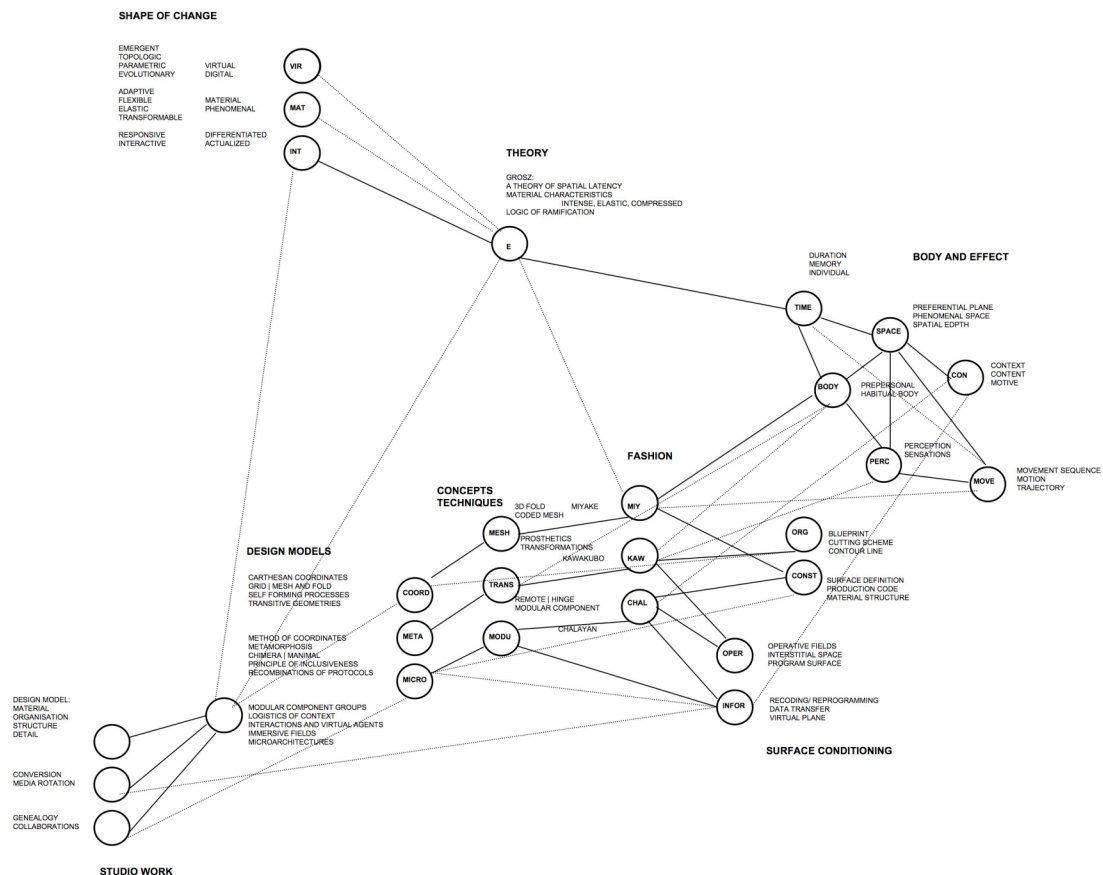*"And this is the crucial question that the virtual continually poses to the real: how can the real expand itself?"*

Elizabeth Grosz, 'Cyberspace, Virtuality, and the Real'

CH02

SHAPE OF CHANGE

EMERGENT
TOPOLOGIC
PARAMETRIC
EVOLUTIONARY

VIRTUAL
DIGITAL

VIR

ADAPTIVE
FLEXIBLE
ELASTIC
TRANSFORMABLE

MATERIAL
PHENOMENAL

MAT

RESPONSIVE
INTERACTIVE

DIFFERENTIATED
ACTUALIZED

INT

THEORY

GROSZ:
A THEORY OF SPATIAL LATENCY
MATERIAL CHARACTERISTICS
INTENSE, ELASTIC, COMPRESSED
LOGIC OF RAMIFICATION

E

DURATION
MEMORY
INDIVIDUAL

BODY AND EFFECT

TIME

SPACE

PREFERENTIAL PLANE
PHENOMENAL SPACE
SPATIAL EDPTH

BODY

PREPERSONAL
HABITUAL BODY

CON

CONTEXT
CONTENT
MOTIVE

PERC

PERCEPTION
SENSATIONS

MOVE

MOVEMENT SEQUENCE
MOTION
TRAJECTORY

FASHION

MIY

**CONCEPTS
TECHNIQUES**

3D FOLD
CODED MESH

MIYAKE

MESH

PROSTHETICS
TRANSFORMATIONS

KAWAKUBO

KAW

ORG

BLUEPRINT
CUTTING SCHEME
CONTOUR LINE

DESIGN MODELS

CARTHESAN COORDINATES
GRID | MESH AND FOLD
SELF FORMING PROCESSES
TRANSITIVE GEOMETRIES

COORD

TRANS

REMOTE | HINGE
MODULAR COMPONENT

CHAL

CONST

SURFACE DEFINITION
PRODUCTION CODE
MATERIAL STRUCTURE

METHOD OF COORDINATES
METAMORPHOSIS
CHIMERA | MANIMAL
PRINCIPLE OF INCLUSIVENESS
RECOMBINATIONS OF PROTOCOLS

META

MODU

CHALAYAN

OPER

OPERATIVE FIELDS
INTERSTITIAL SPACE
PROGRAM SURFACE

MICRO

INFOR

RECODING/ REPROGRAMMING
DATA TRANSFER
VIRTUAL PLANE

DESIGN MODEL:
MATERIAL
ORGANISATION
STRUCTURE
DETAIL

MODULAR COMPONENT GROUPS
LOGISTICS OF CONTEXT
INTERACTIONS AND VIRTUAL AGENTS
IMMERSIVE FIELDS
MICROARCHITECTURES

SURFACE CONDITIONING

CONVERSION
MEDIA ROTATION

GENEALOGY
COLLABORATIONS

STUDIO WORK

CHAPTER 02 | A DEPARTURE FROM THE BLUEPRINT

2.1. An Introduction

2.2. Philosophy of Time and Space: The Nature of Duration and Latency

2.3. Timing Habits of Architecture

2.4. Towards A Materiality of Latency: Poles that Produce Characters

2.5. Conclusion

2.1. INTRODUCTION

In this chapter, the dissertation explores an approach to a theory of latent structures or unfinished forms that originates in contemporary philosophy: 'The Future of Space: Toward an Architecture of Invention' by Grosz.[1] The chapter further expands on concepts of duration in traditional and contemporary architecture in order to reveal how duration has been deployed there. The chapter then returns to Grosz to engage in a discussion as to how a materiality of the durational resonates with relationships between respective poles that affect this materiality, and which are also of concern in architecture (such as time, space, body, movement, perception). This consideration will help in framing the dissertation's engagements with the philosophy that will be deployed in subsequent chapters.

Section 2.2. *Philosophy of Time and Space: The Nature of Duration and Latency* introduces the origins and concepts of duration and latency, and expands on concepts of time-space relationships as the dynamic potential of space through its actual and virtual 'becomings' so as to prepare these notions for later application. The section further traces the argument deployed by 'Future of Space', in which Grosz offers a theory of spatial complexity that recontextualises time and space, and thus recontextualises the design and inhabituation of architecture. In order to explore a potential alternative, or new direction for exploring latency and duration, the dissertation focuses on the conceptual intersection or correlation of time and space through an unfolding of contextual planes of time (actual-virtual).

One might argue that to a certain extent, duration and latency are addressed in traditional and contemporary architecture. In order to understand the limitations, the following section reviews a number of examples. Section 2.3. *Timing Habits of Architecture* explores a framework for the consideration of durational characteristics. It sets the background for a focus on latent formations of architecture, and distinguishes between different strategies of change, chance, dynamic and latent structures. These strategies consider different relationships between time, space and matter that range from: traditional (and habitual) concepts of stable, mobile and flexible solutions; to contemporary approaches of emergence, performative architecture, digital and electronic technologies, and interactive installation art. The durational capacities of these blueprints, and the latency that arises with the introduction of new media that generate different forms of blueprints are discussed here.

Section 2.4. *Towards A Materiality of Duration: Poles that Produce Characters* discusses a line of consideration laid out by Grosz in 'The Future of Space', that is a concept of duration that resonates with a materiality. Grosz's *loci of intensity, of compression or elasticity* produces a specific character of duration, that is it balances and privileges a specific relationship between poles: time, space, perception, body, movement and materiality. These poles and the relationships between them allow the dissertation to reconsider notions shared by architecture, and which may also amplify duration.

Section 2.5. *Conclusion* reframes the key moments of this chapter.

2.2. PHILOSOPHY OF TIME AND SPACE: THE NATURE OF DURATION AND LATENCY

The profession of architecture, that is architectural design and building practice, orchestrates relationships between time and space. Architecture is a system that not merely organises material, but time: its materiality can be considered an expression of architecture's relationship with time. That is to say, architecture has a habit of 'timing' space, or conceptualising space in time that developed over centuries and continues to date.

Traditional architecture organises time through a permanence of physical space constructed by planes, verticality and depth. Classical architectural design for centuries relied on Cartesian geometries, that is the precise quantitative definition produced through mathematical rules of proportion, harmony and rhythm. These rules defined variable typologies that in turn proposed an expectable, recognisable architectural environment. Space in that sense offered a 'stable' container, to be filled with the programmatic protocols of habituation, unfolded through movement and encountered through temporality. As the architect and theorist Greg Lynn argues, these 'ethics of statics' privilege time-space relationships that promote timelessness, or sub ordinance of time to space.[2]

Yet in a contemporary culture, one can argue that architecture has dramatically changed its habits, that is, concepts of 'timing' space: from an approach of stability or permanence towards processes and open formations. The theorist Marc Auge suggests that we occupy the shifting spatial parameters of a 'transitional supermodern environment'.[3] The impetus for such a shift is outlined by lifestyles, programs and profiles of a contemporary culture that are changing with increasing rapidity, causing spatial considerations to become transitional, and in turn different in terms of structural, organisational and material affordances. Current cultural discourse further develops notions of time as fluidity, continuity, transition, duration and latency. Consequently, the understanding of time challenges architecture as that which operates through time. 'Permanent space' shifts to a 'space of flows,' in which multiple layers of movements, occupations, protocols and times are enfolded in each other. Instead of resting on spatial permanence, architecture then needs to address time and space as interdependent, continuous, and intersected. This further raises questions about how architecture can be rethought through time: re-conceptualised, re-organised, and re-materialised, so as to amplify and support the challenge of cultural discourse.

In 'The Future of Space: Toward an Architecture of Invention', the philosopher Elizabeth Grosz offers considerations of a materiality of spatial latency that the dissertation frames as a strategic line for a re-conceptualisation of time and space. 'Future of Space' was first published by Cynthia C. Davidson in *ANYhow in* 1998 as a documentation of the ANY annual conference series attended by architectural theorists, architects and critics. The essay further became part of Grosz's book *Architecture from the Outside: Essays on Virtual and Real Space* of 2001, a series of texts that reflect on the digital potentials of architectural design, theories of embodiment, and possibilities of current cultural spaces from an angle of philosophy. Grosz's work has been widely appreciated respectively by streams of architectural design theories concerned with the space-time potential of

digital techniques, because it frames a "rethinking of space in terms of both becoming and duration; by what the virtual can offer to architectural theory and practice".[4] Current approaches of architecture have instrumentalised these considerations as a basis for new expressions of architectural design and theory. Yet the dissertation argues that the significance of 'Future of Space' for architecture results not merely from a rethinking of time and space, but because this essay formulates the potential of duration and latency as a specific materiality of space. In that sense, aspects of materiality further introduce an understanding of time and space that exceeds the becoming of architecture in the realm of design and construction, towards a continued becoming of architecture through experiential and habitual notions.

