



Where Melodies Meet

Theories of Architectural Order in Visual Perception

A Master Thesis

presented by

Simon Myklebust Sivertsen

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Abstract

This thesis investigates principal terms that are pertinent specifically to the visual character of architecture. In common terminology such as *order*, *complexity*, *variation*, *monotony*, and *contrast*. By surveying recent public debates it is deduced that both laymen and professionals lack the sufficient language to establish common ground. By a doctor-patient metaphor it follows that no remedy can be found unless the issues are more precisely defined and diagnosed.

The theoretical foundations of the work starts off with Nikos Salingaros who writes of the raw material of visual perception, which is the information found in what he refers to as the information field. Ernst Gombrich illustrates this information as being not merely seen, but also *read*. He argues that visual perception by biological evolution constitutes a feedback loop where the brain constantly tests hypotheses against accumulated experience.

Eline Van Geert and Johan Wagemans defines the elementary terms of *order* and *complexity*, and show that it would be imprecise to consider them simply as two extremities on the same scale. They demonstrate a more accurate stance with the two differing scales of *complexity-simplicity* and *order-disorder*.

Variation is generally used to refer to any subject's "change in level", but here Eduardo Lozano provides a more productive definition in the context of visual perception. He defines the essence of *variation* as describing unequal aspects of an environment, but only if they share similarities that connects them in a distinct typology.

In developing these theories the dichotomy *nature as disorder vs. man-made as order* is challenged. It is hypothesised that visually, this condition rests on the assumption that in architecture rhythmical repetition have to be completely regular. This thesis argues that mere similarity also constitutes rhythm, and thereby also order.

Significantly, this thesis emphasis contrast and variation as two distinct mechanisms. *Monotony* represents absolute regularity, while variation portrays surprising alteration of established types. Contrast, finally, breaks with this type by being assuredly unpredictable.

The thesis further suggests implementing the term *dominant order*, which signals a hierarchy where one or more orders visually dominate any built environment. *Urban visual melody* refers to environment of coherence that have both rhythm and variation, and is unbroken by dominant contrast.

Contemporary architecture regularly looms as islands of contrast. In a paradigm where variation equals "that which is different" it is hard to see how coherent visual melodies, with rhythm and variation, can originate. Therefore, whenever someone appeals for variation, as medicine for monotony, they should keep in mind that variation requires the rhythm of repetition.

