It can have a rhythm that speeds up or slows down a pace. Irregular sounds can give frights, a sense of alarm or confusion, while regular sounds can be either calming or a monotonous oppression (Sonnenschein, 2001: p. 65). The invisible vibration

created by sound waves actually impacts on physical objects.

"Acoustics of space refers to the sensation of the sound striking the air. In other words, acoustics is a matter of sound, the result of interfering sound waves being reflected or absorbed when reaching a surface [...] Perforated panels absorb the middle high tones. Porous materials absorb the high tones. Heavy velvet curtain behave as porous materials. Stretched plastic materials can behave like low-frequency absorbing panels. Canvas and comparable materials behave differently." (Luxenburg, 2005: p. 220)

Temperature, humidity, pressures, odours and acoustics act together to create a large part of the invisible world. Philippe Rahm suggests an alternative method of inhabiting space in *Interior Gulfstream* and begins to illustrate how temperature can reflect the form of buliding in *Convective Apartment.* Christine McCarthy identifies humidity as being space and mass, as opposed to an atmospheric condition, that changes the way one perceives their immediate environment and causes emotional turmoil or relief. Smell within architecture has been deemed undesirable and removed from buildings from the Modern era, yet there are some architects who are encouraging scent within

the built, such as Elizabeth Diller, Anna Barbara and Anthony Perliss (with their work *Invisible Architecture)*, Gaetano Pesce, Peter Zumthor. Phlippe Rahm's *Digestible Gulf Stream* uses smell and taste to create new territories, where architecture exists in the built, atmospheric and biological. This particular project is not practical in terms of building so perhaps only exists as installation, and some would argue doesn't provide the shelter and protection traditional architecture boasts. Other installations, such as Malte Wagenfeld's experiments and this projects *Thresholds* installations, attempt to visualise the invisible, and also challenge spatial movement. It is evident air movement is dynamic (figures), and can be captured visually and therefore be can explored in a built sense. After vision, sound becomes a great inspiration for design concepts, and effects inhabitants greatly, modifying spatial perception depending on frequency and materials. Sound has the ability to go around corners, thus breaks down privacy barriers effectively (whether for good or bad) and fully inhabits space. Christopher Janney experimented with sound and sensors in *Reach: New York,* which simultaneously deals with sound, kinetics and social barriers. Temperature, humidity, smell, taste, air movement and sound have been briefly discussed to set up different atmospheric conditions with which to

test architectural ideas upon, and there are multiple precedents for each. The goal of this chapter was to identify some invisibles, and develop ways with which they can be experimented with in relation to dis-location and re-creation (Dis-location and Visual Re-creation are later chapters which set up a method to apply conditions in design). The fluidity and fluctuation of the natural environment is argued by some that it is not being applied to its full extent within architecture, especially within modern architecture (Elizabeth Diller as cited by: Barbara & Perliss, 2006). In fact, these conditions are being treated in a constant and moderated means throughout the western world within the built environment, to ensure comfort levels are maintained, resulting in the desensitisation of the human body. Atmosphere + Removal begins to deal with these issues, and critiqes both traditional and atmospheric modes of inhabitation.

2.3   Atmosphere + Removal

"All in all, the tendency of technological culture to standardise environmental conditions and make the environment entirely predictable is causing a serious sensory impoverishment. Our buildings have lost their opacity and depth, sensory invitation and discovery, mystery and shadow."

Juhani Pallasmaa (2000), *Hapticity and Time: Notes on Fragile Architecture,* p. 321.

According to Jonathan Hill, we have long separated our internal world from our external world (Hill, 2006). In order to survive, human beings have sheltered their bodies from the weather and external factors for centuries. This has become the baseline condition, and what is now known as the built world. This means that there is now a distinct barrier between the body and nature. Philippe Rahm reiterates this view and shows concern; "*How has this impacted on our senses, on our evolution*" (Rahm, 2009b: p. 184)?

"In its material dryness and dehydration, Modernism achieved an ideal that was at times aseptic, a clinical and medical aesthetic devoid of emotion and corporality" (Barbara

& Perliss, 2006: p. 178). This extract above by Elizabeth Diller in *Invisible Cities (*Barbara & Perliss, 2006) paints a rather unpleasant picture of the role that atmosphere has played within modern architecture. Rahm also suggests that the current global warming phenomenon is a warning that society is becoming too detached from the external environment (Rahm, 2007), and he has suggested a move away from separating interior and exterior. I am reiterating the proposition that the spaces we inhabit with our daily activities are regulated and constant, conditioned in a way that physically detaches us from our sensual bodies and is void of the stimulation that the external environment provides. However, what Torben Dahl argues is that comfort levels produce optimum output and activity levels, therefore that moderation is a necessity for productive and satisfying living (Dahl, 2010). What Dahl is suggesting is the internal environment is a place of sanctuary, therefore should be comfortable, yet he favours natural methods of ventilation and lighting to acheive this. Elizabeth Diller suggests a more radical approach. The natural air is constantly moving, constantly changing. By regulating internal environments in the current manner today is further removing the link to the sensual body, and therefore removing bodily delight. Diller suggests that;

"We over-climatise our air. We take any air bound badness out of the air: humidity, smells, heat... We want total control over the environment. It's the kind of control that neutralizes everything into nothing, a flat line condition, a culturally identified comfort zone in which everything is average - a sensory depravation" (Barbara & Perliss, 2006: p. 134).

This *"sensory depravation"* refers to the elimination of sensual elements in architecture and the unforeseeable atmospheric conditions. Ultimately within today's Western internal environments, air conditioning ensures that society knows what condition exists inside without even crossing the threshold. Comfort levels are what govern internal climates, and they also cater to the collective, or what is consider a normal persons comfort zone.[16] The depravation has occurred due to the distillation of air to a level that no longer contains anything *bad.* It is suggested that during the Industrial Revolution and the birth of slums, air carried diseases due to poor hygiene, and resulted in sickness and death (Barbara & Perliss, 2006). This resulted in this *bad air* being associated with the lower socio-economic

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16 Of course comfort is subjective, and derived differently through different cultures (Herschong, 1979). Therefore a standard comfort is produced for the Western world for conditioning to meet these standards.

groups. The air itself could be seen as being too humid, carrying a fetid stench of decay, resulting in the air of the upper class being cleaner and fresher.[17] Still today, society sees air quality parallel to status and societal success. In the 1950's, ad campaigns targeted housewives claiming that if you didn't have air conditioning within your home, you were living primitively. Helen Mallinson writes that society likens air conditioning to great civilisation, and America wanted to be great like the civilisations of Europe, which was termed *"the cradle of civilisation"* (Mallinson, 2006: p. 255). However this civilisation has a cool temperate climate, which differed from their own.[18] Thus mechanical air conditioning was introduced, ensuring civilisation could advance at least to the same level as *"the cradle."* The standardisation of internal air quality was partly marketing, partly comfort, and partly what is considered development and progress. Mallinson, and other like minded individuals such as Rahm, Diller and Scofidio, see this mind set as a disengaging between architecture and the sensual body. Therefore, they and other contemporary artists

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17 This was also the period where the money would move out of the city into the rural area, therefore creating suburbs. This was due to the poor living conditions and air quality within city limits.

18 This goes along with the notion that ancient Greece's air quality was such that made great men, with great intellect, physique and endurance. This then started to be attributed to other societies who could artificially recreate that climate. (Mallinson, 2006: p. 255)

and architects are using the notion to challenge the way we perceive spaces.

"...it is not enough for a furnishing element to be pleasant, well proportioned, or right; it has to succeed in arousing desire. It has to emanate a perfume, inspire a desire to touch it. It has to be sensorially satisfying" (Gaetano Pesce as cited by: Barbara & Perliss, 2006: p. 117).

In *Climatic Constructions: Thermal Asymmetry in Architecture,* Rahm suggests that the exploration of beauty through symmetry within Classical Architecture was not actually following the model of nature it claimed. The 2008 recipients of the Nobel Prize in physics, Yoichiro Nambu, Toshihide Maskawa and Makoto Kobayaski, actually state that the big bang is a result of asymmetry, that life itself is not balanced (Rahm, 2009a). While the aesthetics of contemporary architectural forms are becoming asymmetrical or challenging notions of symmetry and harmony, the atmospheric conditions which are inhabited are becoming more standardised. The investigation into atmospheric conditions and invisibles, is not being challenged in the same way form is. Rahm explores notions of polar opposites and imbalance within climatic conditions in many of his projects. This

thermal imbalance can be seen as a way to derive space, and also another means for the body to perceive the space which it inhabits. While symmetry was the considered perfection within classical architecture, today's society is pursuing the ultimate. This could also mean that internal climates no longer need to be in balance, and can challenge traditional comfort zones.

While being comfortable is considered desirable, it's a traditional mode of occupying space, where one temperature and humidity is moderated throughout the space. Diller has suggested that this is due to modernism removing everything extreme, good or bad, from the air to become sterile and clean. This has reflected upon what is now expected, and internal environments become predictable, which is unnatural as the external environment is constantly in flux and dynamic. Mallinson proposes that the movement towards this mode of living was partly due to status and the colonies attempting to keep up with the *"cradle of civilisation"*. Contrary to this, Dahl offers the idea that this comfort zone is for the benefit of inhabitants and increases productivity. Rahm puts forward that activities can flourish around different climates therefore defining space invisibly and asymetrically. Whatever the argument, it is apparent

there is a standard comfort zone, which is 23.5° ± 1.5° with a relative humidity of 50%, and little air movement, with as minimal change or fluxuation as possible (Wagenfeld, 2008). This is comfortable, but as previously mentioned, the divide between interior and exterior is not as large as it used to be. It may be time to challenge these standard levels and produce dynamic climatic interiors, which in turn challenge spatial perception.

2.4   Atmosphere + Perception

"...perception was not just a passive act, but also an action towards the external world" (Barbara & Perliss, 2006: p. 106).

Perception is late Middle English, derived from Latin '*perceptio,*' which is from the verb '*percipere' (to seize, understand)* (Folwer, et al., 1995: p. 1014). Perception is "*the ability of the mind to refer sensory information to an external object as its cause; the intuitive recognition of a truth, aesthetic; an interpretation or impression based on one's understanding of something* (Folwer, et al., 1995: p. 1014). Perceive is to *"apprehend, esp. through the sight; observe. apprehend with the mind; understand. regard mentally in a specified manner"* (Folwer, et al., 1995: p. 1013).

This definition of perception varies from the view of *percept* within architectural discourse. *Percept* is described as the instant before perception is applied, therefore the unconscious.

Perception is subjective (Leif Finkel, *"The Construction of Perception",* in Jonathan Crary and Sanford Kwinter (eds.) *"Incorporations",* New York. May, 2003). The object being perceived is different for every perceiver, thus making perception

a singular act. Yet it can also be collective through the involvement of additional perceivers.

"Space is always experienced in connection with time" (Exner & Pressel, 2009: p. 41). When experiencing a space, both space and time are experienced. Time has not been researched in depth within this project, but plays a critical part in perceiving. Perception can alter over time, along with materials and the conditions of space. Fred Rush (2009) speaks about the implications of experiencing space in the first chapter of his book "*On Architecture.*[19] *"Phenomenology generally is most useful in assessing the nature of perception or other forms of consciousness that fall short of explicit conception"* (Rush, 2009: p. 3). He describes architecture as an experience similar to that of a surround sound theatre, the experience is not just within the matter, the built or the form. It is about the invisibles, in this case experiential which influence perception. This is also similar to architects such as Peter Zumthor, Diller + Scofidio and Philippe Rahm. Where Rush and Peter Zumthor, takes a phenomenological[20] approach regarding atmosphere, Diller

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[19] The content is predominately focused on experiences in terms of phenomenology.

[20] Exner & Pressel describe phenomenology as *"The philosophy of phenomenology represents the theory that spatial experience is directly*

+ Scofidio and Rahm tend towards a physiological and affect approach.

Although todays society seems to be ocular focused, spatial perception is not just through vision alone. As previously discussed, the entire body is used to experience the world. Some of these features that orient the body in space are learned over time, therefore differing slightly from culture to culture, and differing experiences. Examples of this are the sense of smell. The nostrils filter smells that actually are a more effective memory invoker than sight.

"Olfactory sensations initially evoke emotions, which are only subsequently translated into cerebral judgements and consequently into conscious behaviours" (Barbara & Perliss, 2006: p. 114).