It is the contention of this dissertation that 'Future of Space' formulates a theory of spatial complexity that frames both time and space in a manner radically different to traditional, and contemporary approaches. The habit of timing space changes architecture through the manner in which time considerations shift from aspects of objective and quantitative measurements towards qualitative, subjective and transformative aspects of time, that of duration and latent potentials.

Time, Duration And Latency

Time, one might argue, is a cultural construct, a medium that both expresses and generates its context and performance, and which is subject to continued development. Time enters different systems of organisation, of representation, or of purpose, depending on the respective realm, and its concepts and methods of application. In which manner time relates to and affects matter, space and process also shifts when transferred to a different realm, depending on the criteria and arguments by which it is reflected. Time is a notion that is multifaceted, because its colloquial use contains diverse meanings such as temporality, continuity, duration, and latency. Depending on a conceptual understanding of time, duration and latency, a major bias is produced that separates scientific and artistic domains. One can argue that architecture as a profession that adopts philosophical, artistic and scientific impulses always meanders between these approaches. In order to establish a platform from which a materiality of latency can be addressed, the dissertation will introduce and in the following further discuss suggestions from scientific, artistic and philosophical angles.

One might argue that domains such as mathematical or biological science reorganized the phenomenon of time and processes as duration from controlled observation and classification only with the research by motion studies (as laid down by Étienne-Jules Marey and Eadweard Muybridge). Phenomenological science (as defined by Maurice Merleau-Ponty), and artistic approaches (such as the work of Marcel Duchamp, or Myron Krueger) may in contrast be said to embrace performative, procedural, qualitative aspects of time, through which time becomes an integrated part of the system, product or event it organises. Yet a different conceptual understanding of time crucial to the dissertation refers to philosophical considerations (of Henri Bergson, Gilles Deleuze and Felix Guattari, and Elizabeth Grosz) that conceive of time as an indivisible, continuous entity interrelated with space and individual experience.

Duration in general describes a variable length of time for something physical or invisible to develop or emerge or occur. Physical or mechanical science seeks to control the phenomenon of time and processes through observations of classification, by numerical, metrical and quantitative descriptions. That is to say, duration situated in a traditional scientific context usually describes quantifiable, divisible and calculable aspects of time that are measured against a metrical background as 'long' or 'short' periods. In that sense, duration reflects a series of independent and isolated momentary events that follow each other in causal linear sequences, such as a line of flight of a thrown ball. Duration in this context is deployed as a descriptive instrument, a mechanism deployed for the observation of deterministic processes. In other words, time and process are separated from the development of matter they describe.

Yet scientific process descriptions vary with the material involved, depending on the formation developing in a linear, that is reversible, or non-linear manner. Instead of if-then scenarios, time is understood as an entity through which processes evolve or emerge, and thus becomes available for conceptual considerations. Time informs and is informed by matter in process. In these processes, matter exists as a development in 'ranges' or 'phases' or 'gradients' (water turning into ice), and reaches a formation that is irreversible, and unpredictable, such as thermodynamics. It is the latent potential of a material in process that enables formations to emerge in unforeseen ways, and through which duration starts to be perceived differently.

Latency in general can be described as a time delay of the becoming of a matter or process between the moment something is initiated, and the moment its effects begin or become detectable. During the period of latency the effects of an action are latent, in the sense that these effects are a concealed potential that has not yet come into being, and thus are not yet materialised or experienced. Latency thus also refers to specific formulations of matter that perform or respond in interaction with a force or a context. This concept of duration introduces a challenge to architecture, in the sense that space (as built matter) can then also be considered a continuing process, beyond aspects of measurement, quantity, or dimension.

The mathematician Henri Poincaré (1904) argued that simple mathematical, parameter-based systems showed complex changes as they developed through time in a non-predictable manner.[5] The duration of change processes in science at that moment was thus no longer described as historiographic time, a causal linear sequences and quantitative, but further as continuously becoming, emergent, and qualitative. Paralleling this conceptual shift, the philosopher Henri Bergson in *Time and Free Will* (1910) also discussed the continuity of duration:

> This indivisible continuity of change is precisely what constitutes true duration [...] [r]eal duration is what we have always called time, but time perceived as indivisible.[6]

Bergson's privileging of a non-linear, emergent and continuous time further opens a complex unfolding of different moments that are interrelated, and stimulative to each other. Bergson's duration may best be described by a continuity of time that relates to music, its rhythms, its velocity and its particular time intervals. In that sense, duration offers aspects of time as

continuous and differentiated, but not divisible. When time is considered a continuity that is expressed through process, rather than an instrument by which processes are judged, it becomes an integral part of that which becomes in time.

Yet duration is not a singular specific condition of transition, change, or becoming that is restricted to a singular process or sequence of moments it reflects. The philosophers Gilles Deleuze and Felix Guattari in *The Fold: Leibniz and the Baroque* (1988) suggest that time itself is a multiplicity.[7] For Deleuze and Guattari:

> Time is the power of life to move and become. Time produces movements, but the error has been to derive time from movements. […] [t]ime is not *extensive*; it is not the connection of distinct units. Time is *intensive*; always taking the form of different and divergent durations. […] it is not a world that contains time; there is a flow of time which produces worlds of durations.[8]

Time is discussed here as a complexity of durations that formulates a force, the continuous becoming of life. This time is not one but many, different time planes folded upon and onto each other, different realms that relate and organise relationships between duration and matter. These times describe different states of being and becoming: the virtual, the actual, the real, and the possible.

While these planes all affect the coming into being of time and space, the virtual is of importance to the developing discussion of this dissertation, because from a non-linearity between different planes, or rather a tracing back and forth into this realm of the virtual, a spatial latency becomes available. Deleuze and Guattari describe the *virtual* as the realm in which times of present, past and future coexist. The *virtual* as used in this context is not what is commonly referred to as 'virtual space' (and which currently spells out an alternative reality on the Internet). It is neither representation nor simulation, for both would only allow us to understand the virtual as a (though slightly altered) mirror image of an existing world, a possible aberration controlled by digits. Instead, the *virtual* is considered the sum of all potentialities, prior to coming into being or being materialised for a particular world, unfinished, unframed, and unlimited. It is an open totality that can never be fully given or completed, but can be actualised in specific forms.[9]

When the virtual is actualised or differentiated into a specific form, the real comes into being. This real is preceded by a number of non-material, possible solutions that are 'preformed' by conditions and contexts.[10] The real, physical world is defined in the process of becoming by structured matter, which in turn can be perceived and experienced. In that manner, a multitude of different streams of time coexist and link back to the virtual by difference and differentiation, overlapping and infiltrating one another in a non-linear process. The durations and latencies of times and their intersections pass through individual perception by recognition or actualisation, thus becoming event or fact.

> It is from time and duration [..] that all perceptions are possible. It is this difference
> itself that for Deleuze is the virtual; any world or things is the actualisation or

concretisation of a flux of difference. Worlds and things are constituted from intersections and connections of different perceptions of this difference.[11]

Multitudes of duration that reinform and stimulate each other consequently open a territory of time that cannot be foreseen. In this manner, one might reflect on time as related to the individual, arguing that it is a subjective framework that consists of moments and movements. While different processes emerge and develop out of one another and are shaped by invisible forces, these durational processes are further perceived by innumerable observers, and possibly adopted and continued by interactants. Time as that which consists of multiple durations is then not exclusively descriptive or organizational, but it also entails a latency of process, matter, movement, and most importantly, the individual experience.

When time needs to be considered as a multiplicity of durations, as different planes of time enfolded in each other, and constituting intersections of different perceptions, it proposes a challenge to space in the sense that if time cannot be simple time, then what does this imply for space?

A Theory of Spatial Latency

In contemporary cultural discourse, as has been argued, different notions of time challenge the traditional notions of space. Yet this challenge is in fact not a result of a contemporary discourse, but in 1910, Bergson had already argued in *Matter and Memory* that matter cannot be separated from its process of becoming.[12] There exists an intricate relationship between the force and the object that stores that force in its form, in other words, the matter of space is informed by the continuity of time it expresses. Grosz suggests that when Bergson introduces a continuity of space by the continuity of time, and time also introduces a continuity of space. Each can be understood as the medium of the other; "space as the contraction of time, and time as the expansion or dilation of space".[13] At the outset of 'Future of Space', and on the path towards a theory of spatial latency, Grosz continues Bergson's understanding of time and space as correlative entities:

> If time is neither linear and successive nor cyclical and recurrent but indeterminate, unfolding, serial, multiplying, complex, heterogeneous, then space too must be reconfigured not as neutral, nor as singular, and homogeneous but as opening up to other spaces, not regulating processes and events so much as accompanying them.[14]

Time and space enter a relationship that is radically different because it reverses the objects of equation: time and space are not only independent, but inseparable, informing and influencing each other. Time and space thus share attributes and capacities of duration and latency, in the sense that neither develops and emerges in a linear manner, but exists as a multitude of diverse and differentiated 'timed' spaces, and 'spaced' times.

As much as time can be considered from an angle of occurrence, diversity, process and performance, space then equally inherits a capacity of transition and becoming. Architecture is as

much the result of a process (the architectural design and construction), as it is a performative force of continuous processes that develop in and through architecture. In that sense, time and space are differentiated through process formations of matter or organisation in architectural design, an approach that only relatively recently has entered the discourse of contemporary architecture.

But while a contemporary discourse investigates space-time relationships in design, Grosz argues that "space does not precede objects, but space is produced through matter, extension and movement".[15] Space can be considered durational, sequential, or procedural, because from a perceptual point, we unfold the architectural object while moving through. In that sense, space can be considered as process, a 'lived space', enacted and inhabited in continued processes of occupation. Space then is produced through present perception-action (movement arc) and past recollection (memory), which both become engines for an actualisation, an unfolding of space in two directions of duration: the past and the future. An individual perception is a measure of future actions to be carried out. It exists as an entity between the perception of a present (actual) and memories of the past (virtual). As Grosz suggests, "in opening up space to time, space becomes amenable to transformation and refiguring; it becomes particular, individualised".[16] A user, human, inhabitant interacts with architecture through matter in time. Architecture in this regard can be considered a doubled formation of space. Different formations of matter in space privilege different organisations of time, thus enabling different spaces of interaction that are operated by the individual appropriation.

Architectural formations that develop spatial complexity refer to latency through a number of cross-sections between time and space: to the latency of matter forming in time; to the latency of shapes alternating in attributes and character; and to the latency of spatial experiences different to an anticipated and designed programmatic protocol. This latency, one might argue, is as much part of the material potential of space as it is part of its original building plan or blueprint. It is the contention of the dissertation that a departure from a blueprint as formulated by 'Future of Space' enables the unfolding of different contextual and experiential planes of time, and is thus a prerequisite that affects future transitional capacities of an architectural object.