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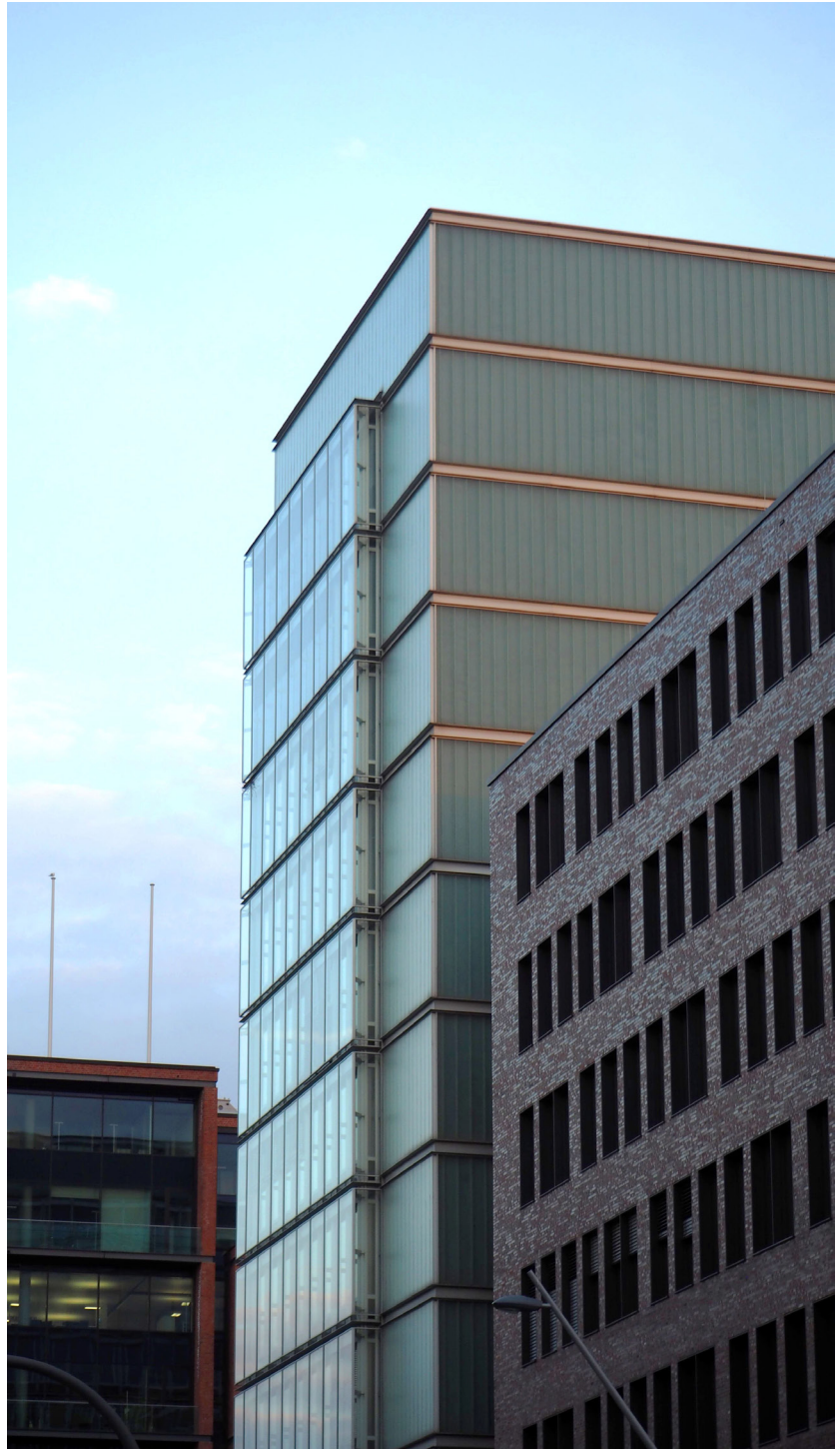
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PART I
Chapter 1

Introduction



Contemporary architecture in HafenCity, Hamburg.

Photo: S. M. Sivertsen

1.1 Introduction

This thesis will investigate principal terms that are pertinent to the visual character of architecture. Terminology such as *order*, *complexity*, *variation*, *monotony*, and *contrast*. The work endeavours to rediscover the essence of these terms, and examine how they could be applied in the development of the language in which architecture is expressed. Ideally, the outcome will be a reinforced bridge between spoken and written language, and the language of architecture as built form.

The opening hypothesis is thus, that existing theories could offer the language required to discuss the visual character of architecture both more widely, and more *precisely*. And equally important: on *common ground*. The aim is not to construct absolute statutes that ensures *ideal* compositions, but rather to rediscover and expand the *apparatus of terms* so as to:

- 1) improve the framework for discussions concerning the visual character of the built environment, both among the professional, and the committed citizen.
- 2) provide principles that would increase awareness for the architects, and other involved parties that give form to the built environment, also, with human visual perception consciously in mind.

The first chapter will attempt to explain why such a thesis is needed in the current paradigm of architecture, and conditions of public discourse.

The rest of the chapters in Part I investigates important writings and research that have been done by others in academia. These writings establish the foundations needed to develop the connection written/verbal language versus architecture as built form.

The deductive nature of this thesis – from hypothesis to testing, and back again – has influenced the selection of other writings. In many ways the selection has been a continuous progress throughout the work, in parallel with the deductive route itself. A set number of specific sources established in the beginning would not have supported the “free” process that has shaped the result. Thus, the selection of sources has been forced to keep up with the new questions and observations that has come up in the process.

Much of the selection is found outside the discipline of architecture, and rather in the fields of psychology, art history, urban design, and philosophy. This is partially intentional, in the attempt to rejuvenate rooted perceptiveness, but also incidental to some degree, simply because these sources were found to be closer to the fundamental nature of visual perception. This thesis has partially been motivated by finding a link between fundamental human perception of any environment and that of architecture as “content”. In this context “the built” does not necessarily

have any exceptional position in the visual environment. In other words, experiencing architecture depends on human perception, while perception itself does not require architecture, and is thus more fundamental. The beginning, naturally, is always a good place to start.