While this example, smell, has a learned or condition emotion attached, it can actually be subconscious. Another example that is

influenced by human perception, which means that human behaviour in the world is defined by sensory perception. Sensation and awareness were already assigned to the body before the thinking process was added to them. In the course of human development, physical experience has moulded people's ideas about things, space, and time. Since human existence and the body are inseparably related to space, spatial design is significant in terms of learning as well as the general acquisition of knowledge" (Exner & Pressel, 2009: p. 14).

Figure 38: Olafur Eliasson's *The Weather Project* in the Turbine Gallery, Tate Modern, London UK, where relationships to the existing environments are questioned in relation to external and internal conditions. Adapted from *Olafur Eliasson: The Weather Project,* 2004, Retrieved April 5, 2010, from http://www.tate. org.uk/modern/exhibitions/eliasson/about.htm

perhaps more subconscious is the ability for the body to balance, and adjust how the body perceives horizontal and vertical. This is located in the ear and allows the body to balance the haptic with the visual. The body also perceives through the haptic senses, hearing, kinaesthics, etc. This shows that in order to connect properly to the external environment (outside the body), an architecture that engages all the senses should theoretically be the most stimulating, and perhaps rewarding. This being said, atmospheric conditions are able to fulfil this sensory requirement, as they engage all the senses, whereas the material aspects of architecture cannot.[21]

Olafur Eliasson's *Weather Project* used atmospheric conditions in a way that challenged users perception of interior and exterior space. By inserting what appears like a sun and a fine mist that forms wisps of cloud into the Tate Modern, Eliasson starts to question our relationship to different environments *(Figure 38).* This coupled with mirrors on the ceiling, creates a strange relationship between space and user, and where boundaries exist between interior and exterior. The conditions of this installation also encourage interaction between users, as

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21 Matter cannot engage with all the senses to the same level that atmospheric conditions can.

the simulated weather becomes a point of conversation. Another example of this it *The Clean Room* installation designed by Clino Trini Castelli and Marek Piotrowski. It is an installation that introduces a very technical and clean chamber inside a domestic environment. Within domestic habitats there are many odours and sounds that are associate solely with home. By superimposing a space that is a clean room, a space with no domestic smells, a non-typical atmosphere for a dwelling, the participants exited disturbed. The invisible conditions of the space did not match the visible setting, thus creating a disturbed emotional reaction from the participants (Barbara & Perliss, 2006: p. 93). This example of dis-location identifies how important the sense of smell within air is to our perception of space. It also begins to investigate the irregularities between what is perceived visually, and what is perceived through the other senses.

Atmospheric conditions have a large role within architecture and the means in which space is experienced, perceived and understood. What seems to be prevalent within architecture today seems to be either the supposed removal of atmospheres, or indeed the strict moderation and "flat-lining" of these conditions within space. It is apparent that there are

contemporary architects using atmospheric qualities to inform and generate architecture, such as Diller + Scofidio, Philippe Rahm, Olafur Eliasson, Peter Zumthor, and Gaetano Pesce. In order to further question relationships between spatial perception and atmospheric conditions, it is important to define the boundaries between the material world and the atmospheric, and also between the atmospheric and the body.

2.4 Atmosphere + Perception

3.0   Boundaries

"Boundary - a line marking the limits of an area, territory etc"

(Fowler, et al., 1995: p.152).

The Blur Pavilion by Diller + Scofidio is aptly named due to the blurring between the immaterial and material. This is the position where atmosphere sits - the boundary between. This chapter identifies the ways in which atmosphere can act as boundary, and how the boundary between body and atmosphere is in constant dialogue. Materials within architecture bind spaces physically, but what is the relationship between materials and atmospheric conditions? The end of this chapter will set up an exploration of tangible approaches to produce an atmospheric architecture through the investigation pertaining to boundaries.
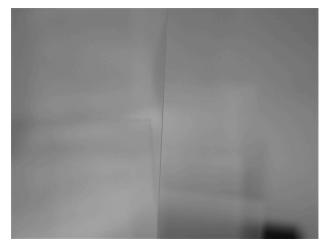
Figure 39: A photographic experiment blurring visual boundaries. By the author.

3.1 Atmosphere as boundary

Gottfried Semper suggested atmosphere has a surface[22], and that this surface is the place where architecture is experienced. *"... the full force of architecture is to be found in its outer surface, the decorative layer through which the atmosphere seemingly percolates"* (Wigley, 1998: p. 20). Mark Wigley also identifies with this idea, suggesting the power of atmosphere affects the built form due to experience and atmosphere being closely associated.[23] This starts to position atmosphere in a desirable position, as it reiterates the notion that atmosphere has, or is, a boundary in the sense that it becomes a surface within the physical and material world, as it physically defines space. This surface can be manipulated, such as how internal spaces are defined through air conditioning.

"The air is silently conditioned in a process that is not confined to remote jungles [...] Like other tidemarks that chart the expanse of civilisation, the air-conditioned environment presents a voracious boundary, a thermal contour that consumes all in its

Figure 40: The fog acts has a definite boundary in Fujiko Nakaya's *Foggy Forrest*, 1992, and creates space within itself. Adapted from *Fujiko Nakaya Fog Sculpture,* 2009, Retrieved 20 April, 2010, from http://thewitchfire.wordpress.com/2009/05/07/fujiko-nakaya-fog-sculpture/

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22 Surface is defined in many ways. The offered here is just one position, and that is similar to boundary.

23 Atmosphere is referred to in this sense as being the general term, not defined as atmospheric conditions. .

path like a gigantic wave" (Mallinson, 2006: p. 252).

What Mallinson, in her essay *Heart of Darkness: Air of comfort,* is suggesting when she compares the plight occuring within the Congo jungle in Joseph Conrad's *Heart of Darkness* (1902) to modern conditioned air, is that this control over the atmospheric is ever increasing to highlight the progress of the developed world. The standardised comfort level achieved through modern air conditioning is likened to a boundary, albiet not in a positive sense. Not only is Mallinson suggesting that ones perception of air conditioning is relative to how civilised one is, but also that this modern development has becoming all consuming and the temperature of internal envionments not become spatial boundaries, but also social and cultural boundaries. Air conditioning has become the known and expected within the contemporary world, and any variation of this can be deemed primitive, as it sits outside the respectable comfort zone. From this extract, what is interesting is the description of the air which has taken on a very physical and visible form - "*a thermal contour that consumes all in its path like a gigantic wave"* - which reinforces the notion that boundary can be formed through the invisibles. This has been previously mentioned in the chapter **Atmosphere**
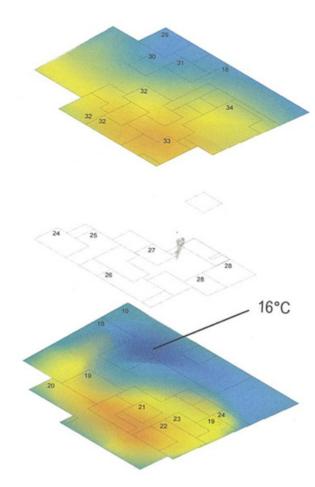

Figure 41: Philippe Rahm's *Convective Museum*. Function is derived around temperature. Adapted from *Climatic Constructions: Thermal Asymmetry in Architecture* by Philippe Rahm, 2009, *Harvard Design Magazine, 30*(Spring/Summer), pp. 38 - 39
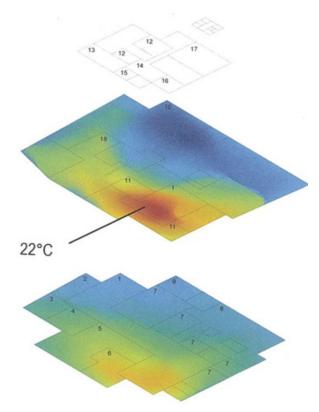
Figure 42: The thermodynamic interplay determines how the space is occupied. Adapted from *Climatic Constructions: Thermal Asymmetry in Architecture* by Philippe Rahm, 2009, *Harvard Design Magazine, 30*(Spring/Summer), pp. 38 - 39

+ Air in the work of Wagenfield and the capturing of air in both space and time. It highlights the fact that the atmospheric has a kinetic element that simultaneously defines and inhabits space, being both the container and the contained. This argument has also been explored through McCarthy's idea of humidity taking on mass and space, forming an invisible yet present boundary (Refer chapter Atmosphere + Air). Taking Semper's argument that atmosphere has a surface, and that this surface can be manipulated, the resulting combination of atmospheres can define spaces. In Philippe Rahm's *Convective Museum, (Figures 41, 42 & 43)* functions are defined according to the temperature and humidity of the area (Rahm, 2007). Therefore the boundary is not a visible one, but actually more of an invisible threshold, a blurred transition between different climate zones, and ultimately, different atmospheres. This identifies that atmospheric factors can define space invisibly. Using a similar method, Anthony McCall's light projects produce boundaries using kinetic lighting effects and artificial fog, which clearly denote immaterial spaces against a dark background (*Figure 44*). This is a visual exploration of intangible space definition, so ultimately the reverse of Rahm's museum. Yet it illustrates points regarding space making - that it does not require solid walls, floors and ceilings to create space.

3.1 Atmosphere as boundary

Looking at the work of artist Petra Blaisse, the notion of boundary becomes fluid and inter-changing, similar to atmospheric boundaries. The installations and curtains she produces identifys that each side of the boundary is dependent on the other, thus positioning the boundary in a place of tension. As mentioned earlier, this is a place where the atmospheric sits. The fluid nature of atmospheric conditions highlight the temporality of everyday experiences, such as transitioning from exterior to interior.

"In Blaisse's projects, boundaries are not merely dividing devices; they articulate the reciprocities at play - such as that of inside and outside, and the fact that they can never do without the other. Hence - as if to underpin this notion of reciprocity - most of the time these boundaries themselves are of a dynamic, shifting and changing nature" (Heuvel, 2003: p. 281).

While the above is referring to installations mostly involving material, tangible objects such as curtains and screens, the same notion is applicable to atmospheric conditions. Conditions that are constantly changing and interacting with each other, begin to not only confuse what is external and internal, but also creates a more kinetic approach towards inhabitation,

Figure 43: Philippe Rahm's *Convective Museum,* interior perspective. Adapted from *Climatic Constructions: Thermal Asymmetry in Architecture* by Philippe Rahm, 2009, *Harvard Design Magazine, 30*(Spring/Summer), pp. 38 - 39
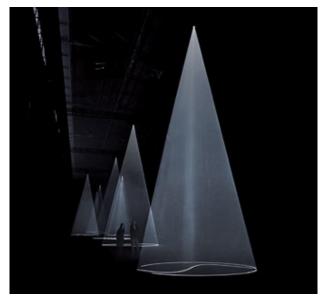
Figure 44: Anthony McCall's light installations bound space visually. McCall installation at Hangar Bicocca, Milan, 2009. Adapted from *Anthony McCall,* 2009, Retrieved 20 July, 2010, from http://www.anthonymccall.com/pg4.html

and functions within this. A space that is heated at one end, and cooled at the other, has a thermodynamic tension in-between and defines the space through various temperatures.[24] The boundaries between the different conditions begin to highlight natural phenomenon that occur in the external environment, such as the event of precipitation. The occurrence of rain is predominately seen as undesirable in an internal environment, yet when injected in an interior space, it begins to challenge perception of interiority and exteriority.[25] The act of indoor rain becomes a spectacle, and encourages the viewer to question what is being perceived and then why it is perceived in that manner. It also begins to act as a physical boundary, although not in a traditional built manner, as it divides the space through the different saturation contents of air, and not through form or function *(Figure 45)*.

Constantly spaces are being defined through air

Figure 45: A concept for a subway platform in Amsterdam, where rain is celebrated indoors. By the author.

24 Philippe Rahm's projects *Interior Gulfstream* and *Convective Apartment* uses this idea to create spaces that are inhabited fluidly and kinetically, thus becoming a subjective and physiological means of occupying space (Rahm, 2009d).

25 Water within buildings is a difficult subject to approach, due to existing connotations surrounding leaks and hydraulic malfunctions. However, it does question the notion as to whether this is on purpose or an accident, thus challenging perceptions surrounding traditional notions of interior.

conditions when no built object is apparent. Whether it be through temperature, saturation content of air, or the pressure of air, a clear spatial boundary exists within the atmospheric. Sometimes these boundaries are visible, such as in the event of rain or light, but the majority are not. Semper identifies atmosphere as a surface, identifying it as a boundary, which is reiterated by the description of air conditioning from Mallinson in *"Heart of Darkness; Air of Comfort"*. Philippe Rahm uses boundaries created by temperatures to create functioning spaces in a museum, beginning to ground some of the ideas surrounding the atmospheric into reality. The means of experiencing these atmospheric boundaries is less ocular, and more through secondary senses.[26] This introduces ideas that precedents such as Juhani Pallasmaa, Peter Zumthor, Steven Holl and Olafur Eliasson investigate, and all of whom argue experience is holistic and space should be designed with this in mind.