Virtual Challenge and Blueprint

Given that time can be viewed as existing as an intersection of different planes such as the realms of the real, the possible, the actual and the virtual, and given that time and space are correlative entities, space also exists in different realms. Yet the profession of architecture tends to untime space, through methods and concepts which every move inevitably gravitates towards the termination of unlimited becomings, towards realisation. Architectural space is challenged by time in the sense that access to its virtual realm expands architecture's reality. Grosz describes this challenge as "the crucial question that the virtual continually poses to the real: how can the real expand itself".[17] This 'virtual' of architecture is by no means merely outlined by contemporary

approaches of multiple times and becomings as processed through digital technologies. Rather, Grosz notes that:

> The virtual is not a geometric, spatial, or technological concept, nor is it structured by phantasma or imaginary projections alone, rather, it is the domain of latency or potentiality, given that the boundaries between the virtual and the real or the physical are unsustainable.[18]

The virtual of architecture might then be described as a becoming other than what was originally determined. In other words, the virtual is a departure from a given path, a non-linearity of both time and space that manifests as the volatile, the latent, the ephemeral, 'the unforeseen'. Access to the virtual potential of architecture media and matter reopens the different planes between which time and space shift and develop. Architecture's real or physical time is expanded by blurring the boundaries between its actuality and its potential, when architecture returns to a not-yet formed, not-yet projected mode. Latency and duration enter the contemporary cultural discourse as spatial flows and as environments of transition, as adaptations and frequentations of the built architectural object. Grosz in contrast contextualises duration and latency in the virtual realm of invention before or even despite architectural becoming:

> The virtual requires the actual to diverge, to differentiate itself, to proceed by way of division and disruption, forging modes of actualisation that will transform this virtual into others unforeseen or uncontained within it….the virtual is the realm of productivity, of functioning otherwise than its plan or blueprint, functioning in excess of design and intention.[19]

In order for architecture's 'virtual' to unfold, the logic or code that organises architectural matter and formation must operate through latency, because that logic already informs architectures capability for transition or becoming. Furthermore, the logic, and thus virtuality of an object, is also bound to its method of description and development. When Grosz refers to the plan or blueprint as that which already discloses the virtual potential of space, it is not the architectural object, the result of the architectural process that is challenged but architecture's capacity of thinking through space and time itself.

Architectural practice deployed the blueprint as a now outdated medium that contained precise and multiplied codes for programme, construction details, context relationships, material and structural information. Technically, the blueprint transferred line drawings from transparent paper through exposure to light sensitive paper (in a reversal to white lines on a dark blue background, therefore termed 'blueprint'). As an instrument of multiplying information and communication, the blueprint renders that which has not yet come into being as unalterable, and in this manner, already excludes certain modes of becoming. Yet there is another aspect to the blueprint that directly refers to affordances of time and duration. Unlike other representational media, the materiality of a blueprint is not 'closed' because it remains sensitive to light. Continued exposure thus leads eventually to dissolution of the image content: when the colour fades, the image

disappears. The properties of a blueprint thus also enclose different aspects of duration in itself, because it is both the description of and subject to a process, a medium and an object.
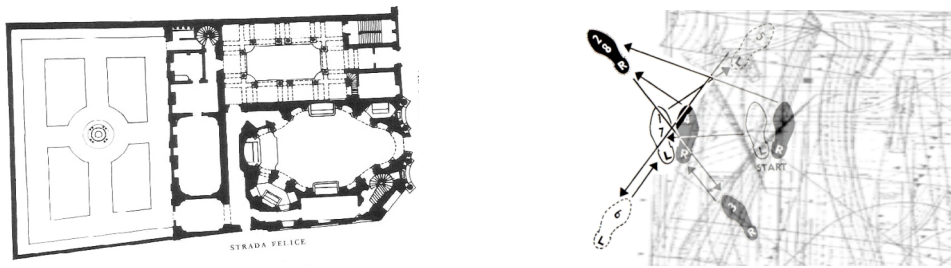

fig 6: A blueprint of differentiated spaces can be associate with the plan of Italian architect Borromini (San Carlo Allo Quattro Fontane, Rome), and the 'mediated blueprints' that times dancing steps (superimposed on a cutting scheme of clothing, author's diagram).

As any other cultural expression, architecture both informs and is generated by the representational media it uses, that is, the medium that develops architecture in a plan or blueprint already informs space and time before they are executed. Architectural design tends to develop habits of 'timing' duration in the sense that it privileges rituals of concepts for producing blueprints or plans, which in turn are limited in becoming. In the context of architectural design and building practice, a departure from the blueprint can be argued to be a departure from media that terminate design processes (such as the blueprint) towards expressing systems of process and performances (such as digital technology). Yet for spaces and times to return to a virtual potential, to continuously become, irrespective of 'functioning in excess of design and intention', this requires logic and techniques that operate on productivity and processural thinking. This logic may amplify duration because it assists architecture in abandoning blueprints of universal validity (types), towards systematising situative exigencies (process). In this manner, latency and duration of architecture are generated by their respective blueprint, 'timed' by their concept of formation (fig 6). Which possibilities of duration, latency and departure may be enclosed within will be discussed in the following.

2.3. TIMING HABITS OF ARCHITECTURE

Traditional and contemporary approaches of architecture demonstrate a habitual engagement with latency and duration through different concepts of a blueprint for time and space. In relation to continuous shifts and changes of contemporary environments, architecture increasingly abandons former systems of order, type, proportion and stability. Habits of architecture arguably developed towards an architecture that engages with matter through time, opening up to process and performance.

One can argue that architecture is always durational because it develops in phases, in design, construction and inhabitation. Each phase excludes options, that is already differentiates, and thus limits a latent potential. The architectural design process incorporates design changes and transformations as alternative designs solutions. In construction, previously interchangeable

spatial, programmatic, material or structural alternatives are defined and materialised. The duration of the architectural object, its 'becoming', terminates at the end of this process, when space is fixed in form and becomes constant. Inhabitation develops within this specified and determinate space in time.

The following section describes a number of architecture concepts and blueprints that engage with time, duration and latency. While architecture always contains aspects of duration in the sense of changes in the act of inhabitation, it does not always include aspects of latency in the sense that it continues to become in an unforeseen manner. The approaches discussed thus range from open forms, to flexible and adaptable solutions; to emergent and interactive systems of architecture. This is done in order to understand habits of time, that is, the manner in which architecture engages with time and space relationships, to understand the limits of those engagements, and to derive future points of departure for latent formations.

The Duration Of Polyvalence

In *The Dynamics of Architectural Form* (1977), Rudolf Arnheim describes architecture as a "stable counterpart to man's mobility".[20] Architecture is conceived of as an object of timeless permanence, in which space unfolds through the movement, rituals and habits of a user. Duration in that respect refers to a continued programming and spatial experience in an unalterable architectural environment.

Traditional concepts of architecture follow blueprints that act as ordering systems of architectural design, such as Cartesian geometry, typological differentiation, systems of symmetry, or rules of the golden section. An architecture based on such 'ideal' geometry might be considered as not in need of alteration or conversion of the built structure itself. These 'ideal' blueprints of traditional spaces reveal aspects of non-hierarchy and homogeneity, as is Palladio's 'Ideal Villa' (fig 7). Spaces that are serial and ordered in form, typology, proportion, or access maintain a structural and material diversity. Rather than assigning spaces to functions as are known today, spaces were assigned to status, character and preferences of the occupant, in specificity and particularity of textural, material, or atmospheric conditions, but not in a functional specification (fig 8). Instead, space and time change through differentiations in context, user, or programmatic protocol. This is because while the respective blueprint of this architecture foresees structural permanence, these spaces can be considered latent through secondary equipment that was imported, and which thus unfolded different programmatic events and performances. In that sense, a polyvalent blueprint that is both specific in structure and indeterminate in programme thus enables a differentiated occupation, a latency of space is continuously actualised. Spaces, times and programmes based on this blueprint are public and shared, a phenomenon that according to the architectural theorist Witold Rybczynski changes with the introduction of spatial domesticity and privacy in architecture.[21]

fig 7: Palladio's 'Ideal Villa' is based on homogeneity, the serial ordering of an idealized blueprint.
fig 8: 'Predomestic' spaces deploy polyvalent organisations, such as Baroque typologies ('Sandizell Castle', Bavaria, 1749). Modern polyvalent space as mediated in 'Minority Report' (2001) echo these, and thus might be considered post-domestic; although material diversity is replaced by digitized imagery.

The Dutch architect Herman Hertzberger discusses such blueprints of spatial and programmatic diversity, as polyvalents form that foster latency through individual interpretation, thus creating permanence through transitional capacities:

> The process of change must constantly appear to us as a permanent situation, that is why the changeability itself must come first and foremost as a constant factor, which contributes to the significance of each individual form. In order to withstand changes built forms must be made in such a way that they permit multiple interpretations, ie that they can both absorb and exude multiple meanings, without however loosing their identity in the process.[22]

Spatial duration in a polyvalent form is continuous because its spatial formation can be associated with multiple meanings and interpretations. These formations thus also refer to a latent cultural identity, in the sense that they offer a time 'competence', an 'accommodating capacity' of different times and programs of a culture. Within the boundaries of polyvalent blueprints, spaces and times unfold in the anexactitude of programme, or indeterminacy of spatial function, and through material specificity that because of its non-neutrality allows contextual and cultural re-adaptations.

The Duration of an Experiential Promenade

In modernist architecture, the former polyvalence of program and space is functionalised and differentiated according to programmatic content. Spatial concepts parallel developments of industrialisation in Western countries, in which tendencies of specialisation, rationalisation and mass production were transferred to the domain of architecture. Hertzberger notes that modernist or functionalist architecture derives form as an 'expression of efficiency'.[23] In *Towards a New Architecture* (1923), the architect Le Corbusier suggests that architecture is 'a machine for living in'.[24] Corbusier's architectural machines are modelled along the icons of industrialisation, that is, automobile, naval and aeroplane industries. Machinic efficiency addresses the object as functionally specialised container of program and use, in a manner that formulates an economy of dimensions, proportions, and functions. Space and time relate to one singular function (bathroom, toilet, living room, master bedroom), regulated by access to rooms via corridor structures. In that sense, the blueprint changes from a superimposed ideal or mathematical order that formulates the totality of the architecture, to a rule system of elements through which architecture is assembled.

Corbusier's 'Dom-ino House' illustrates a rule system so as to allow variations of becoming in its method of architectural design and production (fig 9). In 'Five Points of Architecture', Corbusier establishes the blueprint of a new, modernist architecture by a series of configurable elements; 'plan libre', pilotis, free façade, horizontal windows and a roof garden.[25] These elements express the form and gestalt of architecture in a shift from a former Cartesian blueprint, which enters the third dimension as 'deep' façade, massive construction and ornamentation, to the 'plan libre' that instead formulates a sum of specialised layers.[26] Layers of spaces are assembled through a kit-of-parts set of customised and mass-produced parts (that translate as steel beams, aluminium profiles, glass planes, concrete slabs, and white interiors).

fig 9: Le Corbusier's 'Dom-ino House' illustrates the rule system that formulates varying blueprints (1914). 'Villa Savoye' can be considered an actualised blueprint of such system (1931).