Communicating the entire history of architecture's relation to language and reading would have made an already extensive thesis even more so. One of the comments that was made to this thesis was that it emphasises "reading" of architecture, and according to conventional linguistics, information requires that the observer possess a language before information can be interpreted or read. This statement of course, has an inherent logic to it.

Architectural theory often borrows terms from other fields, as a way to make the argumentation understandable, or in fact to be able to make the argument at all. The verb "to read" is certainly valid in the case of studying a painting, and not only something written. Language itself is a far-reaching term, and one should be careful when connecting the language of something written or spoken to closely to whatever language architecture can be said to produce or require. Some might even question the actuality of architecture as language at all, or if it is purely a metaphor, a tool needed to describe or study architecture. Reading architecture is simply not the same as reading a novel or conversing with a friend. Caution might be advised when one draws parallels between one "type" of language to another. This again will have implications on what language means, and what is required before an observer could read architecture as visual information.

Part II starts off with *observations from nature* after the theories have been summarized at the end of Part I. These chapters show how the theories could be developed through illustrative examples found both in nature, and the built environment. The testing of these adjusted theories on contemporary facades will be summarized in the *findings* found in Part III. Finally, the totality of observations will be made into some general advice for the *attentive architect* and the *committed citizen*.

1.2 Turmoil in the Architectural Debate



Contemporary architecture in Stavanger, Norway.
(Photo: S. M. Sivertsen)

In October 2020, member of the Norwegian Parliament, Stefan Heggelund initiated a public debate on architecture in the interview *Why does all contemporary architecture have to look the same?* (Sørgjerd, 2020) His diagnosis as a layman was "...Flat roofs. Grey facades, without any decoration. Straight angles. Windows without framing or rails. Lack of traditional symmetry. Massive mono-functional buildings without any activities on the ground floor. Great, attached balconies". Frustrated, he asks "how did we get here, and why does everything have to be the same? Why can't we have greater diversity in the urban development? Why does everything have to be large glass- and concrete surfaces. Why does everything have to be modernistic... we should dare discuss ugly and beautiful in architecture..." (Sørgjerd, 2020).

Soon after, Heggelund was criticized by developer Selvaag Bolig who claimed that "...taste is subjective...we never build anything we don't find 'pretty'" (Petrém, 2020). Social anthropologist Bengt Andersen reported that local authorities have the power to demand certain aesthetics or qualities, but many find such qualities difficult to *define*. Architect Astri Dalseide supported the idea of a public organ who could provide public guidelines and "signalize what good quality *really* is" (Petrém, 2020).

During the spring of 2021, the debate gained new momentum. This time launched by the group *Arkitektoppørret (the Architecture Rebellion)* who found inspiration in different European initiatives, among them the Swedish *Arkitektupproret*. These organizations tend to construct dichotomies between architecture as styles, between "traditional architecture" and Modernism. The Norwegian social media-rebellion does not yet constitute a professional, united organization. Other than favouring "traditional architecture", it communicates perhaps more of a general sensation, rather than a well-defined programme, which is that "we are not happy with the aesthetics of contemporary urbanism and architecture".

The following quotes are selected from the Norwegian public debate on architecture during the autumn of 2020. Among members of the architecture profession there are differing opinions, but even considering that the rhetorical language is adapted to the general public, it only describes the visual character of architecture in vague terms without much elaboration:

"... there should be *more diversity* in the urban development. More blending of functions and more *varied* architecture. The advancement of residential architecture has had an *industrial character*, which to a certain extent have been *dominated by repetition, poor materials, and poor adaptation to locational conditions...*"

- Architect Lars Haukeland, LPO architects (Petrém, 2020)

The lack of colour and the dominant use of white and grey, is a recurring theme in the architectural debate. Many parties outside of the architectural profession seem to adhere to the idea that a general implementation of an increased quantity of hues, will solve many of the perceived issues of contemporary architecture:

"... during the last 20 years colour has been considered something superficial and uninteresting among architects and developers... a grey carpet has covered most Norwegian cities... The facades are mostly monotonous. Local identities go up in grey, generic smoke.."