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26 These are also often referred to as the minor senses, and include all senses other than sight and sound. However, sound is sometimes also referred to as a secondary sense.

3.2   Body as boundary

Figure 46: Pallasmaa associates every interaction the body makes to the external environment with skin. "*Vision and the tactile sense are fused in the actual lived experience,*" Herbert Bayer, *The Lonely Metroplolitan, 1932.* Adapted from *Hapticity Vision* by Juhani Pallasmaa, 2005, *Architecutral Design, 75*(4), p. 138.

Juhani Pallasmaa argues that everything the body does is through touch. Even eyes have a layer of skin that connect us to our external environment (MacKeith, 2005: p. 322). Therefore all perceptions become about touch, and architecture is always experienced through touch. Skin can also be seen as a boundary between self and the external environment. This tactility begins to evoke the notion of time, and the "*experience of a temporal continuum*" (MacKeith, 2005: p. 324)*.*

"*As we open a door, our body weight meets the weight of the door; our legs measure the steps as we ascend a stair, our hand strokes the handrail and our entire body moves diagonally and dramatically through space*" (Pallasmaa, 1993: p. 35).

Pallasmaa illustrates how body and space are in constant dialogue. This is also reiterated by other architects and artists, such as Rahm and Eliasson. "*We are not just **in** the world - we are **of** the world*" (Eliasson, 2008: p.20). The body and atmosphere have an intimate relationship. External conditions affect human bodies physically, which in turn affect the emotional self. Bodies react according to different atmospheres on an automatic level.

When the external conditions are too warm, the skin will perspire allowing the body to maintain its optimum internal temperature. Physically they adapt to ensure that a suitable comfort level is maintained. Atmospheres also affect emotions through this physical relationship, due to the receiving of information of the sensation to the brain (Coren, Ward, & Enns, 2004).

As defined by some views of affect, such as those of Deleuze and Spinoza,[27] the whole body can be seen to be integrated with the external environment. Environment and body must come together in order for affect to arise.[28] This participation between body and its surrounds is important as the body affects the atmosphere purely by inhabiting it, and at the same time the atmosphere is affecting bodily processes.

"The dynamic relationship between the space and

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[27] Affect theory has been researched to acquire an adequate understanding of atmosphere and some of the precedents analysed, such as Rahm and Eliasson. A thorough understanding of this complex topic would require further research. Nigel Thrift's *Intensities of Feeling: Towards a Spatial Politics of Affect,* and *Non- Representational Theory: Space, Politics, Affect* provide more understanding.

[28] Two separate bodies must be present. For affect on human beings, obviously one of those bodies is the human body. So in the case of this research project, the atmosphere and the human body are these two distinct entities, or the atmosphere and material are two entities, and also the one atmospheric condition in relation to another could be the two separate entities.

occupant in an affective environment establishes a responsive feedback loop of percepts - situations of conditions that influence a particular perception of material qualities and affects subsequent emotions responses" (Nulman, n.d: p. 86).

In this respect the body is not just a vessel but a permeable being that interacts with all other organisms on the planet, and indeed affects these organisms. As Eliasson states, *"we are **of** the world,"* not just inhabiting it. To further unpack this notion, physiological processes can be examined along with how neurones receive external information through sensation. Rahm and Déscosterd's Swiss Pavilion at the 2002 Venice Architectural Biennale, *Hormonorium,* investigated this idea. The boundary between body and exterior was blurred as the oxygen levels coupled with the UV light outputs decreased fatigue and increased hormone production, giving a slight sense of euphoria (Jodidio, 2006). *"The Hormonorium is a proposal for the design of a new public space. It is based on the disappearance of the physical boundaries between space and organism, as revealed by biology and the neurosciences"* (Jodidio, 2006: p. 102). This blurring between bodily boundary and space is achievable through conditions of atmospheric. Rahm writes:

Figure 47: Philippe Rahm's *Hormonorium* breaks down the barrier between the body and the external environment, allowing perception to change over time due to biological processes. Adapted from *CH: Architecture in Switzerland* by P. Jodidio, 2006, Taschen.

"The development of the life sciences and of ecology in the 20th century invalidates the hierarchical system of Hegel, which is founded on an ontological separation of man from his environment. Biological, chemical, and electromagnetic exchanges tie man to his environment through the intermediary of ecological, physiological, and neurological processes, through respiration, ingestion, through conduction, and through radiation. Furthermore, the extension of the domain of knowledge of the invisible, at the microscopic or nanometric scales, transforms the validity of an aesthetic judgment which is happy to distinguish only the phenomena which can be perceived by our own five unaided senses" (Plewke & Rahm, 2010: Retrieved 5 April, 2010, from http://archinect.com/features/article.php?id=96362_0_23_0_M).

Affect is described by Eliasson not as emotion, but as the transformation that takes place before the emotion occurs, or the shift that allows the subject to recognise his or hers subjectivity in transformation. Percept then is not about the named perception but the encounter that allows that percept to occur (Eliasson & Frichot, : p. 34). This follows the view of Deleuze, where he argues that affect is the movement between states (Deleuze, 1997: p.181). Letizia Schmid's *The Evaporating*

Subject explores Derrida's argument of odours "*blurring subject-object distinctions*" (Barbara & Perliss, 2006: p. 116). When an odour cannot be named, it is not part of "I." Only when the odour is experienced through "self" and can be identified, does that odour become one with self. Therefore the odours become part of the beings, and in that sense the being becomes part of the space that is occupied through the sense of smell.

As stated in the opening paragraph, Pallasmaa identifies everything with touch; even eyes have a layer of skin. So the physical boundary that keeps everything within the body separate from the exterior, is indeed skin. This is where external conditions are experienced.

"*The skin responds to a variety of physical stimuli. When an object deforms the skin surface we experience touch or pressure. When an object bends any hair on our body we also experience touch. The temperature of the object with which we touch the skin causes a sensation of warmth or cold depending on the temperatures of the object relative to that of the skin*" (Coren, et al., 2004: p. 195).

Torban Dahl's *Climate and Architecture* suggests that

skin is more of an adaptive membrane as opposed to a barrier. It reacts to external conditions and changes accordingly, in a very dynamic manner. *"[H]uman skin is a multi-functional climate screen with a number of passive and active functions, which could be termed our personal protective packaging against the surrounding world"* (Dahl, 2010: p. 24). The skin is likened to a building envelope, protecting the inside from external conditions, but is *"a very dynamic interchange with the surrounding with regard particularly to heat, moisture and biological material"* (Dahl, 2010: p. 25). Exner and Pressel also describe skin in this manner, saying "*the human skin also functions as a membrane between the body and its environment, and is able to sense even the slightest change in temperature or humidity"* (Exner & Pressel, 2009: p. 42). This interchange suggests the skin is more of an adaptive membrane as opposed to a barrier, therefore a fluid boundary. It reacts to the conditions applied in the external environment, and changes accordingly. The model of the skin (regarding the dynamic interchange between interior and exterior) has influenced building design, and is now what is currently being adopted within contemporary sustainable design.

Skin is the element of the body which presents itself to

the external world, but atmospheric conditions can effectively move through this barrier and inside the body, affecting bodily processes *(Figures 48 - 51)*. Therefore the boundary between body and the atmospheric becomes less distinct; atmosphere can be seen as an affective element, but so can the body.

Affect and percept are as difficult to define as atmosphere. As previously stated, further research into this area could be undertaken (refer to Nigel Thrift's *Intensities of Feeling: Towards a Spatial Politics of Affect,* and *Non- Representational Theory: Space, Politics, Affect)*, yet the purpose was to achieve a level of understanding of affect to fully grasp atmosphere. In this respect, the body and atmosphere are both affective elements, and are in constant dialogue with each other. This elevates atmosphere to an other level, as it is an aspect of architecture that can penetrate the body. Rahm illustrates this in *Hormonorium,* and Pallasmaa explains that everything experienced is through skin, making skin an important boundary. Dahl suggests skin is a model for buildings, and is a fluid boundary with remarkable capabilities, which highlights possibilities of relationships between skin, atmosphere and materials.

Across the page:
Figures 48 & 49: The skin not only reacts to external stimuli through pores, but also through hair follicles.
Figures 50 & 51: Perspiration allows the body to cool. Atmospheric conditions have the ability to affect the physiology of humans. By the author.

Across the page and this page, Figures 52 - 55:
Condensation acts in both a kinetic and static manner, depending on density or quantity of saturation content in air acting upon material. The levels of privacy are determined by this. By the author.

3.3   Material boundaries

When atmospheric conditions meet matter, visual and physical effects can be created. This transformation from invisible to visual highlights the physicality of these seemingly intangible conditions and the processes that are occurring constantly within the air. The addition of the built environment is a way for atmospheric conditions to show themselves, such as when timber is warped through heat, or when frost settles on glass panes, or through the corrosive power of rust.

An investigation into this is *Condensation Wall* from Jurgen Mayer Hermann. *Condensation Wall* plays off the natural occurrence of condensation on glass when the interior and exterior temperatures are extreme differences. "*After reaching a certain temperature called dew point, water vapour condenses into liquid that settles on surfaces in the room with temperatures lower than dew point*" (Exner & Pressel, 2009: p. 42). This is materialised by becoming a means of providing privacy, obscuring the visual boundary between spaces. The naked body can reside comfortably within the dwelling, yet due to the polar opposite temperatures and non-insulated glass "*the condensation has the effect of a veil*" (Hermann, 1998: p. 4). This
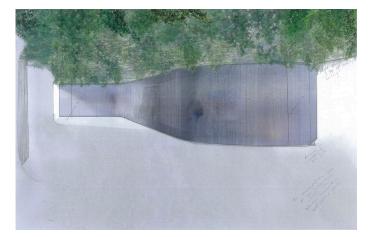
Figure 56: Experiment of an Amsterdam subway station, using different humidity levels creates interesting material effects on common construction materials, and recycled condensation droplets feed the green ceiling. By the author.

is a case of the invisible becoming visible, and starting to inform building material and define spaces through immaterial means. *"The condensation wall suggested here constitutes a redefinition of conventional space production in the interest of a desired level of comfort"* (Hermann, 1998: p. 4)*.* This natural atmospheric occurance is based around the body, and what the body is doing in space, leaving the material to become a resultant.

Exploring this concept, functionality can be designed around the phenomena of atmospheric meeting the built, the dialogue between the immaterial and material. Using humidity and glass, a similar idea was tested within this project in a metro station within Amsterdam. The notion that the temperature differences in each space, coupled with glass walls, creates a sense of intrigue, voyeurism and privacy, behind both sides of the wall. Due to the blurring of vision created through the condensation, a private activity could be introduced to this public realm. The private space became a sauna, where the public entrance to the metro was activated by the condensation wall. This normally undesirable effect - condensation - becomes a place of play, and interaction *(Figure 56)*. This condensation collected vaporised water and recyled this to hydrate the living

ceiling, which in turn maintained the humidity level of the station entrace. Even though space production and the climate of those spaces were the forefront for design, materials that thrived off the conditions (and indeed existed only because of them) flourished.

While condensation creates visual boundaries, rust begins to remove them. Through corrosion, rust begins to attack the material that existed first, slowly removing layers over time and creating dynamic material systems. Of course in the majority of cases, this is deemed indesirable, as aging is commonly associated with decay and death. Yet many materials are now being chosen for their weathering and aging properties in relation to the climatic conditions they are exposed to, whether to withstand them, or express them fuller. Zumthor expresses these qualities of death and decay within the Bruder Klaus Chapel in Mechernich, Germany. The solid concrete exterior gives way to a sensitive interior of 120 slowly smoked tree trunks, which provides a rather aged, distressed appearance *(Figure 57)*. Zumthor uses materials that not only react with climate and context, but also with each other. "*Materials react with one another and have their radiance, so that the material composition gives rise to something unique. Material is endless" (Thinking architecture).* This, "*[m]*

Figure 57: The interior of the Bruder Klaus Chapel by Peter Zumthor. The logs have been tortured with heat, warping the material qualities through an elemental quality. Adapted from *The Pritzker Architecture Prize 2009 presented to Peter Zumthor (award booklet),* 2009, Retrieved on 16 June 2010 from: *http://www.pritzkerprize.com/laureates/2009/photobooklet2009.pdf:* The Hyatt Foundation.