One might argue that the blueprint method developed for 'Dom-ino House' enables a latency for architectural space in design, in the sense that a rule system and defined elements strategically replace the mathematics of a universally applicable blueprint, so that context and content can endlessly be adjusted. Corbusier notes:

> [t]he plan is the generator. […] A plan calls for the most active imagination. It calls for the most severe discipline also. The plan is what determines everything: it is the decisive moment. […] The plan bears within itself a primary and pre-determined rhythm. […] The plan carries in itself the very essence of sensation.[27]

The 'plan libre' describes the duration or latency as a superimposition of boundaries, the blurring of thresholds, and material transparencies. It thus formulates an expansion of space through an ambiguity or indeterminacy of spatial reading while moving through space. The process of (visual) transitions through glass contains aspects of dissolving a spatial boundary or allowing information permeability. As the boundary changes from solid to transparent, the transparency at that moment is not only enabling an interaction with space, it also promotes communication between separated zones. Transparency and glass at that moment become operational devices for content, time, space and individual.[28] The blueprint of the 'plan libre' generates superimpositions of spatial dependencies and relationships through design variations, and through a blurring of boundaries within the architectural object generated by material ambiguities of transparency.

Yet the 'plan libre' is not only a generator of design variations, but further deployed as a generator of the experience of the architectural envelope. Corbusier organizes durational space with assistance of the 'Architectural Promenade', a singular and defined line that develops on the open plan and lays a path for the occupant in a single itinerary that links all spaces in a narrative

manner.[29] This 'Architectural Promenade' predefines a continuous linear flow of an experiential sequence through all levels, each time directing and constructing a cinematographic framing of space and environment. While movement and a shifted viewpoint of perception can conceptually amplify duration, Le Corbusier's path is a pre-determined sequence that is actualised through movement but allows no aberration. The reason is that laying a line excludes a 'straying' from that given path. The 'Architectural Promenade' precedes motion, it forecasts movements and passages that develop in duration but cannot emerge or depart from the determined spatial sequence.

The Duration of Reorganizable Architectural Fabrics

Duration enters architecture in a different manner when changes to the blueprint are considered as repeated structural and material actualisations, and thus become available to inhabitation. Adaptable and flexible systems provide forms and means that facilitate a fit between occupants and the constraints of their homes either before or after occupancy. These systems rearrange the matter of architecture and its whole system of operation by providing alternatives to the executed blueprint; as adaptable or flexible systems of duration.

In *The Adaptable House* (2002), Avi Friedmann defines adaptability as the accommodation of an ongoing transformation of family structure and work conditions by a literal, physical adjustment of the architecture. Strategies and components set in the initial approximate design facilitate the requirements of new circumstance prior to occupation, rendering the interior spaces adaptable during subsequent residency. This projected environment deploys reconfigurable definitions of unit size, space perimeter, number, types, or material, because it feeds 'the management of change'.[30] Adaptable architectural systems consider within their blueprint 'catalogues' of duration that include manipulations of volumes and parts, such as the fusion of levels, or alterations in relation to circulation areas or utilities. The 'life-expectancy' of the architecture project is thus furthered by diverse cycles of change that are executed through major adjustments of the architectural fabric (reduction, expansion and division), and its interiorised spatial settings. Again, spatial latency is counteracted by a projected change built into the architectural fabric.

Flexible systems showcase spaces that change on a frequent basis of cyclical organisations, in which rooms are coded by activities, and primary and auxiliary territories can be marked. In the generic Japanese house typology (fig 10), the blueprint of Cartesian geometry rests on a singular module, the Tatami.[31] This module system deploys a blueprint that coordinates pattern and dimensions on a two-dimensional plane, and instantly informs space through rhythmic proportions between plan and elevation.[32] While the blueprint size varies with the number of Tatamis, the profile of spaces rests on 'gradients', that is, programmatic zones attached and subdivisions that can be differentiated (niches and sliding doors).
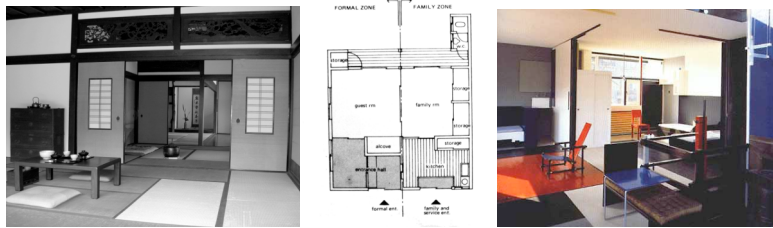
fig 10: Flexibility of spaces as provided in a generic Japanese house, and its transfer to European culture by Dutch carpenter Gerrit Rietfeld in the 'Rietfeld-Schröder House' (1924).

The architectural fabric is internally reorganised in a daily cycle through shifts of options between programme, occupant, time and use. While space is configured as pre-determined unit, its alterable boundaries, gradient zones and relocatable programmes change with habits and inhabitation. Spatial duration in flexible systems is experienced as the multiple organisation of related parts of the architecture, that is a flexible actualisation of the architecture. In this flexible blueprint, space emerges as a change in programmatic protocol that maps the performance, communication and interaction of people within space and time.

Blueprints of adaptable and flexible architecture open moments of negotiation, through which changes to the material fabric is predetermined and can be executed on a singular or repeated basis. Yet in this habit of timing space, ordering precedes production, the coming into being through matter, movement and extension. While space thus becomes amenable to daily life, and is actualized through individual reconfiguring, context and content; the architectural envelope and its instrumentality of inhabitation remain permanently bound, thus exclude latency, an unforeseen performance of space and time.

The Duration of Relocation and Nomad Mobility

When the architectural fabric is relocated, it demonstrates a different engagement with habitual 'time' as durational considerations previously explained. Blueprints that generate architectural systems habituate relationships between material structure and context differently, that is, they become permanent once assembled, or remain consistent while being relocated, such as typologies of portable or mobile buildings. Jennifer Siegal notes in *Mobile - The Art of Portable Building* (2002) that these generic types are designed for resituating of non-permanent geographical bases, they are an equivalent of stable forms.[33] They produce stability under negotiation of changing environments and circumstances. Reiser + Umemoto refer to this mode of lifestyle as the pursuit of static conditions:

> The surfer stays in the same place (summer) by moving in sequence with climatic progression…similiarly, the nomad on the steppes stays still relative to the greening of the landscape, by moving at the speed of annual climatic fluctuation they are riding on a green wave.[34]

In addressing this need, nomadic architecture types such as mobile and transportable systems consider duration as object continuity for a specific programme, which thus provides the means of

continuation in a territory that is foreign or adverse. While contexts change, either the permanence of spaces remain, or a habituated way of using, reconstructing or relocating them develops each time. The way in which relationships to context are established differentiates the 'nomad' habit as transportable, prefabricated or mobile architecture. Relocatable architectural environments are informed by internal necessity, standardisation, mass-production, or prefabrication,[35] as Robert Kronenburg notes in *Houses in Motion* (1995) and *Transportable Environments* (1998).[36] Depending on their architectural fabric and blueprint of construction, two general classifications can be divided into a first group of prefabricated and demountable number of parts systems, and a second group of portable or mobile capsules.

The first group includes module or flat-pack, prefabricated systems made from components or 'kits of tool-parts', in which components are to a degree exchangeable with each other, demountable and portable. Tensile, pneumatic or combined systems equally form shelter through a lightweight skin or cladding, and a supporting transportable and demountable structure. These prefabricated systems can potentially be rearranged in a different manner when situated in a different context, yet they are firmly bound to their original blueprint. Prefabricated systems are permanent because their habit and system of construction are permanent. In contrast, latency might suggest an unfinishedness or adaptability of system parts.

The second group of portable or mobile architectures are equally relocatable, but non-negotiable. They deploy rigid shapes derived from strict functional requirements that control self-sufficiency in remote locations: pods, capsules, or caravans (fig 11). Mobile architecture carries its context within, because, as Rudolf Arnheim notes, it is "designed to suit adequately all situations and with no distinctive appropriateness".[37] Yet in contrast to prefabricated architectures discussed previously, the minimal surfaces of mobile architecture precast possible exterior or contextual forces (such as climate, currents, or wind) in which they arrive. Mobile architecture is characterised by a disconnection, a machine that neutralises by a definite threshold between specialised content and foreign context, exteriority and interiority.

fig 11: Mobile architecture that is relocatable but not changeable can be designed as caravans or containers (such as Jennifer Siegal, 2001), or capsules such as the 'Living Pod' (1965) by David Greene.

While these mobile architectural machines counteract spatial latency through their specificity of structure, other machines that offer modes of operation for nomadic mobility become more latent through their structural and experiential ambiguity. The 'Cushicle' (1966) is a piece of mobile architecture that interpolates body extension and architectural environment. In this prosthetic inflatable capsule, the body merges in movement with the toolset of what becomes a temporal

space when unfolded. This prosthetic extension is durational due to its object stages (fig 12). It is also latent because while offering an altered perception of territory, it further accesses virtual realms by the communication media (TV) it distributes.
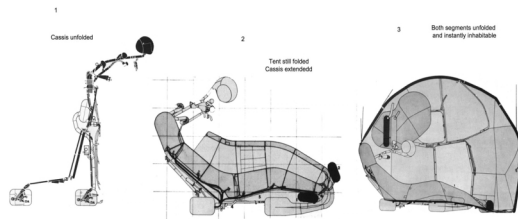

fig 12: A different mode of 'nomad' architecture is suggested by Mike Webb's 'Cushicle' (1966), which becomes a spatial prosthesis through possibilities of unfolding, inflating and media equipment.

Mobile systems do not anticipate changes of formation within the architectural object. On the contrary, when contexts change, it is the inserted architecture that remains as it was originally intended to be. Yet one might argue that a relocation of the mobile object initiates a contextual actualisation as a by-product. Arnheim reports that a change of place always affects the permanence of an object, for "when an object changes context, it changes character".[38] In that sense, a displacement (an unforeseen context) or a deprogramming (abandoning function) would reflect a crisis to the architectural object that opens the latency of its blueprint. When the function the object is shaped for is abandoned, a new or different program needs to be found for or interpreted into the object, within its material specification, and then can be actualised (used) in an unforeseen manner, or relocated in an adversary context.

Blueprints of mobile or prefabricated systems thus formulate duration through the determinacy of their coordinated blueprint, and through their coherence to programmatic function. The latency these systems enable can be argued to be immaterial, organisational and programmatic, arising from a contrast to purpose and context.

From Coordinated Blueprints to Digits

Formulating blueprints for duration through latent formations depends on an understanding of time not considered as subordinate to space, but of time and space evolving in dependency of each other. While the previous section focused on architecture thinking time and space through habitual (rigid or coordinated) blueprints, this section will address procedures that open a latent potential of architecture through a procedural engagement of time in its blueprint. Architecture can be considered as constructing spatial latency and duration differently when it changes its habits of timing spaces through blueprints; through concepts, media and methods that engage with time when formulating matter and material.

The development of media that are available for a registering of time, duration and latency also informed the way in which these notions can be conceptualised. According to Marshall Mcluhan, it is the nature of a medium that registers but also affects that which it contains. McLuhan argues that each medium forms its own context and content,[39] "the medium is the message".[40]A new medium

first simulates its predecessor, and then generates alternative applications of techniques or machinery, altering the fact through the instrument. According to Deleuze, a code that passes through a medium is inflected by the medium's inherent method and techniques.[41] Thus, any representation ultimately detaches and transforms the relation between concept, form and material fact. Using design models and rotating them through different media are suggested as ways, deriving from the research to date, that enhance an explorative design process and employ representation as research. In conjunction, design model and media rotation investigate the essence of an idea through detailed representations, in different techniques and through hybrid mediation.[42] In that sense, in whatever mode time is mediated by, also informs its formation and behaviour.

The understanding of time developed through media that express characters and behaviour of time as a process or performance. In the context of architecture, representational media that inform its blueprints may be argued to become a springboard for rethinking of duration and latency, and open new approaches to a blueprint. Architectural media that operate through processes rather than along coordinate systems thus produce architectural objects that become the result of procedural thinking instead of style or typology.