-Colour Designer Dagny Thurmann-Moe (Pettrém, 2020)

Some architects simply seem generally hesitant to discuss aesthetics, and the visual character of architecture at any level, particularly when the debate turns over to concepts of taste. The typical attitude that is portrayed is that architecture is *more than facades*, and that *past historical styles does not carry the answers to future challenges*:

"... just as Modern architecture addressed great social issues, the architecture of the future needs to solve many new challenges tied to climate- and environmental changes. This is the debate we should attend to. Consequently, discussing taste and styles is digressing".

- Architect Gisle Løkken President of NAL (Løkken, 2020)

One possible, and essential, verdict to these observations, in applying a doctor-patient metaphor, is that it is clear that many voices observe pathologies, or *sickness*, in contemporary urbanism and architecture. Typical *diagnoses* found are that everything *looks the same*, there is *no variation*. Everything is *grey*, there are *no colours*. There is *poor detailing*, *no ornamentation*. All lines are *straight*, and that everything *looks like boxes*.

1.3 Variation and Orientation Throughout History

It might be beneficial to look back in the history of cities, to give contemporary debates some perspective. In his book *Life Between Buildings*, Danish architect and urban designer Jan Gehl (1987) promotes the urban life of the Medieval city. Cities that were not planned in a contemporary sense, but grew out of need, shaped through the cooperation of their citizens. The Medieval city was primarily a tool created through process, and not a planned end-in-itself. What characterized its urban spaces, writes Gehl, was the emphasis on the space and its function, and not its buildings. The piazzas and squares found their form through centuries of adaptations and experience.

Lozano (1974) (introduced later) writes that the Medieval city had intrinsic qualities that supported orientation, where a person either through her own



The medieval city of Lübeck, Germany.

Photo: S. M. Sivertsen



Medieval city plan, Tübingen, Germany (Kohler, 1819)



Baroque city planning meeting the medieval city of Rome. (Stockdale, 1800)

experience, or through shared cultural structures could find visual support for her own stored mental images. Different landmarks, such as walls, main streets, and significant buildings, secured a continuous visual dialogue that tied the city together in a coherent network. The building-modules that belonged to a shared typology, created orientation through variation within a common arrangement. Variation is also found by Lozano in the sequences of unexpected visual experiences that opens to the pedestrian. An almost continuous visual contact with landmarks or other references made the people able to dive into a "...surprising, intriguing, and even mysterious..." (Lozano, 1974, p. 407) labyrinth, where orientation could be restored quickly when needed.

Gehl (1987) argues that the paradigm by which cities are built have been overthrown twice since the Medieval city. The Renaissance of the 15th century brought groups of professional planners that now took control of a no longer self-grown city. These professional artists extended the idea of the city from being primarily a tool, to also being art. Renaissance [and Baroque] city plans, writes Gehl, are often compelling in a purely graphical sense, which also unmistakably show that they are creations of the drawing board. The planners, although concerned with certain novel functionalities, were primarily driven by the effect provoked by various visual schemes.

The Baroque- and the Renaissance square represent variation, writes Lozano (1974), by being an exceptional and unique element in the urban structure. These squares could not be repeated because they would create large-scale monotony, being based primarily on redundant information and relying on a strict, inner geometrical repetition. The square also plays an important part in orientation because "...the strong visual identity obtained through its regularity helps in developing clear mental images..." (Lozano, 1974, p. 409).

With the arrival of Modernism, the functional aspects of architecture were more distinctly separated from aesthetical considerations. Equipped with new awareness of health issues, the architects of the new era strived to provide equal opportunities for everyone dwelling in the cities. Gehl (1987) claims that the effect was a narrow-minded emphasis on the purely physiological aspects of health: light, air, sunlight, or access to greenery. Density was reduced in new areas, where all buildings were free-standing, and oriented towards the sun, and work was distinctly separated from living in new urban plans.