Figure 58: Diller + Scofidio's *Blur Pavilion,* blurring the boundary between building and climate, and interior and exterior. Adapted from *The Endgame of Minimalism,* 2007, Retrieved 15 March, 2010, from http://www.eikongraphia.com/?p=1430.

Figure 59: Diller + Scofidio's *Blur Pavilion*, where the mist makes the pavilion disappear against the environment. Adapted from *CYBORGS: the uncanny reconfiguration of space,* 2009, Retrieved 15 March, 2010, from http://laurenfenton.com/?tag=haunted&paged=2.

aterial is endless",* follows the argument that atmosphere is a valid material, and that possibilities for new and innovative uses of materials for construction are endless.

An innovative use of an intangilble climatic building material is the *Blur Pavilion* from Diller + Scofidio. As previously mentioned in Boundaries, Diller + Scofidio see this building as a blurring between the immaterial and material, and the context and building. The mist becomes the building material and is dynamic, as the wind interacts with it and the external humidity changes the appearance. However, the actual constructed material are hundreds of pipes and nozzles, pumping the water through. The mechanical system can be seen as the foundation and the mist is the surface or cladding *(Figures 58 & 59).*

"When a material is used in new and unexpected ways, or where its characteristics are presented in an unconventional condition, the level of design is raised" (Ballard Bell & Rand, 2006: p. 11). Buildings such as Zumthor's *Bruder Klaus Chapel* and Diller + Scofidio's *Blur Pavilion* argue this statement from Bell and Rand. When atmospheric conditions meet building materials, beautiful and grotesque results can occur, granted not all are desirable. Many construction materials are interesting

and beautiful as they are, and others age and weather more gracefully and poetically. The aim of this chapter was to highlight different oppurtunities within the construction industry and use of materials in regards to atmospheric conditions, and the effect these can have.

"Boundary - a line marking the limits of an area, territory etc" (Fowler, et al., 1995: p.152). While there may not be a definite line, atmosphere has a boundary and a surface, as stated by Semper. Whether this boundary is created within atmosphere itself (through temperatures, humidity, air movement etc), or the flexible and permeable boundary that is skin, or the definite boundary between the built and the atmospheric, there is a definite space dividing aspect. These boundaries become important as methods to use the atmospheric in space creation, in conjunction with dis-location and visual re-creation, which are explored in the next design chapter.

Figure 60: Ned Kahn dislocates an external condition and injects it within an interior. This questions functionality of space. Duales Systems Pavilion - EXPO 2000, Hannover, Germany. 2000. Adapted from *Ned Kahn,* 2008, Retrieved 4 April, 2010, from http://nedkahn.com/fog.html

4.0   Design: Dislocation + Visual re-creation

A means to approach the task of creating an architecture around atmospheric conditions is to research current methods of doing so. Precedents such as Olafur Eliasson, Philippe Rahm, Diller + Scofidio, Ned Kahn *(Figure 60)* and Fujiko Nakaya have dislocated atmospheres in order to challenge spatial perception. SANAA, R&SIe, along with some works from Philippe Rahm and Steven Holl re-create atmospheric conditions visually. Both methods are valid means of making space. However, to counter the previous statement of the atmospheric in architecture tending towards the temporal, I am arguing that the combination of these approaches can be adopted to create a holistic, sensorially stimulating built environment.[29] This will be applied to the previously mentioned Amsterdam subway system and then will eventually focus on Waterlooplein Station. This chapter will discuss two strategies that will be applied within the design project; dislocation and visual re-creation.

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[29] Running parallel to these methods are others which are more overtly bottom-up design approaches. These are based on running the data of atmospheric through programmes that can generate forms, thus eliminating (to a certain extent) the genius architect. This method has not been explored within this research project

4.1   Dislocation

The different boundaries discussed in the previous chapter identify various areas where atmospheric conditions can be explored within architecture. A strategy that will be adopted with these boundaries in mind is the dislocation of atmospheric conditions, which is the isolation of climatic conditions and introducing them into foreign contexts.

When a climatic factor is present in an environment it is not typically associated with, previous understanding is challenged.Sensory cues that do not align begin to test spatial perception, and also draw attention to that perception, making perception itself the object (May, 2003). Olafur Eliasson has investigated this idea in many of his art works, in *Green River, Waterfalls* and *The Weather Project.*

"[...] our ability to see ourselves seeing - or to see ourselves in the third person, or actually to step out of ourselves and see the whole set-up with the artefact, the subject and the object - that particular quality also gives us the ability to criticise ourselves... (and gives) the subject a critical position, or the ability to criticise one's own position in this perspective" (*"Daniel*

Figure 61: *Winter Beach* by Philippe Rahm, borrows the invisible physical conditions of the beach and inserts them into an internal environment. Adapted from *Philippe Rahm Architectes - Winterbeach* by Helvetia, P, 2008, Retrieved 5 April, 2010, from http://www.article.no/en/content/kunstnere/philippe-rahm-architectes-ch

Figure 62: *Jour Noir* by Philippe Rahm, uses dark lamps to make night during the day within the city. Adapted from *Jour Noir,* 2005, Retrieved 08 June, 2010, from http://www.philipperahm.com/data/projects/blackday/index.html

Birnbaum in conversation with Olafur Eliasson", in Madelyn Grynstein, Daniel Birnham and Michael Speaks, Olafur Eliasson, London 2004: as cited in: May, 2003: p. 18).

This idea that is evident in Eliasson's work is influenced by the works of Merleau-Ponty, who argues that we can step back from ourselves to view perception "*itself as an act of consciousness*" (May, 2003: p. 18). In order to properly grasp the concept of perception, Merleau-Ponty and indeed Eliasson, suggest that the perception itself should be viewed as an object by the subject. Here is where atmosphere sits - the force in between that can generate awareness about how the world is perceived by all the subjects (May, 2003). In Eliasson's *The Weather Project*, the installation of an interior sun and misty conditions creates an external environment internally, which challenges the boundary between inside and outside and the position of the body in both. Philippe Rahm has also experimented with this in *Winter Beach,*[30] *(Figure 61)* and *Jour Noir (Figure 62).* In the *Winter Beach*, atmospheric conditions of the beach - from the smell of sand and sunblock, to the UV rays - are removed from their natural

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30 An internal environment has the smell of sunblock and sand, UV light, injected to create the sensory illusion of a beach, which confuses spatial understanding, as that is associated with external environments.

environment, and located into an interior space, thus creating a year round internalised beach. This dislocation that is occurring challenges norms that are established within the built world. This in turn challenges spatial perceptions, and the way these spaces are being engaged with. Rahm also suggests that approaches towards interior and exterior are more flexible than ever, due to climate change and technological advances. McCarhty also suggests that the perception of interior and exterior no longer apply in the traditional sense (McCarthy, 2003), as discussed in Atmosphere + Air. This provides a greater oppurtunity to explore ways of using climatic conditions to develop a means of habitation that is neither internal or external.

Sean Lally experiments with this idea (surrounding internal and external) and begins to identify how programme and function can mould around atmospheric conditions, instead of constructed containers. *"Climatic variables are otherwise simply mediated – either allowed in or reflected away – and are rarely investigated as a point of departure for design; because, after all, it is the common assumption that the envelope will do all the heavy lifting for this design profession"* (Lally, 2010: p. 16). In the *Wanderings* project, the immediate environmental

Figure 63: Sean Lally's *Wanderings*. Adapted from *Eat Me... Drink Me...* by Sean Lally, 2010, *Architectural Design, 80*(3), pp. 14-19.
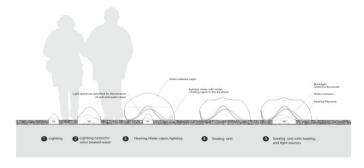
Figure 64: Sean Lally's *Wanderings*. Adapted from *Eat Me... Drink Me...* by Sean Lally, 2010, *Architectural Design, 80*(3), pp. 14-19.

Figure 65: Sean Lally's *Wanderings*. Adapted from *Eat Me... Drink Me...* by Sean Lally, 2010, *Architectural Design, 80*(3), pp. 14-19.

Figure 66: Sean Lally's *Wanderings*. Adapted from *Eat Me... Drink Me...* by Sean Lally, 2010, *Architectural Design, 80*(3), pp. 14-19.

context is challenged through the substituion of another climate, and the pods used to produce this begin to set up communities in an invisible manner *(Figure 66)*. Although forms are used to mechanically produce the climatic conditions (with some acting as furniture *(Figure 63)*), the environments are not separated by any walls, floors or ceilings. Space is derived through invisible yet tangible means, allowing activities to occur without formal restrictions and boundaries *(Figures 64 & 65)*. Whilst *Wanderings* is an external project based around the meanderings of seasons, a similar approach could be adopted internally. This design approach allows activities to occur that would normally not be possible in the external environment in certain seasons. This begins to question the notion of interiority and the role it has played within architecture, and the traditional model laid down by Vitruvius. What Lally argues is for the dissolving of conventional envelopes to allow activities that have predominately been associated with the interior, to thrive in a new context. Lally refers to this as *"speculative environments yet to exist"* (Lally, 2010: p. 16). The boundaries Lally explores are atmospheric and bodily, relating directly to the immediate atmospheric context in which the pods sit and the affect upon human users. Would the pods have a similar effect if they sat within an interior? This would

create different spaces through climatic interferences in a similar way to being placed within the exterior, as it is boundless. New territories are created in an invisible manner, whether that be in the internal or external world.

Dislocation is a strong design strategy, as it not only allows users to question their understanding and to challenge spatial perception, but also that of the designer's. By seeing relationships that are brought about by unfamiliar couples can produce new notions of space, such as in the case of Rahm's *Hormonorium* or *Digestible Gulf Stream* where the architecture is experienced chemically (as discussed in Atmosphere + Air), or in Diller + Scofidio's *Blur Pavilion* where walls disappear into mist (Materials as boundary).

Taking the programme of the subway stations, a similar dislocation technique will be applied across one line, testing this through urban intervention. By isolating various atmospheric conditions and injecting them into contexts not normally associated with them, perception itself becomes the object (as discussed previously). According to Eliasson, this begins to allow the user to see themself in space (May: 2010) and perhaps connect them to the space in a more meaningful manner. So

Figure 67: An experiment into the ability of air to inhibit movement within a subway station. By the author.

Figure 68: The movement of air not only is a method of visualising what is occurring below, but also has an air of playfulness. By the author.

by using this strategy will hopefully make the everyday task of commuting more enjoyable, or at least sensorially satisfying.

As Sean Lally injected climatic conditions into the exterior that are normally associated with internal climates, this project looks to dislocate some external conditions to the interior. This reversal seeks to further question associated norms pertaining to interior and exterior, and indeed why they are in place. By increasing the humidity of the entrance, challenges the perception of the space that is being experienced. High humidity begins to inform other design aspects. Functions that can utilise high humidity are things that green houses and saunas. What are the implications of installing a sauna within the station? What materials need to be used to create this and what are the implications of these materials on the atmospheric conditions? Plants are a natural means of increasing humidity within space, but also the level of humidity impacts on what plants can survive within that environment. As discussed in Material as boundary, relationships can be expressed by how the climatic condtions reacts with a building material, such as the effects of different humidity on glass. One such occurrence is condensation, as mentioned earlier in this text. Condensation starts to represent

Figures 69 - 73: An initial concept experimenting with colour associated with temperature. The temperature along the station would always be changing, thus begin to represent itself visually through the use of coloured LEDs.

visually (as previously discussed in Material as Boundary), the invisible vapour in the air meeting the material and the cool temperature on the other side of the material. It therefore starts to illustrate the meeting of warm, humid air with cool air and the reaction that takes place. Condensation within buildings is usually viewed negatively. However, by placing atmospheric conditions as the forefront begins to celebrate this process and actually use it as a design feature *(Figure 68: p. 100)*. The detailing of the condensation process also starts to illustrate how the atmospheric can become interactive, and encourage the body to become activated in the space. Through the vapour becoming liquid on the glass, creates intrigue as the viewer attempts to increase the ability to see. As glass is predominately transparent, the condensation begins to obscure the images on the other side of the glass. Humans being the curious things they are, can wipe away the condensation to try and glimpse the actions of those behind the glass. This becomes the opposite when the atmospheres are reversed. When the glass box hold a humid environment, the water cannot be wiped away, thus rendering the viewer incapable of controlling the level of sight into the box. This represents both sides of the condition and illustrates to the inhabitant how the process works, further questioning the

conditions of the space.