EDWARD MUYBRIDGE/ 1887
,MAN IN MOTION'

MARCEL DUCHAMP/ 1912
,WOMAN WALKING DOWN A STAIRCASE'

ETIENNE JULES MAREY
,OSZILLATION OF THE FRONT LIMB OF THE HORSE WALKING'
(REFLECTIVE OPTICAL DISKS)

MAREY
MOTION STUDIES
INSTRUMENT TO ILLUSTRATE THE
FLIGHT OF INSECTS'

WALTER GROPIUS
PHOTOGRAPHIC EYE

DUCHAMP/ 1915-23
'LARGE GLASS' (DELAY)
4D AXIS SYSTEM
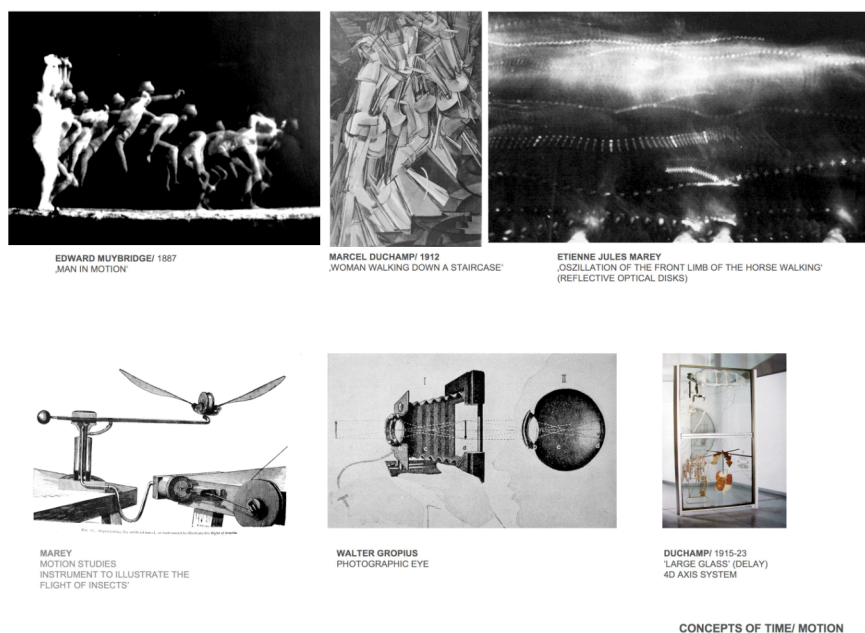
CONCEPTS OF TIME/ MOTION

fig 13: A research diagram of the author that assembles different strategies of media for registering time and movement relationships. Top series: chronophotography of Eadweard Muybridge (1887), Marcel Duchamp's '*Nude Descending A Staircase' (1912),* photography of motion by Étienne-Jules Marey, from 'Study of *Animal Mechanism' (1883)*. Lower series: one apparatus of Marey's motion studies, Walter Gropius's cpomparisons of photographic camera and eye (1943), and Duchamp's 'Large Glass' (1915).

A shifted understanding of time, as that which unfolds, changed radically from a traditional deterministic view of the world with the introduction of media such as photography and film (fig 13). Between these two, time is addressed in very different manner. Photography opens the representation and re-creation of reality as perceived by what is in principle a reconstruction of the human eye.[43] The photographic medium depicts fragmented and isolated moments of a reality thus frozen in time. It is a non-neutral observer,[44] because it is not built to report a continuity of time and

context. Time is considered differently in modifications of representational media towards a capability of depicting a continuity of time, such as the medium film that developed out of animated or chronophotography. When motion and movement are traced through multiple exposure, duration can be registered as multiple or serial organisation of former singular moments. In turn, these may be available for conceptualisation of the duration, which they mediate. The zoologist Étienne-Jules Marey in *Animal Mechanism* (1883) describes the developing rhythms of animal locomotion by chronophotography.[45] In this research, optical discs attached to the limbs of animals reflected a supporting light source registered on photographic paper by multiple exposures over time. The resulting images, configured by the serial movement sequence of the animal body in space, thus described duration. The scientist Eadweard Muybridge in *Animals in Motion* (1925) similarly used multiple exposures to exploit motion, albeit of the human figure.[46] Muybridge's photographs illustrate sequences of body positions and prototypical gestures, so that not a singular generic movement, but a behavioural pattern linked to a specific body identity is represented (such as a child playing, or two men wrestling). Muybridge thus establishes a visual archive of body durations in motion and movement that has been exported to investigations on motion outside science, to language and art.

Media techniques that describe time and duration further on migrated from their domain of origin, and were adopted by other domains (such as art and literature). In close relationship to the previously discussed concepts of tracing duration in movement, the conceptual artist Marcel Duchamp traced different behavioural potentials of an identity in the painting *Nude Descending A Staircase* (1912). The French writer Anaïs Nin in *A Spy in The House of Love* refers to this work as:

> a multiple exposure of a woman's personality, neatly divided into many layers, walking
> down the stair in unison… a mere outline of a woman, the figure designed as the eye
> could see it, but empty of substance, this substance having evaporated through the
> spaces between each layer of the personality.[47]

Thus captured in duration, the identity of the person is both becoming through, and disguised by, the moving body. In this manner, the foundations are laid for an understanding of time and space as a process of continuous becoming, in which the object body is formulated in a multiplicity of times through which it passes and from which it is configured. When this concept of time is then transferred to the realm of architecture, the architectural body can be equally considered as an entity that is affected by and affects time. This is achieved through the manner in which its media and techniques forecast time, component matter, movement and individuals, and through which architecture then continuously evolves and changes in the process of duration.

In a current cultural context that widely deploys the advanced media of computational and digital techniques, the understanding of time shifts further, from serial representation of duration towards the latent potential of space. A sharp conceptual and historiographic cut needs to be made here due to the manner in which digital technology fostered methods of design that already open a departure from the previously discussed durational effects of blueprints. Instead of pursuing a continuation or transformation of types or styles, advanced technology in current architectural

design can be argued to shift habits of time and space by a systemic delay that amplifies the emergence or evolution of unforeseen design formations both in architectural design and construction. The dynamism and evolution of structures has become part of a contemporary architectural design process that is arguably extended, accelerated and informed by digital tools.

Ali Rahim in *Contemporary Processes* (2000) describes digital techniques as instruments of latency, in the sense that they produce or permit a situation of 'delay':

> [n]ew modes of thought evolve with generative potentials, force fields and conceptual diagrams. Together with the use of high-end computer software packages, they make possible the condition we call 'systemic delay'. By this we mean the temporal interstice of conceptual development between initial idea and its material form.[48]

The preference for a 'systemic delay' thus postpones material, structural, or constructional characteristics. Rahim argues that these considerations would limit potential design solutions through predeterminacy and predictability of relationships between form and concept, similar to being 'precast' or determined by a mould.[49] Rahim argues that, through a systemic delay, flexible yet specific structures can be explored that intertwine heterogeneous ideas without being bound to, or being predicted by, a premature materiality. However, the dissertation argues that on the contrary, a multiplicity of heterogeneous ideas arises first from the conjunction of concepts and materials, and secondly from a materiality capable of duration.

One might argue that computational software for design, digital construction techniques and electronic and digital facilities have changed the habits of time for architecture. Digital design and production software can now be employed to open a field of architectural latency in the design process. Furthermore, when design data are interfaced with professional data networks, the economy, efficiency, and production knowledge between the architectural concept and its physical coming into being are significantly enhanced.[50] Digital technology can be roughly categorised according to the way they shift design and material in and out of time and timing in design, construction and operation. The 'digitizing' of architecture replaces traditional lines of a blueprint. Digital processes employ computer technology predominantly in the design process as a representational device (CAD, Computer Aided Design). Digital processes employ computer technology further in the construction process to produce parts of the future architecture (CAC, Computer Aided Construction and CAM, Computer Aided Manufacturing). Other digital approaches monitor a data base to which diverse building professions contribute (engineers, architects, finance: BIM, Building Information Management). Architecture deploys digital appliances as secondary material such as sensor technology for building surveillance or communication. Finally, interactive installation architectures are temporarily inserted into stable architectural spaces. While all the aforementioned contemporary architectures deploy digital techniques, or processes, thus enabling a stronger engagement of latency in architecture; they enact this to different extent, as will be discussed.

The Latency of Emergence

Architecture in a digital realm focuses on design organisations that respond as alternating forms to complex calculations. Digital design simulates life processes in order to develop architectural formations, based on models and concepts derived from fields within the sciences, such as mathematics, physics, biology, bionics and genetics. Principles are translated as mathematical calculations, which produce genetic algorithms, parametric distortions and topological objects.[51] Phenomena such as particle streams, and wind tunnels or growth studies deliver principles and universal laws used to give impulses to new formations in architecture. Specifically, emergence is a contemporary area of architectural design and theory that aligns with with morphology, behavioural science and complexity theory, amongst others.

In systems theory, emergence refers to the way complex systems and patterns arise out of a multiplicity of relatively simple interactions. Latency of formation is considered by emergence not as a process of causal sequences, but as a formation of matter that is becoming or emergent. Constituent parts are interrelated and simultaneously affect — and are affected by — each other in a chaotic and non-linear fashion as they develop through time. Michael Weinstock and Michael Hensel of the *Emergence and Design Group* refer to "'emergent' as that which is produced by multiple causes but which cannot be said to be the sum of their individual effects".[52] An emergent behaviour or property can appear when a number of simple entities (or agents) operate in an environment, forming more complex behaviours as a collective. Weinstock notes:

> In emergent systems, the feedback loops, from pattern to form and from form to pattern, construct a mathematical model of morphogenesis as a dynamic process from which form emerges. [53]

The complex behaviour or properties are not a property of a single entity, nor can they easily be predicted or deduced from behaviour in the lower-level entities: they are irreducible. Emergent structures are more than the sum of their parts because the emergent order will not arise if the various parts are simply coexisting; the interaction of these parts is central. Emergence depends on intricate causal relations and originates through complex feedback in systems with emergent properties, through processes of differentiated patterns, or growth (movement of flocks of birds, or school of fish). Yet limitations of emergence arise when this strategy is merely deployed in a digital/virtual realm within the design process, without taking into account formations driven by material traits in the boundaries of real-time operations.

Strategies of emergence in architectural design offer a capacity for limitless variations of formation that emerge through manipulating singular parameters. In that manner, the digital realm allows for an area of repeated experimentation through program conditioning of virtual environments – before verification or actualisation. Digital formations can be argued to address duration through evolutions of form generated by impact of forces or context. After a process of producing design options, finally one shape is chosen and then enters a process of fabrication. Design processes that privilege computational, geometrical, technical, material aspects, or represent biomorphic

processes, may be considered as abstract. In a prioritisation of their formal language, these approaches dismiss aspects of material, detail, structure, considered devoid of operative depth, complex material intersections or ambient effects.

The Duration of Digital Prefabrication

In order to overcome limitations of digital processes, contemporary approaches have taken advantage of CAD further and linked data sets to production techniques that firstly materialise representations of design, and secondly transfer design directly into production (fig 15). This is advanced by computer technologies that transfer the design to fabrication, in which data are translated into a signalling code that informs machinery. In a sense, the blueprint shifts here from the coordinated lines of a plan to the digits of a production protocol.