The urbanism of the Modern Movement is described by Lozano (1974, p. 411) as "one of absolute dominance of redundant information, extremely low-order visual organization, and absence of variety at any level, resulting in an oppressive feeling of monotony, coupled with disorienting. The visual clichés originated in the mechanical repetition of identical elements at all scales... and the lack of complexity in the visual inputs are expressions of

the characteristics of the movement". In this new paradigm, writes Gehl, the psychological and social needs of humans were forgotten. The urban spaces could no longer support adequate opportunity for children's play and social encounters. Some European cities are still rooted in Medieval organization, and Gehl champions their intrinsic qualities, which he thinks lack in many contemporary cities.

The historical city is idealized by Salingeros (2005) for its capacity to convey information through extensive use of concave and convex shapes. The texture, relief and light colours of the surfaces had a natural ability to reflect visual and acoustic information. Contemporary building materials on the other hand, are described as minimizing surface information, only ever able to reflect perpendicular. Furthermore, highly reflective, mirror-effect surfaces confuse the eye, which is left with nothing to focus on. While extensive use of dark rather than light materials, absorbs information no matter its reflective angle. Grey concrete, he exemplifies, have poor reflecting properties.

1.4 Experiencing Architecture

Public debates on architecture, as have been shown, tends to be based on visual descriptions, and that is why this thesis will emphasise the built environment as visual information - perceived by the human brain. Kevin Lynch (later introduced) wrote that "we must consider not just the city as a thing in itself, but the city being perceived by its inhabitants" (Lynch, 1960, p. 3).

Perception of course, is more than *seeing*. The Danish professor of architecture Steen Eiler Rasmussen (1898-1990) wrote wonderfully enlightening about the immersive nature of architecture. In the introduction to his book *Experiencing Architecture* he writes that:

"Understanding architecture... is not the same as being able to determine the style of a building by certain external features. It is not enough to see architecture; you must experience it. You must observe how it was designed for a special purpose and how it was attuned to the entire concept and rhythm of a specific era. You must dwell in the rooms, feel how they close about you, observe how you are naturally led from one to the other. You must be aware of the textural effects, discover why just those colours were used, how the choice depended on the orientation of the rooms in relation to the windows and the sun" (Rasmussen, 1959, p. 33).

Gehl (1987) even lets architecture play second fiddle in the experience of the city. He claims that studying the faces of strangers or meeting a friend on the street represent a more vivid, immersive experience than glancing at facades. After all, facades have little affiliation with the evolution of the human brain or with survival. Through the eyes of the environmental psychologist the experience of architecture is, like any other experience, the

sum of received stimuli. Comparing one visual stimuli to another can be problematic, and comparing stimuli of different senses is another matter entirely. Inspired by the field of psychology Gehl wrote that "no moment is like the previous, or the next, when people move among people. This is an endless line of new situations and new stimuli... 'life between buildings' is both more rich on experience and stimuli than any matter of architectural intervention" (Gehl, 1987, p. 19). Even though Gehl argues that it is people that invite people, he still indicates that visual character is a component in the *spark* which is the beginning of urban life.

1.5 Language of Architecture and Common Ground

In his influential book *The Image of The City* (1960), urban planner Kevin Lynch (1918-1984) studied the city through the inhabitant's shared environmental images. He describes these images as "common mental pictures carried by large numbers of a city's inhabitants: areas of agreement which might be expected to appear in the interaction of a single physical reality, a common culture, and a basic physiological nature" (Lynch, 1960, p. 7).

Inspired by Lynch, this thesis will assume that the public - without degrading the experience of the individual - have shared images of the city, and shared experiences of its visual character. Based on the aforementioned public debates, it is also evident that there exist a collective, if not uniform, image of fundamental shortcomings in contemporary architecture and urbanism. Although the attempts to describe the situation are numerous, the issues remain poorly defined.

In 1974 Eduardo Lozano addressed the same observation of incomplete language, and he showed that the contemporary Norwegian debate, naturally, is neither unique geographically, nor in history:

"few of the large-scale projects built in the last decades are able to evoke satisfactory aesthetic response from the lay public or the critics, and it is possible to advance the hypothesis that this visual dissatisfaction is part of a major conflict between people and the new built environment..."