While this condensation was tested on one station across the urban intervention, the main design surrounded Waterlooplein Station, with the atmospheric condition of temperature. By inserting various temperatures across the length of the station created invisible yet bounded spaces, that were also dynamic and changed with the level of communters (will be discussed further in Design: Waterlooplein Station). While dislocation is suggested here in a positive manner, it can also become quite disturbing (as mentioned in Atmosphere + Perception). Therefore the intention is that the trains depart every 10 minutes so commuters will not be subjected to any extreme conditions for longer than this period. Also, to aid the user in their understanding and also ground this discourse within the professional realm, visually re-creating atmospheric conditions will be explored simultaneously with dislocation as a design strategy involving the atmospheric.

4.1 Dislocation

4.2   Visual re-creation

Along with dislocation, another method of approaching the atmospheric in respect to design is to visually re-create climatic conditions. SANAA, R&Sie, Ryue Niskizawa and Graft have conceptual and built projects that reflect this. Experimentation with this concept is through photographs and image manipulation.

White images creates a sense of inhabiting an ephemeral fog and seem to be adopted by quite a few architects as a means of exploring atmosphere through the built.. This technique seems to be employed by R&Sie, SANAA and Philippe Rahm. By using white, strips the space of its tactility, perhaps blurring boundaries that would normally exist. It creates an ephemeral and fog-like appearance. Ryue Niskizawas *Video Pavilion* further explores this blurring by using soft, flowing edges, blurring the connection between floor and wall *(Figure 75)*. R&Sie (New Territories) also explore this idea of curvilinear forms in the interior project *Snake*. The combination of white and the twisting angles seems to create an atmosphere of mystery, ghostliness and ephemerality, as seen in *Figure 74.* These forms have also been explored in other built projects, such as works by GRAFT.

Figure 74: R&Sie's *Snake* (New Territories) explores white spaces with soft edges. The bottom image gives the appearance of being within a fog. Adapted from *Snake,* 2009, Retrieved 10 May, 2010, from http://www.new-territories.com/snake.htm

Figure 75: Sanaa's *Video Pavilion* shows how edges can be curved to create a material appearance of being in a fog. Adapted from *Ocean of Air - SANAA 1998-2004* by C. Diaz Moreno & E. Garzia Grinda, 2004, *El Croiquis, 121/122,* p. 387

*Figure 76:* Concept drawing from SANAA Toldedo Art Museum. The white image portrays blurring and translucency, a visual representation of how the space is to be experienced. Adapted from *Ocean of Air - SANAA 1998-2004* by C. Diaz Moreno & E. Garzia Grinda, 2004, *El Croiquis, 121/122,* p. 119

Figure 77: SANAA's conceptual drawing of the Toledo Art Museum. The glass and white reflective surfaces blur boundaries, and produce an ephemerality. Adapted from *Ocean of Air - SANAA 1998-2004* by C. Diaz Moreno & E. Garzia Grinda, 2004, *El Croiquis, 121/122,* p. 119
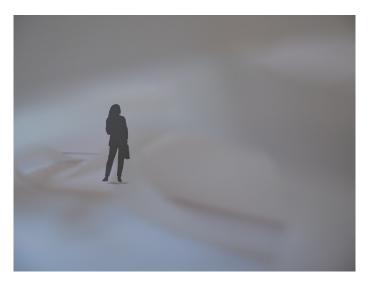
Atmosphere, when thought about at the design stage, tends to evoke images of ghostly scenes, soft and flowing forms, curvilinear elements *(Figures 76 & 77).* The straight line is viewed as man-made, while curved forms begin to suggest the organic and natural forms. Using the previously mentioned precedents as inspiration, a series of images testing these ideas was produced, using maquettes and manipulating the images *(Figures 78 - 85, p. 108; and also Appendix).* This begins to become a useful representation tool. However, it is difficult to illustrate the invisible and this is identified within this project. It is this reason I am aruging that dislocation and visual re-creation must be used in conjuction as design strategies when designing around the atmospheric.

The mediation between visual representation and dislocation is the area where atmospheric architecture can be utilised in the everyday. Through the use of precedents such as Olafur Eliasson, Philippe Rahm, Diller + Scofidio and SANAA, this is made possible. This collaboration between that which is experienced visually and that which is experienced through the other senses ensures total sensorial stimulation. By making visual the non-visual creates awareness of the invisible, and this

4.2 Visual re-creation

begins to challenge they way people identify with perception, thus making perception the object. Through the use of atmospheric conditions, space which is usually immediately understood becomes a space that tests the boundaries of perception. It is the unknown (to begin with) and unexpected - a challenging of the components of usually spatial norms (May, 2003: p. 18).

"[T]hrough an accentuation of the gap between the rational expectation of an occurrence and its correlation with the visceral experience of it" (regarding experience as simultaneously physiological and psychological) (May, 2003: p. 18). Through dis-location of atmospheric conditions, previous spatial presumptions are challenged. The known is tested against the unknown through bodily engagement within space, and understanding is sought by making conscious the act of perceiving. When walking into a space with a dislocated atmosphere, previous understanding of the space is challenged. As the subject is trying to understand the surroundings, they make conscious the act of perceiving, thus making perception itself an object (May, 2003). This in turn reflects back on the subject. This leans towards a phenomenological approach, but remains constantly grounded within the physiological. Atmospheric conditions are a means for

producing affective architecture, which ensures a more dynamic means of inhabiting and making space. Previously discussed are various experiments conducted in order to test both dis-location and visual re-creation. The design begins to apply these methods, but does not fully detail the design to a construction level, only identifies how the strategies developed may be adopted. Visual re-creation becomes a powerful tool and is used often within architecture; the issue is within this project that it is not be the only component of making architecture (that is the paradox as this project argues to move away from ocular focused architecture, yet is required to visually represent it). Therefore it is to be used in conjunction with dislocation strategies. The next section of this chapter identifies the design across an entire subway line in Amsterdam, and narrows down the station to produce a possible scenario of how the design can be implemented holistically with both dislocation and re-creation strategies.

4.2 Visual re-creation
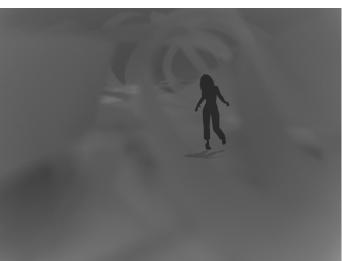
Figures 78 - 81: An exploration of re-creating a particular atmosphere visually, questioning habitation and scale. This was an attempt to further materialise smoke, as previously shown in Atmosphere + Air. Photographs of maquettes. By the author.

Figures 82 - 85: A similar experiment but reversal of colour, questioning whether white space is a better shade to represent atmosphere. Photographs of maquettes. By the author.

4.3   Design: Waterlooplein Station, Amsterdam

The initial concept explores a series of interventions along the subway line from Amsterdam Centraal to Bijlmer Arena celebrating a different atmospheric condition within each station, whether relevant to context or as a means of increasing commuter participation. Through a combination of dislocation and visual re-creation strategies, each stop through the line could be highlighted according to a different climatic condition. This urban intervention is a conceptual glimpse at the possibility of applying strategies and tools discussed within this project into actual built works. In Nieuwmarkt Station differing humidities offer oppurtunites for plant life to flourish underground. Weesperlein Station identifies how air movement becomes a playful time indicator, while in Wibaustraat Station precipitation further questions relationships between interior and exterior.

The main focus on design culminates however, with further exploration of Waterlooplein Station. The dominant climatic condition is temperature, with humidity becoming a resultant.

When designing with atmosphere at the forefront of the

Figure 86: The entrance to Waterlooplein Station via the Stopera. Adapted from *Beeldbank,* 2010, Retrieved 8 July, 2010, from http://beeldbank.nederlandmetro.nl/gallery2/main.php?g2_itemId=5759

Figure 87: The external entrance to Waterlooplein Station via the Stopera. Adapted from *Beeldbank,* 2010, Retrieved 8 July, 2010, from http://beeldbank.nederlandmetro.nl/gallery2/main.php?g2_itemId=5759
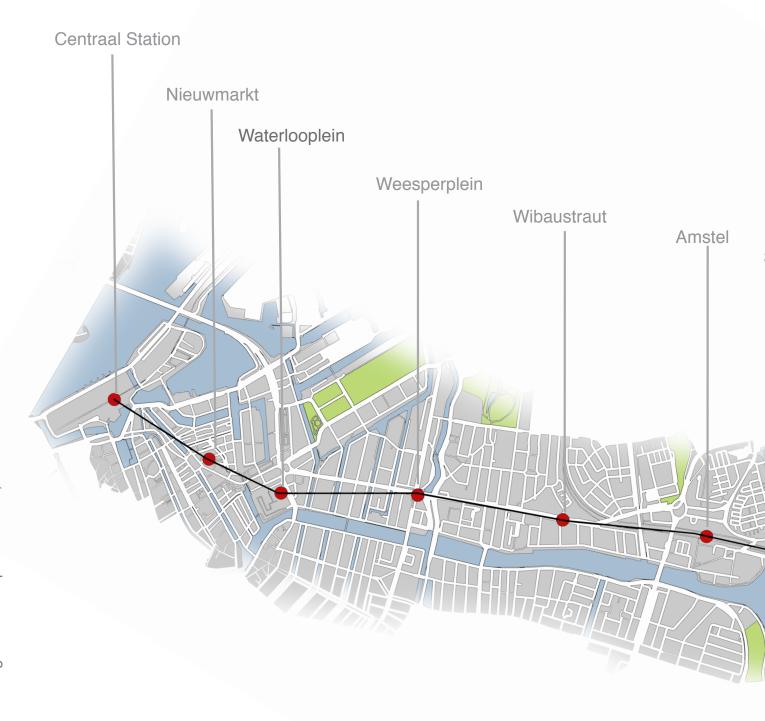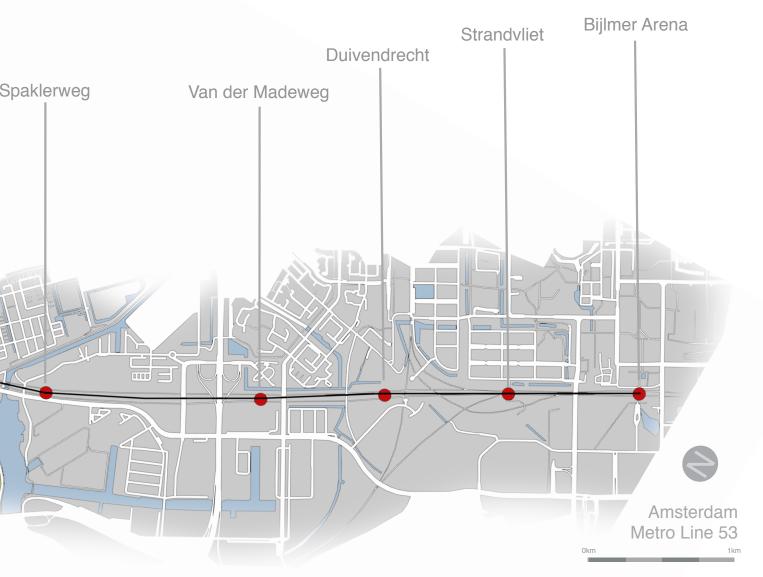
Figure 88: View of one of the exits from the platform. Adapted from *Beeldbank,* 2010, Retrieved 8 July, 2010, from http://beeldbank.nederlandmetro.nl/gallery2/main.php?g2_itemId=5759
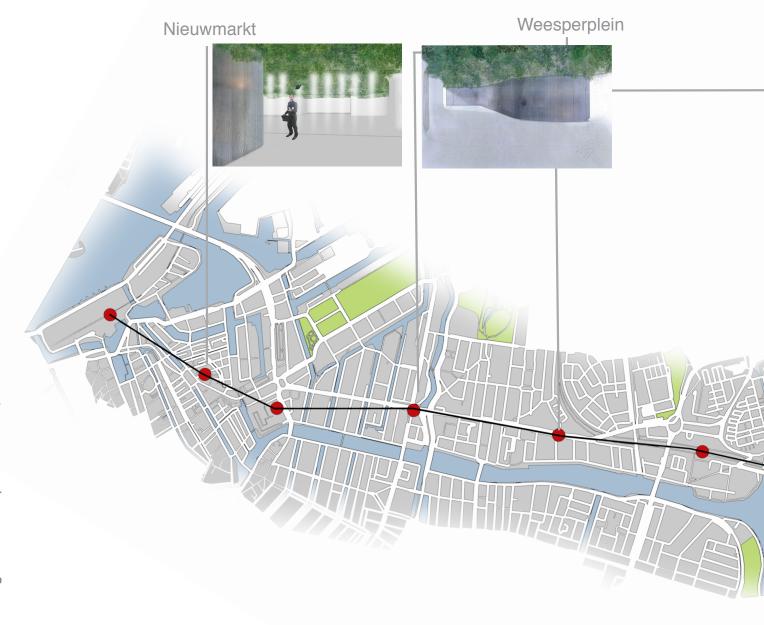
process, context becomes relevant in the sense of the existing conditions of the site as opposed to the material and cultural characteristics. This means context is not viewed in the typical sense. Existing materials, history and function become obsolete, and the quality of air, air movement and temperature become the driving factors. For Waterlooplein, temperature becomes the dominant factor, both through dislocation and visual re-creation (figures. p. 110-111). Different temperatures are injected into the space through common mechanical means such as through vents, but also through a sculptural form. This form or wisp, will hold various temperatures that begin to encourage interaction, and perhaps associate commuters with one another (figure. p.). This wisp is the visual re-creation component of the design. It is an attempt at visualising a wisp of hot air rising and solidifying, so that it can have a valid function within the station, such as acting as seating for the users.
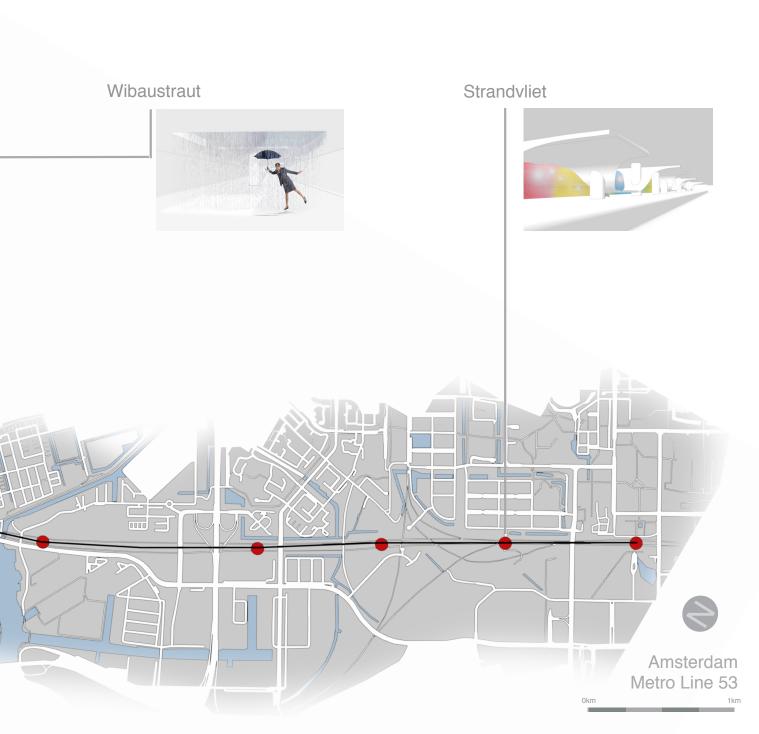
The design remains an experiment using both dislocation and visual re-creation as strategies in order to implement the atmospheric as a design generator, and explores ideas mentioned previously within the text such as relationships to various boundaries.