These shapes are similar to modernist theory elements of the totality of the architectural object, and in a similar manner, the specificity of rules and element techniques interfaces between the possibility of the object (design) and its actualisation (fabrication). Yet in contrast to the modernist element language, where elements are variable, now elements are refined through persistent parameters that adjust each one to contribute to the overall complex form. Digital media driven methods for architectural production extend the possibilities of design variations to the development of new materials and extended constructional methods, in which time is cut short between shape formations in a digital realm, and their direct translation into production and fabrication. Mills points out that through the advent of enhanced computer technologies, a "hybrid has emerged that bridges the limitations of computer modelling" allowing a combination of analogue and digital modelling techniques.[54] Both rapid prototyping and laser cutting techniques are open for design negotiation. Specifically in CAM, digital and analogue phases are included in a process that continuously shifts between analogue and digital techniques (fig 14).
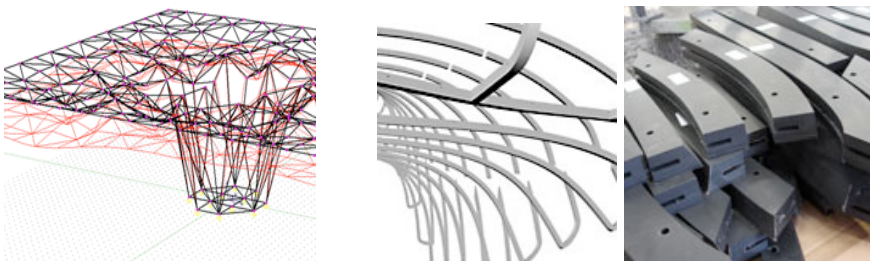

fig 14: Digital codes enhance production. Designtoproduction, CAD and CAM are deployed for the design, analysis, and construction of complex geometries (from left to right: analysis, simplification of digital construction, form parts).

CAM assists the actualisation of architectural production in parts through techniques such as laser-cutting, high pressure water-jet cutting, stereo-lithography, rapid prototyping through computer-controlled lasers and assembly systems such as robotics and positioning systems. Specifically CNC milling enables a fabrication of individual components that are mass-produced, but customised. Fabian Scheurer and Arnold Walz of Designtoproduction describe four realms of interfacing between design and production. The first realm organises design through parametric models for design and manufacturing, the second optimization forms according to constructive,

structural, and functional solutions. The third realm interfaces knowledge of geometry, production, material research for a simplification of both form and technique, and the fourth finally interfaces the collaboration between designers and manufacturers for materialisation.[55] Through interfacing, the blueprint or rather code of the architectural object is opened several times to alternate versions of its becoming. Production is both automated and individualised, the efforts of planning and logistics are more intense, and effectively reverse traditional design processes. This blurs the boundaries between phases of design and construction: through the use of software tools that allow the exploration of non-standard geometries, and a precise realisation of complex shapes.

Yet while in such a manner complex and unforeseen forms become available for architectural design, they might at best produce an effect of polyvalence that bears similiarities to predomestic spaces, thus becoming subject to cultural interpretation. Yet one might argue that while matter is formed/cut/produced, a materiality of duration is not necessarily informed by those techniques. Thus it is not limited, unless a logic of latency is considered within the process of shaping that material, and which therefore could unfold after production. While this interfacing of techniques allows design and production to merge, despite the complex shape that is the result of these processes of becoming; the object's becoming nevertheless terminates with its construction. It is the contention of the dissertation that architectural latency, when remaining in a digital (virtual) realm of these first two object phases, fails to incorporate a duration of inhabituation, and thus excludes phenomenological, cultural, or perceptual aspects.

The Latency of Interfacing Multiple Times

Digital technologies can further be deployed to the extend that rather than enhancing processes that define the architectural object, they also enhance capacities of performances, and thus affect experiential rather than habitual relationships between time and space. Digital or electronic equipment enables mediation in architecture, through the implementation of information screens, or interaction with datascapes. These interfaces, information screens depend on relationships between a surface, and information that is carried within. Architectural objects that deploy information surfaces with sequences can be argued to construct a depth that is both spatial and durational. Architecture then can be considered a hybrid in which parts continue to alter, change or become in an immaterial, ephemeral manner.

Contemporary architecture already applies electronics and telecommunications to produce an individually controllable comfort zone (temperature, news, light conditions, surveillance). Yet digital or electronic equipment that enters an architectural context without an accompanying concept or interactive intent, does so often on the basis of subservience, not enhancing an individual experience. These appliances are often secondary to the architectural organisation, a dependent surface attached to the architecture, through which relationships between time and space are not reorganised. In contrast to this approach, Mark C. Taylor suggests in '*Surface Consciousness*', a different understanding of surface interfaces:

When depth becomes transparent, it is surface. When the inner space becomes transparent, it becomes the outside. Is this surface still a membrane or does it rather become an interface? An interface carries information processes not only between the interior and exterior, the body and the world, rather between the material and the immaterial. […] transparency, which becomes translucent, a surface, which becomes the interface and an interface that constitutes an information process. Within this lies the depth of skin.[56]

Properties of material transparency in surfaces blur the boundaries between different areas of a physical world. In the same manner, information surfaces blur former separations between actual and virtual worlds; they open different plateaus of time. One can argue that digital surfaces are hinges to dimensions of other realities through media screens, contextual data, stored memories, information networks and thus temporally expand the realities and possibilities of the real.

Contemporary architecture increasingly suggests hybrid architectural surfaces that are both a spatial boundary and a medium of context. A departure from the blueprint occurs here as an immaterial shift, a trickle on the surface of the screen (or mind). This interfacing behaviour of surfaces, the mediating of a continued becoming of space depends on the surfaces' ability to perform in process, to behave and interact. Nicholas Negroponte in *Soft Architecture Machines* (1975) describes these as 'operational and informational' responses of architecture systems.[57] In Herzog and De Meuron's 'Kramlich Residence' (1997), information surfaces introduce an interface that enforces a shapeshifting of the blueprint.[58] Projected on curvilinear walls, a collection of video art intertwines domestic life with critical, individualistic or aesthetically dominated interpretations of the world (fig 15). The blueprint of duration thus changes twice, in the duration of inhabitation of its users, and through polyperspective, multiple visions, shifting angles of the stories told. Many times and durations are enfolded here, the narratives delivered by movie sequences, the object-time of projections, and the perception-time of individual observers.

fig 15: Herzog& DeMeuron, 'Kramlich Residence' (1997)   fig 16: Hariri and Hariri, 'Digital House' (1998)

In the 1970, the interactive artist Myron Krueger developed a concept of "responsive environments", in which the audience could use full body gestures to interact with an array of spatially projected digital media. Krueger conceptualises human 'response' to an external signal as a "new art medium based on real-time interaction between men and machines".[59] In other words, the human response to animated media and vice versa thus is understood as an integral material to the performance, and with that, to space-time formations. Similiarly, the sound artist David Rokeby argues that the content of the artwork lies in the interaction itself over any physical or

symbolic representation, by a 'construction of experience'.[60] In this manner, the specific nature of the experience is critical because rather than formulating space or time, experience is formulated.

In Hariri and Hariri's 'Digital House' (1998),[61] a super-sized display monitor shows a smiling digital chef offering helpful instructions to a 'mistress' in a highly polished kitchen (fig 16). Not restricted by spatial limitations, the former glass surface reveals its methodological capacities to interact with a person, scheduled to provide information and a personal response, offering comfort and advice. Information is not only personalised, but also impersonated. It has a face, behaviour, and a dress code. The digital servant is as much a literal prosthesis and extension of the 'housewife', as he is of the house, a link between the architectural envelope and the individual identity of its owner. Here, a potential of duration is articulated through the performance on and with digits that control the behaviour of matter in space. Interfaces in this manner open a path for duration and latency through interactivity, in which the interaction itself can be considered a design element articulating space through a sensual and tangible experience.[62] Durations of time can be differentiated as those of object times, perception times, processes of habituation paralleled by recorded sequences of life. While the interface is inserted into what seems to operate according to a classical blueprint, the information surface extends the access of its owner to different times and different spaces of a digital world. The interest in interfaces for the present dissertation is thus twofold: latency can be argued to arise through the superimposition of two paralleling times (such as realtime actions interlaced by movie sequences), yet latency can also arise when digital figures (such as the butler) behave unexpectedly.

This section has introduced habits of time in architecture, in which concepts for the blueprint that formulate duration and latency differ critically. These habits produce space-time relationships through: spatial ambiguity of the architectural object; through promenades and shifts in occupation; through relocation and reorganisation of parts within the (architectural) system; through interfacing object stages; and through interactions between agents, humans, or parts (where at least one is animated, thus able to perceive on an individual basis).

In these versions of space-time or time-space, the blueprint shifts from the determined lines of a traditional blueprint towards a blueprint that is continuously informed by its code of production, and further towards a blueprint that instead of formulating an object, engineers the behaviour of an ephemeral or temporal spatial expression. Yet for most of these examples, time is considered subordinate to form, formation and space, or time is controlled, or habitual in the sense that space (and thus time) is predetermined. For the reason that in-built architecture duration remains tightly bound to construction processes, and to sustainability of buildings, a latency of duration necessarily needs to address structural and material aspects. However, as long as the habit of transferring the blueprint towards a stable materiality remains, latency is enclosed within its determined settings.

In contrast, latent formations that open a departure from the blueprint may be considered as an interchange: between space and time, space and inhabitant, matter perceived through movement,

materials organised through performances, and continuously developing processed between real and virtual modes. These latent formations as much express sequential formations in a movement through form as much as they offer a perceptual experience through performance of the individual in an activated response by animated matter. It is the contention of this dissertation that a shift from the blueprint needs to be inscribed in the potential of spatial materiality itself, in order to allow a continued becoming, possibly through a materiality that considers time, response and behaviour of an occupant as part of the architectural scheme. These notions of a materiality of duration are further subject to exploration.

2.4. TOWARDS A MATERIALITY OF DURATION: POLES THAT PRODUCE CHARACTERS

As has been introduced in the initial section of this chapter, Elizabeth Grosz's *'The Future of Space: Toward an Architecture of Invention'* differs significantly from concepts of time-space relationships deployed by architectural design, theory and building practice that have been discussed to this point. While these approaches that engage with architecture follow a coordinated or emergent passage of the blueprint, the dissertation argues that Grosz's essay formulates a theory of spatial latency that opens a departure from the blueprint.[63] Grosz's materiality of duration is not merely bound to architecture's habit of formulating matter, but it entails a challenge to the effects and experience of space, enabling simultaneous or coextensive relations of space and inhabitant; allowing both to unfold in multiple times.

At the outset of '*Future of Space'*, Grosz reintroduces Bergson's continuity of time and space as being inseparable entities, which share properties and characters. The importance of this precondition stems from the fact that when time is continuous, space equally becomes negotiable as that which is not linear, successive, or recurrent. Grosz extends Berson's time properties to describe space as equally "indeterminate, unfolding, serial, multiplying, complex, heterogeneous",[64] thus setting a challenge for architecture: while multiple and repeated formations are available to architecture in singular phases of either design, or construction, or inhabitance, a continuous unfolding through all phases establishes a dilemma. The medium of architecture is by its very nature forced to produce a stasis (object permanence) that counteracts a continued becoming.