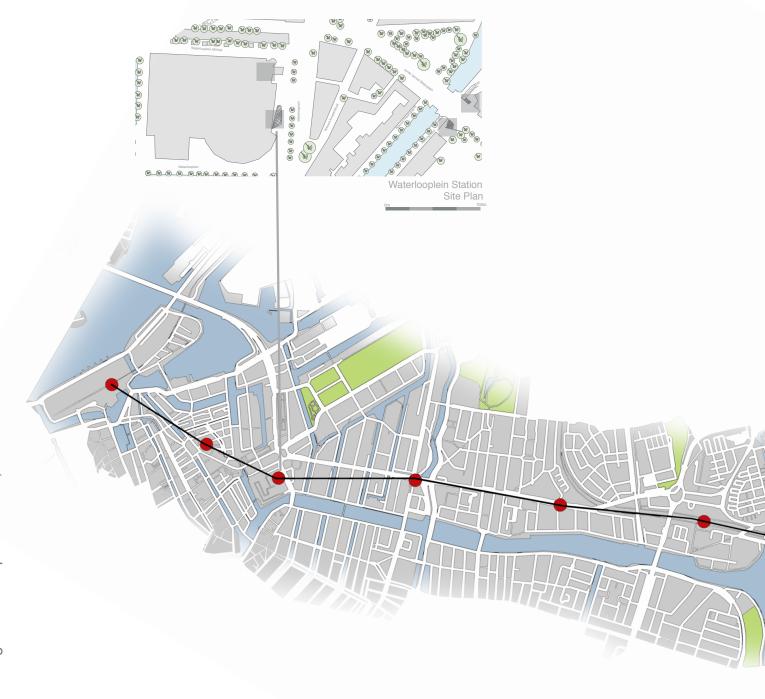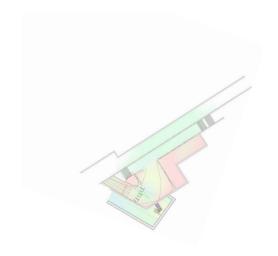**<u>Urban intervention across Amsterdam subway line, the Netherlands</u>**

Centraal Station

Nieuwmarkt

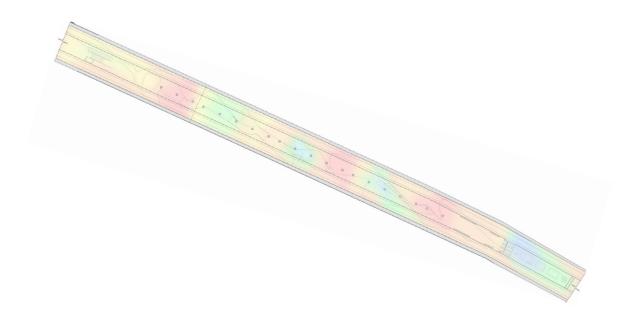Waterlooplein

Weesperplein

Wibaustraut

Amstel

Spaklerweg

Van der Madeweg

Duivendrecht

Strandvliet

Bijlmer Arena

Amsterdam
Metro Line 53

0km   1km

Nieuwmarkt

Weesperplein

Wibaustraut

Strandvliet

Amsterdam
Metro Line 53

0km   1km

Design focus on Waterlooplein Station, Amsterdam

Waterlooplein Station
Site Plan

0m   100m

Amsterdam
Metro Line 53

0km   1km
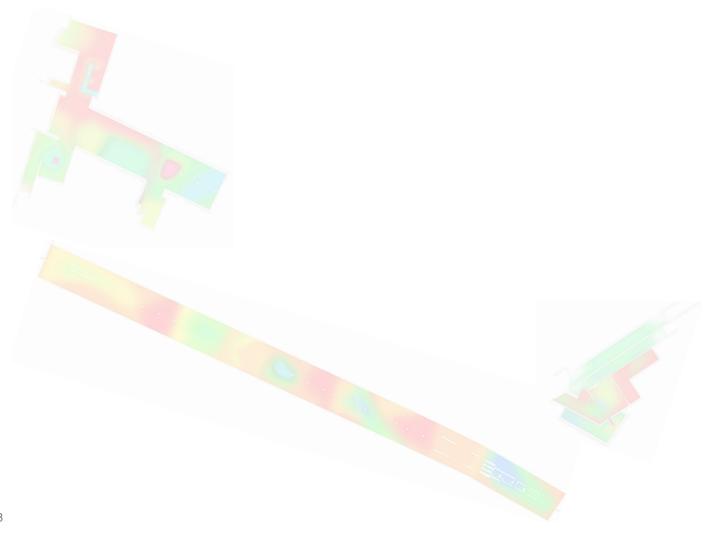
Through injecting foreign temperatures into the station creates a new means of occupying space. Instead of being bounded by walls, the different temperature zones allow pockets of habitation based upon subjective comfort.
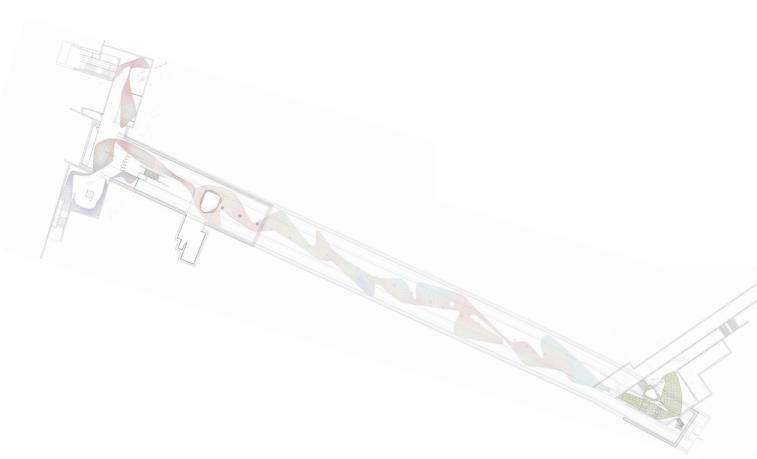
Dis-location
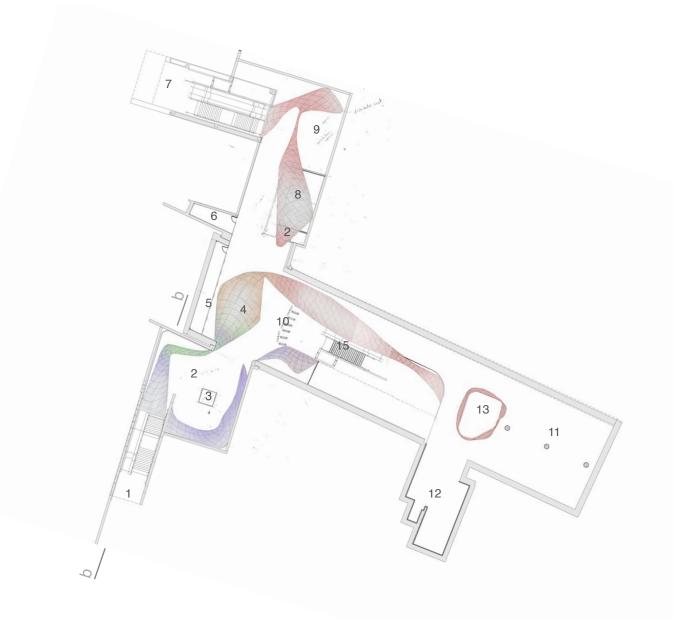
- Injecting atmospheric conditions into a foreign environment

- Using temperature as a means to create spatial boundaries

- Break proximities and social boundaries

Visual re-creation

- Atmospheric condition to reflect visually

- Wisp reflects the invisible condition of the air - attempts to communication this condition through visual form

- Colour changing LED's portray temperature through colour

- Wisp begins to celebrate the invisible in a visible manner (refer to Appendix A for further reference to obtaining form)
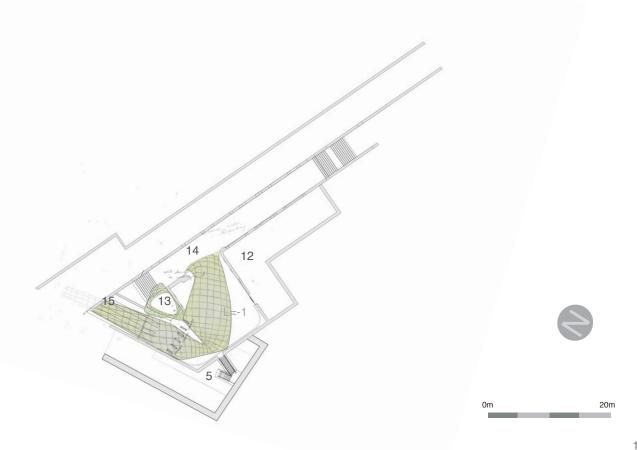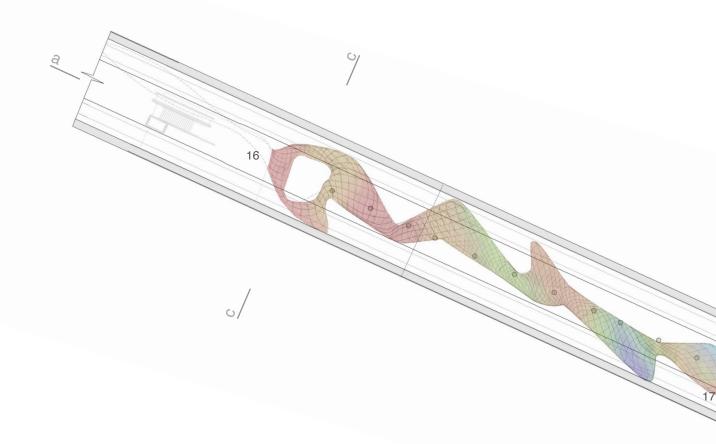
Waterlooplein Station
Level 1 Plan
Upper Floor Levels - L = 5000mm below ground