Yet this dilemma of architectural stasis, as the research argues, might be overcome by correlating time and space through aspects of matter and performance. In *The Creative Mind: An Introduction to Metaphysics* (1946), Bergson suggests that duration, or the unfolding of time, is similar to a rubber band that stretches over a period of time between two points:

> [I]et us imagine an infinitely small piece of elastic, contracted, if that were possible, to a mathematical point. Let us draw it out gradually in such a way as to bring out of the point a line, which will grow progressively longer. … Let us consider that this action, in spite of its duration, is indivisible if one supposes that it goes on without stopping; that, if we intercalate a stop in it, we make two actions of it instead of one and that each of these actions will then be the indivisible of which we speak.[65]

An expansion of time depends on a fluency and differentiation of matter, and consequently determines how this matter must be shaped in order to be continuously and repeatedly differentiated. In a sense, Bergson's materiality of duration that illustrates the continuous development of time is reversed by Grosz into a duration of materiality that amplifies the continuous becoming of space, as is suggested in 'Future of Space':

> If duration exists in states of contraction and expansion, in degrees of uneven intensity, […] then perhaps space too need not be construed as even, homogeneous, continuous, infinitely the same. Perhaps space also has loci of intensity, of compression or elasticity, perhaps it need no longer be considered a medium. […] The very configuration of space may be heterogeneous, just as movements and configurations of duration vary. Perhaps, in other words, there is a materiality to space itself, rather than a materiality residing only with its contents.[66]

Each of those loci (plural of 'locus'; Latin for space, place) refers to a spatial behaviour that is expressed through a specific materiality by which it performs in time. Duration and latency, as is suggested, are generated by the multiple, or massing of differentiated and specific spatial characteristics; by loci of intensity; loci of compression; or loci of elasticity. Each of those expressions slightly shifts in focus of attention between medium, object, observer and performance. That is to say, depending on the term, different meanings and planes may be associated with the time and space of architecture.

Loci of compression resonate with a plane of mechanical or physical developments, the emergence of process formation, or organisation of architecture. Physical compression is the result of the subjection of a material to compressive stress (or force), resulting in a reduction of volume (or in reverse an expansion through tension). *Loci of compression* may thus be understood as a structural or material compression. Yet on an abstract level, this compression may also be considered as 'compressed' dormant programmes, which unfold into adjacent ambiguous areas, thus refer also to a condition of unfolding activity, an immaterial, temporal expansion of event or performance. *Loci of elasticity* similarly resonate initially with a plane of material performance and may refer to specific behaviours of a texture. Elasticity in general refers to a physical property of a material that, when deformed, returns to its original shape when the force is removed (such as a rubber band and its linear deformation). Yet the term specifically relates inherent material properties to a behaviour in time, that is the materials capacity of duration, in which different stages emerge in a non-linear, unforeseen manner. *Loci of intensity* resonate with a plane of force impact or effect. Intensity describes the degree of a force, as the measure of the time-averaged energy flux that passes through a medium. In a sense, loci of intensity may also refer to ephemeral, temporal phenomena or atmospheres that are perceived as individual movements and experiences registered by a spectator or inhabitant.

Each of these *loci* is characterised by material configurations that deploy a capacity of transition, or transformation, so that space proceeds in intermediate conditions between states, phases, or

ranges.[67] Intensity, compression and elasticity are formations of matter that in contrast to architecture's 'ethic of statics' develop in time through specificity and particularity; and through heterogeneity and indeterminacy.[68] As the dissertation argues, they may lead a path to a different architectural paradigm of time: when deployed as descriptions of material formations or behaviour; as techniques for structural or organisational specifications; as initiatives for experiential effects and sensations – in short, when deployed for concepts of a materiality of latency.

Poles that Produce Characters

In 'Future of Space', Grosz describes spatial characters (*loci of intensity, of compression or elasticity)* that emerge through matter in time. The dissertation argues that in this manner Grosz's theory of spatial latency rests on concepts of diverse materiality. Yet it is important to note here that these concepts are not to be read in a manner applicable to concepts and strategies in relationship to the previously discussed blueprints and habits of architecture. While in those a singular concept defined a singular method of design or production technique and thus resulted in a singular object, the manner in which concepts are conceived of and thought through already mediate the becoming of worlds and times. Grosz adopts Deleuze and Guattari's strategy of concepts that are procedural, because they are not regulative or determined:

> Concepts are points of multiplicity, connections of components, which share 'zones of proximity', borders, with other concepts, marked by irregular contours, an improper or imperfect fit. This is why, although they attain certain cohesion, they cannot align to form systems. … Concepts are centres of vibrations, each in itself and every one in relation to all others. This is why they all resonate rather than cohere or correspond with each other.[69]

Relationships between these poles shift, as much as the poles themselves oscillate between one meaning and function or another, forming concepts for duration. The relationships between these poles, potential formations and intersections then ultimately define the materiality of duration. An extended map of interconnections and relationships can be argued to establish 'rules' or scenarios for duration. For the purpose of the dissertation, these concepts are described as 'poles'. The term 'poles' is chosen in order to connect to duration and latency that also exist in ranges or stages. It is suggested that these 'poles' can be thought of as similar to magnetic poles, between which not matter but meanings and associations shift, accumulate and temporarily form, and which loosely associate with each other and regroup in the next instance (fig 17).
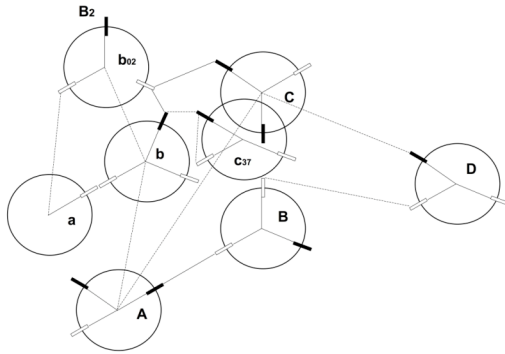
fig 17: author's diagram of the regrouping relationship between poles that formulate 'centers of attention', and which shift in meaning and appropriation depending on the domain in which they are discussed or deployed (such as 'body' relating to body movement, self, body margins, or the architectural body).

The research argues that a theory of spatial latency includes as much a complex becoming in the design process, as it requires a potential of 'becoming-other' with post-productional changes that develop through a shift between poles or strange attractors. When *loci of intensity, of compression or elasticity* are understood as expressions and concepts of a materiality of duration, they can be considered as the result of relationships between other notions involved in duration. Each of those notions further resonates with other realms and understandings: time (duration and formation), space (surface and shape), body (perception, individual and movement arc), and materiality (matter and media).

The virtuality of a blueprint explored and defined in design offers a latency of formations that are 'preformed' by conditions and contexts. A latent formation of architecture understands architecture as coded for process and performance: when actualised or differentiated in a specific form and matter, the object (that of space or clothing item) comes into being. The object is can be perceived and experienced in duration (by inhabitant or consumer), in which it continues to become through individual identity, movement and adaptation. When changed in a manner not foreseen by the original design intention, an immaterial latency (of programme shift) arises. A latent formation that continues to become through a force of impact (of matter being continuously formed or information processed) requires a materiality that foresees ranges or phases of becoming. This processing of architecture then initiates changes to the individual and its experience of the world. In other words, a blueprint that is determined allows duration in the sense of interpretation, yet a departure from the blueprint allows a latency of behaviour or performance of the object matter, in interruptions and ruptures, with openings and unforeseen occurrences through codes and concepts that behave in their expression of materiality.

A theory of spatial latency*, as the research argues, responds through the materiality of *loci of intensity, of compression or elasticity* to a change of cultural context, related to user adaptation and individual perceptual experience of spatial shift. A responsive behaviour and a potential reorganisation may allow a departure from a blueprint. Such a materiality of duration and latency fosters an un-programmed, individual spatial interaction through the surface programming, structure, material and detail. It is thus appropriate for a rethinking of architecture, that is a new

spatial paradigm. When rethinking durational, intense, qualitative, differentiated and discontinuous notions, concepts and effects of poles equally need to proceed through different contextual planes (of theory, of design, of adaptation). The path that the dissertation takes to explore these poles and their latent relationships thus refers as much to a mode of reflection as to a 'mode of production'.[70] Strategies of formulating poles and their relationships through matter, and the way in which that formation of matter maintains capacities of interaction, thus requires an integration of both theoretical or conceptual, and design reflections. The research suggests that the concepts by which the named poles and their respective interrelations can thus be extended and transferred to other areas (of theory or design), can equally amplify duration. That is to say, instead of considering poles and concepts as firmly bound to the discipline in which they are thought in and for, shifting poles of time, space, body, individual and movement back and forth between disciplines opens passages of thinking through their latencies. In this manner, Grosz's theory of a spatial complexity may thus be deployed for a strategic discourse, and for a design methodology of latent architecture, as is the central focus of this dissertation.

2.5. CONCLUSION

In this chapter, the dissertation has argued that traditional and contemporary habits of duration in architecture prompt a conceptualisation of homogeneous space, limited change or predetermined solutions. The chapter has explored a framework for the consideration of durational characteristics and given a background for a focus on latent formations of architecture. The chapter has further differentiated strategies of change, chance, dynamic and latent structures. These strategies use different relationships between time, space and matter that range from: traditional (and habitual) concepts of stable, mobile and flexible solutions; to contemporary approaches of emergence, performative architecture, digital and electronic technologies, and interactive installation art. As has been discussed, these approaches to latency and duration are limited, because they have a habit of subordinating or instrumentalising time to space. When variation is inscribed into the constructed space without aspects of latency, it induces conformity, because it allows only a series of predetermined alternatives, rather than responsiveness to unforeseen contingencies. Duration thus remains a secondary functional specification to the volume of space. Additionally, a number of aspects have been traced in these approaches that can be considered partially effective for duration in architecture, and will thus be reintroduced and discussed later.

Because contemporary approaches are limited, the dissertation has explored an alternative approach to a theory of spatial complexity that originates in contemporary philosophy: 'The Future of Space: Toward an Architecture of Invention' by Grosz. Grosz's essay offers an understanding of duration and latency that has a potential to allow architecture to address change through spatial complexity. It can therefore be considered a strategic argument for a durational architecture. Specifically, Grosz's concept of a materiality of duration through differentiations of *loci of intensity, of compression or elasticity* can support an unfolding of unforeseen contingencies. Grosz's 'Future of Space' suggests that durational or latent capacities of space unfold through a materiality of

latency. This materiality results from relationships between poles: Time (Duration and Formation); Space (Surface and Shape); Perception (Body, Individual and Movement Arc) and Materiality (Matter and Media). These are poles and contextual planes described by Grosz, which are expressed as specific *loci* of space. It is thus an approach of specific material techniques, and their effects, that must be considered momentous for an architecture of duration.

The following Chapter 04 will explore the way in which Grosz's *loci of intensity, of compression or elasticity* relate to material articulations of latent formations. In order to compare and explore notions of latency, the dissertation thus transfers the previous mapping of poles towards the context of sartorial fashion. When concepts are translated into a different domain (such as science to art or fashion to architecture), differences emerge in thinking, strategies, methods and techniques. Crossing and intersecting between differences of origin and destination realms may be argued to produce certain gaps, slippages and apertures that inform concepts and procedures in both. In that line, the following chapter will explore intersections between the domains of philosophy and fashion. It explores design techniques that when associated with expressions of Grosz's considerations further differentiate corporeal and perceptual effects. This is performed in search of a methodology that amplifies duration and latency through specific aspects of structure, materiality and individual response, in order to prepare for a second intersection, that of fashion and architecture, which follows at a later stage.