Upper floor levels:

1. Entrance Waterlooplein
2. Cool temperature
3. Tropical plant box - high humidity
4. Ticket hall - temperatures merge
5. Plant room
6. Cleaners cupboard
7. Stopera entrance
8. WC
9. Exhibition area - warm temperature
10. Albert Heijn quick stop
12. Office
13. Void
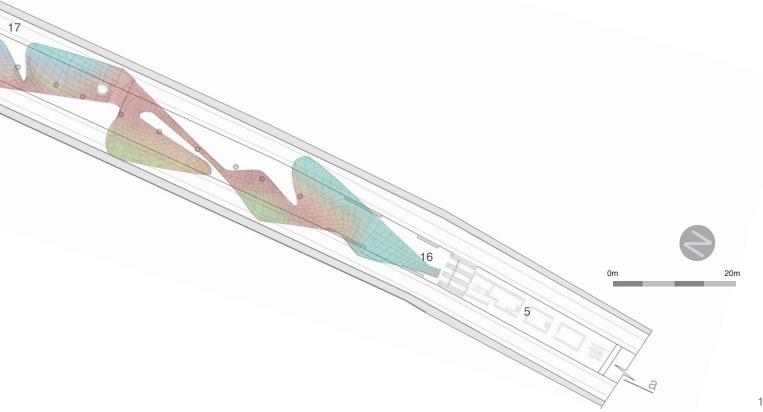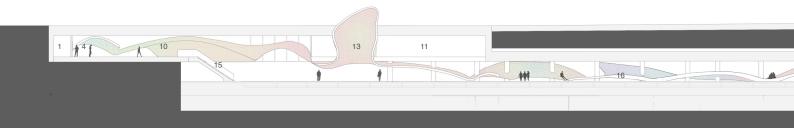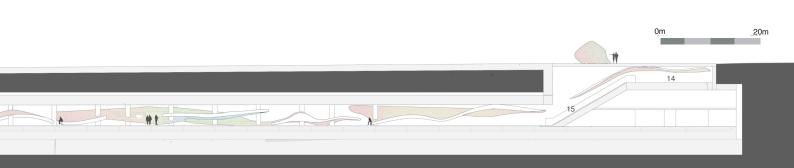14. Entrance Herengracht
15. Lift, stairs and escalators to platform

14

12

15   13

L=-1

5

0m   20m

Waterlooplein Station
Level 2 (platform) Plan
Lower Levels - L = 9425mm below ground

Lower floor levels:

1. Entrance Waterlooplein
2. Cool temperature
3. Tropical plant box - high humidity
4. Ticket hall - temperatures merge
5. Plant room
6. Cleaners cupboard
7. Stopera entrance
8. WC
9. Exhibition area - warm temperature
10. Albert Heijn quick stop
12. Office
13. Void
14. Entrance Herengracht
15. Lift, stairs and escalators to platform
16. Platform
17. Magnetic train tracks

17

16

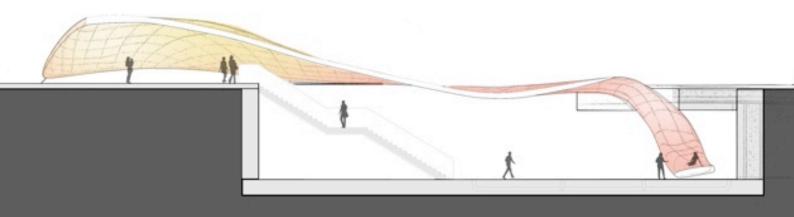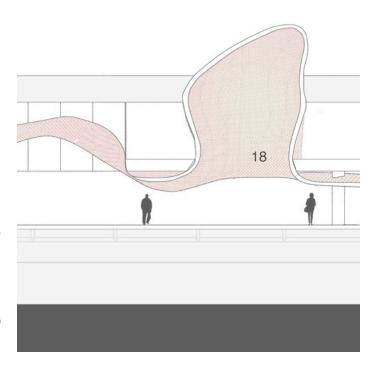5

a

0m   20m

1   4   10   13   11

15   16

Waterlooplein Station
Section aa

0m   20m

14

15

Waterlooplein Station
Section bb

Waterlooplein Station
Section cc

11   13   12

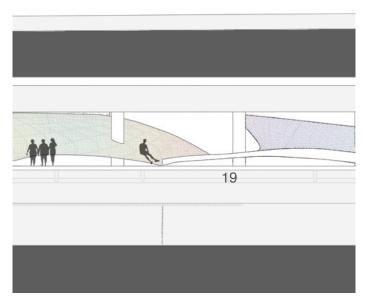17   16

18

19
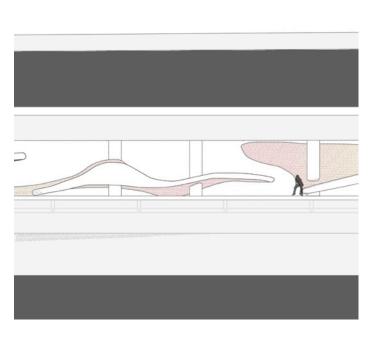
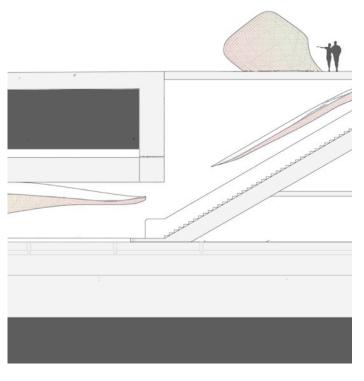Section aa:

18. *Wisp structure -* steel space frame (anchored into existing structure), colour-changing LED's, Cast Polymer cladding.
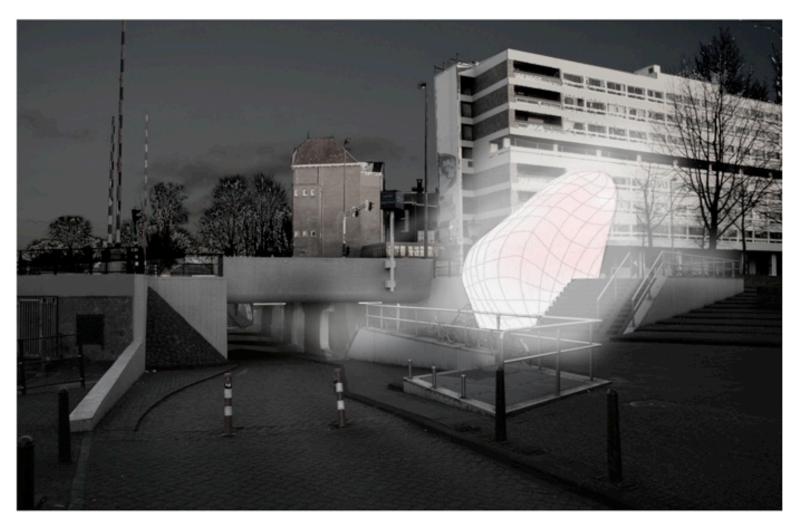19. Under floor mechanical heating and cooling

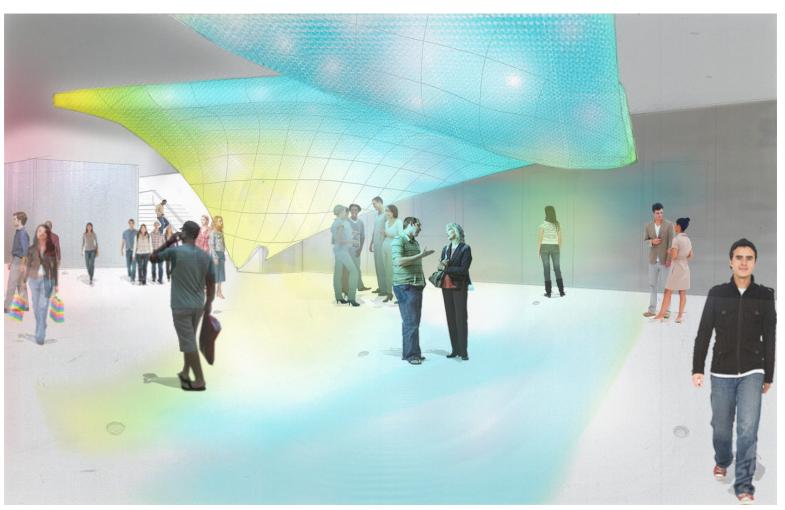0m   20m

Perspective 1: The external entrance outside the Stopera. The wisp structure exudes into the streets of Amsterdam, bringing with it a different temperature from the outside climate. The LED 's reflect the temperature that is being conducted so allowing pedestrians a glimpse of what is occurring underneath.

Perspective 2: Even the vents reflect the visual aesthetic of the wisp, and are able to interacted with. The vents connect the exterior to the interior, with wind rising when a train rushes past further dissecting the barrier between interior and exterior.

Perspective 3: View of the structure that runs through the interior of the station also connects to the exterior, exuding with a different temperature.

Perspective 4: The ticketing station has vents that connect to the tunnel underground, allowing the air to rush up when the train passes. The different temperatures create a dynamic flux throughout the space, allowing various modes of inhabitation. The tropical garden box highlights the different temperatures in a visual manner, by allowing condensation to appear on the glass.

Perspective 5: The wisp structure flows all through the station, and creates different zones of comfort or discomfort, depending on subjects threshold of comfort. These begin to inform certain social circles through likes and dislikes of temperature. This of course is also relative to season and time of day. The wisp structure also acts as furniture. The temperature is constantly changing based on sensors identifying what is required.

5.0   Conclusion

Juhani Pallasmaa writes about the immateriality of space as being the experienced. Jonathan Hill argues for the need within architecture to collaborate between the immaterial and material. Elizabeth Diller writes that contemporary architecture needs to begin to move away from the ocular and sterile modes of modernism, towards a more bodily evocative means of habitation. But what does this mean for the built world and is it applicable? Writings around atmospheric architecture paint an idyllic picture, where solid walls suddenly vanish and become smoke, ceilings are nothing more than clouds overhead, and all occupants actually enjoy coming inside to be rained upon. These images are indeed evocative and intriguing. Yet a compromise needs to be achieved in order for investigations of atmosphere to become a part of built architecture, otherwise all these ideas remain speculation within discourse or art. Perhaps that is where it should remain? This project does not confirm this. This project argues that atmospheric architecture is possible. Through combining both the immaterial and material, as Hill suggests, the atmospheric and built, different modes of occupation can be questioned yet still inhabited. It is the mediation between the two

where the success will lie for this means of making architecture

The built world consists of immaterial and material aspects, with the dominance often being placed on the material, which can be seen to stem from the Vitruvian dogma. However, there are architects, theorists and artists who explore the immaterial and attempt to define its position within the world. While Jeremy Till suggests a move away from the Vitruvian traditions, Jonathan Hill suggests a collaboration between immaterial and material within architecture as a solution. In the chapter Immaterial + Material, the word immaterial was defined loosely as being experience, user definition, drawing and representation, emotions and atmosphere (Hill, 2006a), and deemed to be a difficult term to grasp, due to its slippery nature. Elizabeth Diller suggests a shift in the means of producing architecture, from ocular dominant to a more immaterial approach, such as that through atmosphere. Atmosphere + Definition saw atmosphere as both ambience and climate, proving just as elusive to define as the immaterial. However, with these definitions two different approaches could be adopted, either involving mood as atmosphere, such as the works of Peter Zumthor, or climate as atmosphere, such as Philippe Rahm. Hill argues the two definitions overlap (Hill, 2003),

while Mark Wigley approaches atmosphere in a more scientific way, with atmosphere being to architecture what it is to a planet (Wigley, 1998). Regarding atmosphere as ambience identifies it as a tool to describe immaterial details of space, and to connect people emotively to experience. In Atmosphere + Ambience, atmosphere, ambience and experience (according to Wigley) are all linked and all present themselves to the user in an invisible means. This introduces the notion that atmosphere is closely connected to body and sensation. Peter Zumthor approaches architecture in this ambient manner, stating that *"atmosphere is an experience that is more complex than architecture alone"* (Barbara & Perliss, 2006: p. 157). Using ambience to recall spatial details allows the user to create space with no materials, through the description of intangible yet recognisable ambiences, such as cozy, homely or vibrant. These emotive terms begin to draw up space visually, but often rely on invisible atmospheric conditions as well, such *"as the scent of wax, the warmth of the flame, and its occasional, quiet sizzling sound"* (Exner & Pressel, 2009: p. 15). These invisible stimuli are physical as they are experienced through sensation. This physicality suggests that in order for ambience to exist, climatic conditions must be present. Within *"the air in any particular place"* (Folwer, et al., 1995: p.