Notes

[1] Elizabeth Grosz, 'The Future of Space: Toward an Architecture of Invention', in: *Architecture from the Outside, Essays on Virtual and Real Space* (Cambridge, MA: MIT, Writing Architecture Series: 2001), 109-130.

[2] Greg Lynn, *Animate Form (*New York: Princeton Architectural Press, 1999), 9-43.

[3] Marc Auge, *Non-Places: Introduction to an Anthropology of Supermodernity* (London: Verso, 1995), 35.

[4] Grosz, 'Future of Space',127.

[5] Janet Folina, *Poincare and the Philosophy of Mathematics* (New York: Macmillan, 1992).

[6] Henri Bergson, *Time and Free Will: An Essay on the Immediate Data of Consciousness*, trans. F. L. Pogson (London: Allen and Unwin, 1910), 149.

[7] Gilles Deleuze, *The Fold: Leibniz and the Baroque,* transl. Tom Conley (Minneapolis, MN: University of Minnesota Press, 1993).

[8] Claire Colebrook, "Movement – Image And Time," in: *Understanding Deleuze* (Sydney: Allen and Unwin, 2002), 40-55.

[9] Ibid., 1.

[10] "The possible, or at least one of them, is a preformed real: the real is simply the coming into material form of this nonmaterial possible." Grosz, 'The Future of Space', 129.

[11] Colebrook, *Understanding Deleuze*, 154.

[12] See Henri Bergson, Matter and Memory, trans. Nancy Margaret Paul and W. Scott Palmer (New York: Zone Books, 1988).

[13] Grosz, 'The Future of Space', 115.

[14] Ibid., 119-120.

[15] Ibid., 115.

[16] Ibid., 117.

[17] Grosz, 'Cyberspace, Virtuality, and the Real', 89.

[18] Elizabeth Grosz, 'Cyberspace, Virtuality, and the Real', in: *Architecture from the Outside: Essays on Virtual and Real Space* (Cambridge, MA: MIT, Writing Architecture Series, 2001), 86.

[19] Ibid., 130.

[20] Rudolph Arnheim, *The Dynamics of Architectural Form* (Berkeley: California Press, 1977), 148.

[21] Witold Rybczynski, *Home: A Short History of an Idea* (New York: Viking Penguin, 1986).

[22] Hertzberger, *Lessons,* 149.

[23] As described by a publication of lectures at Delft University, Netherlands, 1973. Hermann Hertzberger, *Lessons For Students In Architecture* (Rotterdam: Uitgeverij 010, 1991), 146-149.

[24] Le Corbusier, *Towards a New Architecture*, transl. Frederick Etchells (New York: Dover Publications, 1986, originally published: London: J. Rodker, 1931).

[25] *Les 5 Points d' Une Architecture Nouvelle/ Five Points in Towards A New Architecture*: Le Corbusier, Pierre Jeanneret. Originally published in Almanach de l'Architecture Moderne, Paris 1923.

[26] According to Soriano, "[T]he plan libre in the Corbusian sense … basically proposed a disintegration of the traditional construction system… enclosure and structure, indissolubly united in the bearer wall, made up the definition of space [boundary]. The object was constructed from the volume, where a solidly understood thick elevation moulded a void… when Corbusier announced the separation…, [he indicated] the replacement of a massive wall with the optimised sum of specialised layers." Federico Soriano, *Towards the Definition of the Deep Plan, the Anamorphic Plan and the Fluctuating Plan* (Madrid: El Croquis 81/86, 1996), 4-5.

[27] Le Corbusier, *Towards a New Architecture*, 46-49.

[28] Aspects of interfaces, superimpositions and transparencies have been discussed by the author in a paper: Reinhardt, Dagmar. "(Un)Limited Privacy-(Un)Limited Identity: On The Border Of 4-dimensional Space: Domesticity, Information Screens, Digital Work Surfaces And Representation," Sahanz XXI/Limits, 2004, Melbourne, Australia, (eds.) Harriet Edquist and Helene Frichot, Sahanz Conference Proceedings(Melbourne: RMIT and Routledge Taylor Francis), 406-412.

[29] Soriano states that "[Le Corbusier] introduced the concept of the architectural promenade – a fixed, single - file itinerary that would link the spaces in a narrative manner." Soriano also describes the implications of the plan libre as a device for a continuous, not fluid space. Soriano, *Towards the Definition of the Deep Plan,* 7.

[30] Avi Friedmann, *The Adaptable House* (New York: Mcgraw Hill, 2002), 12.

[31] The dimensions of traditional Tatami mats can vary from district to district, but the contemporary 'standard' size is usually taken as 1.80 x 0.90, or 6:3 foot. These measurements define a spatial operation through the modules: two mat ends equate in size to the long side of a third mat, generating a pattern that in turn defines the overall size of each room. Tetsuro Yoshida, *Das Japanische Wohnhaus* (Tübingen: Verlag Ernst Wasmuth, 1954).

[32] Walter Blaser, *Struktur Und Gestalt In Japan - Structure And Form In Japan* (Stuttgart: Verlag für Architektur, 1963), 77.

[33] Jennifer Siegal, *Mobile: The Art of Portable Architecture* (New York, Princeton Arch Press, 2002).

[34] Jesse Reiser, *Reiser + Umemoto: Atlas Of Novel Tectonics* (New York: Princeton Architectural Press, 2006).

[35] Robert Kronenburg, *Transportable Environments-Theory, Context, Design and Technology* (London: E&FN Spon, 1998). See also: Jennifer Siegal, *Mobile: The Art of Portable Architecture* (New York: Princeton Arch Press, 2002).

[36] Robert Kronenburg, *Houses In Motion: The Genesis, History And Development of The Portable Building* (London: Academy Editions, 1995).

[37] Rudolf Arnheim, *Dynamics of Architectural Form* (Berkeley: California Press, 1977), 145.

[38] Ibid., 146.

[39] Marshall McLuhan, *The Medium Is The Massage* (London: Penguin, 1967).

40 Marshall McLuhan, Understanding Media (London: Routledge, 1964).

[41] Gilles Deleuze, *Francis Bacon: The Logic of Sensation* (London: Athlone, 1990), 113.

[42] The author discussed the concept of media rotation, and additional design models grouped in a typology, in the following essay. Dagmar Reinhardt, "Representation as Research: Design Model And Media Rotation", RIBA Journal of Architecture, ed. Hilde Heynen (Vol.13, April 2008): 185-201.

[43] This similiarity is discussed by Gropius in his essays Walter Gropius, *Is There A Science Of Design? Scope Of Total Architecture (*New York: Harper, 1943), 26.

[44] In order to further discuss the differences between representation and manipulation of reality through the potential of the camera as a reflective surface, a non-neutral observer. Colomina offers this traditional definition for photography: 'a

transparent presentation of a real scene'. Beatriz Colomina, "*Photography- The Mechanical Eye," in: Publicity And Privacy: Architecture And Mass Media (*Cambridge, MA: MIT Press, 1994), 57.

[45] Étienne-Jules Marey, *Animal Mechanism- A Treatise On Terrestrial And Aerial Locomotion* (London: Kegan Paul Trench & Co, 1883).

[46] Eadweard Muybridge, *Animals In Motion* (London: Chapman & Hall, 1925) and Robert Haas, *Muybridge – Man In Motion (*Berkeley: University California Press, 1976).

[47] "For the first time…she understood Duchamp's painting of a nude descending a staircase, eight or ten outlines of the same woman, like a multiple exposure of a woman's personality, neatly divided into many layers, walking down the stair in unison…If she went to Alan now it would be like detaching one of these cut-outs of a woman, and forcing it to walk separately from the rest, but once detached from the unison, it would reveal that it was a mere outline of a woman, the figure designed as the eye could see it, but empty of substance, this substance having evaporated through the spaces between each layer of the personality." Anais Nin, *A Spy In The House Of Love (*London: Penguin, 1954).

[48] Ali Rahim, *Bound Inspiration for Architectural Innovation: Contemporary Processes in Architecture,* (London: Wiley Academy, 2000), 6.

[49] Ibid., *7.*

[50] Branko Kolarevic, *Architecture in the Digital Age: Design and Manufacturing* (New York: Spon Press, 2003).

[51] Digital design has developed its own phrasing, nd appropriated descriptions together with concepts from science, biology, mathematics, philosophy: topology, parametric design, morphogenetics, emergence, rhizomatic processes, chronomorphology, emergence, open source, open organisational structures, genotype-phenotype categories, hypergrid, complex active systems, deep planning, effect-affect dependencies, temporary autonomous zones, strata.

[52] Emergence and Design Group (Emtech), Architectural Association, http://www.aaschool.ac.uk/Default.aspx?section=school&page=emtech%20MSc/March (accessed February 12, 2009).

[53] Michael Weinstock, *Morphogenesis and The Mathematics of Emergence* (London: Wiley Academy, AD Architectural Design, 2004), 15.

[54] Thomas Kvan and Ruffina Thilakaratne, "Models In The Design Conversation: Architecture vs Engineering," *Design+Research* (Melbourne: AASA, Second International Conference of the Association of Architecture Schools of Australasia, 2003).

[55] Quotes and Summary of website: Designtoproduction, http://www.designtoproduction.com/ (accessed March 30, 2009).

[56] Marc C. Taylor, *Surface Consciousness/ "Ueberlegungen Zur Haut"* 129/130 Arch+, pp 85-87Symposion Discussion/ Columbia University 1995/ Exhibition 'Light Construction'/ MoMA [original source in German, quoted in translation]

[57] Nicholas Negroponte, *Soft Architecture Machines* (Cambridge, MA: MIT Press 1975),144.

[58] Fernando Marquez Cecilia and Richard Levene, *Herzog and De Meuron, 1981-2000 (Madrid: El Croquis 60+84, 2000).*

[59] Myron Krueger, "Responsive Environments", in: Randal Packer and Ken Jordan (eds.), *Multimedia, Multimedia: From Wagner to Virtual Reality* (New York: Norton, 2001), 104-120.

[60] David Rokeby, "The Construction of Experience", in: Clark Dodsworth (ed.), *Digital Illusion: Entertaining the Future with High Technology* (New York: ACM Press, 1998).

[61] Hariri and Hariri's Digital House was part of Terence Riley's exhibitio at Moma: Unprvate House. See also: http://www.moma.org/interactives/exhibitions/1999/un-privatehouse/Project_05.html (accessed March 30, 2009).

[62] The potential of interactivity has been discussed by the author in relation to an installation work ('*Trivet Fields'*, 2006), and through a paper in collaboration. Joanne Jakovich and Dagmar Reinhardt, "Trivet Fields – The Materiality of Interaction in Architectural Space", Paper (Leonardo, forthcoming). The installaton has also been partially presented in: Joanne Jakovich and Dagmar Reinhardt, "Sonictecture – Esthetic spatial conditioning through sound, computation and interaction", CC2007 Creativity and Cognition Conference (Washington, DC June 13–15, 2007).

[63] Grosz, 'The Future of Space', 109-130.

[64] Ibid., 57-73.

[65] Henri Bergson, *The Creative Mind: An Introduction to Metaphysics* (New York: Wisdom Library, 1946), 164 -165.

[66] Ibid., 127-128.

[67] Grosz, 'The Future of Space', 119.

[68] Grosz, "Deleuze and Space", Lecture held at Sydney University, lecture notes received as mail correspondence of author (September 10, 2003).

[69] Elizabeth Grosz, e-mail message to author (September 10, 2003). E-mail contained lecture notes of Elisabeth Grosz, 'Deleuze and Space', Lecture held at Sydney University (2003).