78), are many different atmospheric conditions, as suggested in Atmosphere + Air. These conditions are odours, sounds, tastes, air movement, temperature, humidity, contaminants and light. The invisible aspects are the main focus for the chapter. Temperature, humidity, smell, taste, air movement and sound have been briefly discussed in respect to precedents to set up different means of experimenting with atmospheric within architecture. *Interior Gulfstream* by Philippe Rahm uses temperature to illustrate how different modes of habitation can occur without formal boundaries such as walls, and how temperature can be visually represented such as in Convective Apartment. Humidity is revealed as capable of becoming mass and space, according to Christine McCarthy, with psychological implications. Smell within architecture has been deemed undesirable and removed from buildings from the Modern era, yet there are some architects who are encouraging scent within the built, such as Elizabeth Diller, Anna Barbara and Anthony Perliss (with their work Invisible Architecture), Gaetano Pesce, Peter Zumthor. Using smell and taste to extent the borders of architecture, *Digestible Gulfstream* by Philippe Rahm identifies how architecture can exist in different realms, such as in the gastronomic system. Malte Wagenfeld's air photographic experiments and this project's *Thresholds* concept installations,

make visible the invisible, and identifies air as inhabiting space dynamically, allowing this to be represented visually. Sound is a huge source of inspiration for design concepts, and effects inhabitants greatly, modifying spatial perception depending on frequency and materials. Sound has the ability to go around corners, thus breaks down privacy barriers effectively (whether for good or bad) and fully inhabits space. Christopher Janney experimented with sound and sensors in *Reach: New York,* which simultaneously deals with sound, kinetics and social barriers. The fluidity and fluctuation of the natural environment is argued by some that it is not being applied to its full extent within architecture, especially within modern architecture (Elizabeth Diller as cited by: Barbara & Perliss, 2006). In fact, these conditions are being treated in a constant and moderated means throughout the western world within the built environment, to ensure comfort levels are maintained, resulting in the desensitisation of the human body. Atmosphere + Removal begins to deal with these issues, and critiques both traditional and atmospheric modes of inhabitation. Torben Dahl suggests that the standard comfort zone that is commonly used in the building industry is for the benefit of occupants and gives the most pleasure and productivity. This comfort zone is a traditional model, which is heavily moderated

air conditions within interiors, which Diller suggests is due to the sterile environments established within modernism. Helen Mallinson offers up that the movement towards this conitioned living was partly comfort, partly marketing and partly due to status and trying to keep up with the *"cradle of civilisation" (*(Mallinson, 2006: p. 255).   Philippe Rahm suggests that the traditional divide between exterior and interior no longer applies in todays society, therefore suggests activities no longer need to be within moderated zones and can inhabit different climates and invisible zones. Atmosphere + Perception proposes that atmospheric conditions play a large role in spatial experience, and there are many architects and artists experimenting with this, such as Diller + Scofidio, Philippe Rahm, Olafur Eliasson, Peter Zumthor and Gaetano Pesce. In order to question these relationships between spatial perception and atmospheric conditions, it is important to define the boundaries between the atmospheric, the body and the material world.

Constantly spaces are being defined through air conditions when no built object is apparent. Atmosphere as Boundary argues that through temperature, humidity and the pressure of air, a clear spatial boundary exists within the atmospheric, whether

visible or invisible. Semper identifies atmosphere as a surface, in turn suggesting it has a boundary even though it is invisible. Helen Mallinson reiterates this with her literary description of air conditioning becoming a physical wave in *"Heart of Darkness; Air of Comfort".* Rahm uses boundaries created by temperatures to define spaces around climatic conditions within in a museum. He begins to ground these ephemeral and intangible concepts into the real world, with many buildings being constructed, proving there is a place for atmosphere and the architectural profession to exist. The means of experiencing these atmospheric boundaries is less ocular, and more through secondary senses. In Body as Boundary, Juhani Pallasmaa states that everything the body experiences is through touch, and that the body and space are in a constant dynamic dialogue. This introduces affect and percept to the argument, areas of theory that are difficult to understand, and which this project has only lightly touched upon. Body and atmosphere both become affective elements due to the ability to transform each other. *Hormonorium* from Philippe Rahm is an interesting experiment with atmospheric conditions affecting hormones, thus physically challenging perception of users and proving architecture can reside within and without of the body simultaneously. Skin is the most obvious bodily

boundary, and one which is suggested as an example for building materials, due to its remarkable capabilities. When construction material meets atmosphere, many interesting and sometimes, undesirable, effects can be achieved. In Materials as Boundary buildings such as Zumthor's *Bruder Klaus Chapel* and Diller + Scofidio's *Blur Pavilion* identify how new and creative ways of using or treating uncommon building materials can result in spectacular experiences. Atmosphere, body and material are all valid boundaries, and each uniquely define boundary. All of these boundaries become important as tools to use in the creation of space, along with dis-location and visual re-creation.

Sean Lally and Philippe Rahm clearly explore design involving atmospheric conditions through dislocation. This becomes a valid design strategy and is introduced in the chapter Dislocation. By isolating a climatic condition and injecting it within a foreign context identifies new relationships to explore in regards to design, such as with materials, the body and other atmospheric boundaries. However, using this as a design tool can also cause discomfort to the inhabitant, and threatens to affirm that this means of producing space should remain in the temporal realm. Therefore, in Visual re-creation, I argue for adopting both

strategies in order to extend into the built realm. Architects such as R&Sie and SANAA use visual techniques to re-create a certain atmospheric quality, and experiments into this have been explored. There lies the paradox, as this project initially argues to step away from ocular focused buildings to a more fully sensorial means of producing space.Yet in order to ground the project, a visual means of creating space was adopted in conjunction with an invisible one. This could be because this project only focused on one manner of representation and that was through drawings, photographs of maquettes and still frames of movies (it could of been explored through installation or other physical testing, yet still would have to be represented visually for production of this document. This becomes a limitation of the project.), or it could also mean that vision must be privileged within society, as mentioned by Diller (Barbara, 2006).

Previously mentioned was the possiblity that investigations into the atmospheric should remain within discourse and art as modes of testing these ideas. The line between art and architecture can be seen as blurred at times, and an area that could be investigated intensely,[31] therefore creating difficulties

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31 Not within this text however, further research into this area would need to be explored.

when it comes to intangible topics such as those investigated within this research. There are many architects exploring concepts of atmosphere, not only within installations, but also with built, real projects, which identify this means of producing space as relative.

I wish to emphasise that the drawings reflect the experimental nature of the research. They intend to reflect the theoretical approach adopted and have therefore not been designed in minute detail. The initial proposal was to seek a means of approaching the move towards atmospheric becoming more than a standardised internal condition within the architectural profession, questioning what extent it should be used within the design process. The ability to use atmospheric as design generator is definitely possible, as is evident in the precedents mentioned within this project. The research illustrates that there are endless oppurtunites when dealing with immateriality within architecture, and as such, a framework was set up in order to ground this. By first breaking down what atmosphere is, then by identifying areas of tangible architectural qualities and developing a strategy to manage these qualities, an architecture that could be a possibility within the everyday was derived. To reiterate

however, this was not developed to a construction quality, as the focus was on developing the framework of this slippery topic through discourse, to a level that could become obtainable at a professional level. More research could be undertaken at further detail, with investigating feasible means of producing the invisible qualities within the real world. Rahm, Diller + Scofidio and Lally may offer other insights into this area.

To what extent should we consider the invisible atmospheric conditions in the design process of architecture? This project can only conclude that there are many possibilities to explore this manner of making space, but it is indeed a valid one. However, in order to fully step away from an ocular focused architectural realm may prove too far from reality, and therefore a certain amount of mediation between dislocation and visual re-creation is required. In order to explore new territories of the atmospheric. More experimentation with installation and real conditions needs to be conducted, similar to the works by Lally, Diller + Scofidio and Rahm. However, the architectural profession may never adopt this approach to producing space, as there are still basic needs for traditional architectural models,[32] and this

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32 Such as those previously discussed, including financial and construction issues.

method of space making could be seen as extravagant.

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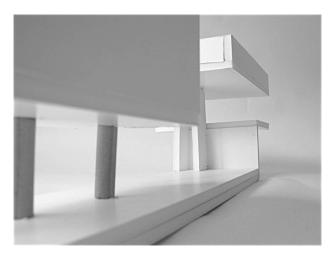Wilhelm, R. (1998). Atmospheric Disturbances. *Diadalos, 68,* 76-80.

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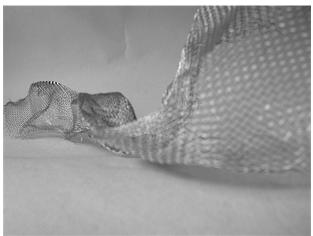
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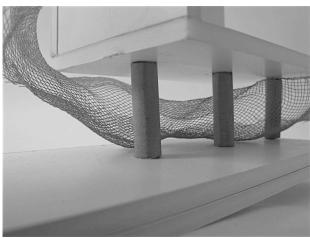
8.0 Appendix
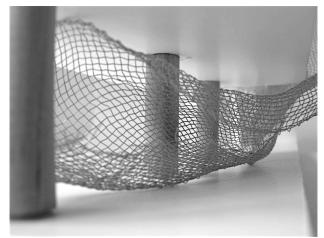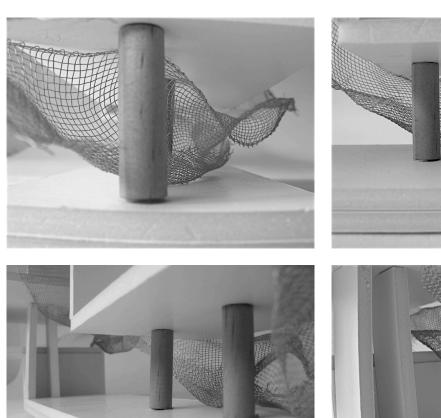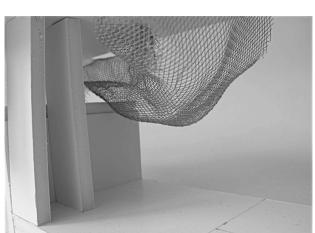
Visual experiments to re-create the atmospheric

Physically creating the wisp in Waterlooplein Station

Physically creating the wisp in Waterlooplein Station

Visual re-creation - test

Investigations into re-creating the invisible conditions

Investigations into re-creating the invisible conditions

Investigations into re-creating the invisible conditions

uv light floor
+ living ceiling
= distorted
perception

air pressure
as time
indicator

air movement
+ visual representation
of air condition
(humidity and temperature)
through glass/perspex panels
and LED lighting on
sensors

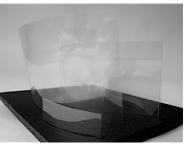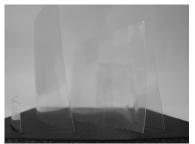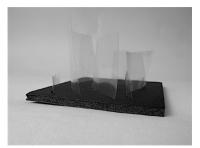precipitation

different humidities
+ glass
= condensation

cool
and dry

hot
and humid

?

Atmospheric conditions in space (tests)

Investigation into emperature effecting body and movement through undressing

A breathable object - concept into a construct that moves with inhabitation