...One burden of the aesthetic criticism is the architectural tradition of criticism, which has been notoriously unable to generate common criteria and acceptable methodologies of analysis to evaluate built form and spaces. In this respect, the lay public and the 'educated' critics show little difference in their reliance on highly subjective concepts to illustrate an aesthetic reaction. Most of the assessment tend to remain at a gross level, failing to recognize the components of the problem, which is considered in its superficial totality, and often ending up in a simple polarity of positive or negative feelings – perhaps with some historical comparison to add perspective. Words such as monotonous, regimented, chaotic, and

confused are used to synthesize a negative assessment; words such as balanced, clear, interesting, and dramatic are used in the case of a positive assessment – seldom with a definition of and a justification for the use of a particular adjective...". (Lozano, 1974, p. 397)

Lozano argues that this incomplete language of "superficial totality" is as relevant for what he refers to as the "lay public", as it is for the "educated critics". His remarks almost fifty years ago are strikingly relevant when put into the contemporary context of this thesis.

This chapter is concluded with repeating the basic supposition that an unknown magnitude of the public collectively sense that something about the built environment is defective. Through observing the debate it is possible to deduce that professionals and laymen alike, lack the sufficient language needed to discuss the visual character of the built environment. Circling back to the medical metaphor: naturally, it follows that no remedy can be found unless the issues are more precisely defined and diagnosed. Implementing the wrong treatments could even make the situation worse.

PART I

Chapter 2

Order and Complexity in Visual Perception



Orangerieschloss, Potsdam.

Photo: S. M. Sivertsen

2.1 Modes of Visual Perception - Stecker

How do the inhabitants and the visitors to a city perceive it? Are everyone always constantly assessing the pleasantness of their surroundings? In his book *Intersections of Value: Art, Nature, and the Everyday* (2019) Professor of Philosophy Robert Stecker suggests some general ways in which one might think about such intricate concepts.

When the observer walks down a street he does not perceive the world in two-dimensional images, as is often portrayed in architectural representation. More precisely, he experiences three-dimensional space in a fourth dimension of time.

Sometimes the human mind finds itself lost in its own thoughts, like when the driver of her car suddenly feels that she cannot remember the events of the past half-hour. Other times, when the mind appears more engaged, the eyes seemingly, autonomously scan the surroundings purely for information: should you go that way, or the other.

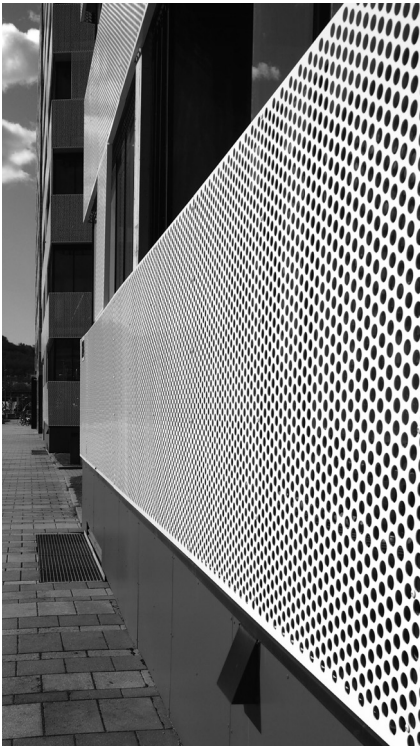
Other times yet, the awareness of the observer reaches a level where she consciously perceives an environment as pleasing or unpleasant - to one's liking or not. This instant process Stecker (2019) terms as having an *aesthetic experience*: a quite immediate positive or negative perception of one's surroundings.

For the final modus, the reader is asked to imagine walking around in an art museum, with no knowledge, nor interest in its exhibited pieces. The trip to the museum is just a continuous and arbitrary sequence of "beautiful", "ugly", "boring" or "interesting" objects. Then, back again in the museum after devoting a year to the study of art history, the observer pauses in front of the paintings and studies them: the materials used, the direction of the strokes, he thinks about the time-period, the artist's own history, and he compares this particular painting to others. This experience is something different, and Stecker (2019) refers to this as the *artistic experience*: a rooted cognitive process, which is based on knowledge.

Now, Stecker's primary concern is the perception of *art* in general, yet it seems natural also to imagine observing the built environment through different *modes of perception*. Unconsciously seeking information, or conscious and immediate "aesthetic" appreciation, or alternatively heightened "artistic", cognitive assessment.

2.2 The Information Field - Salingeros

It is clear that the experience of architecture depends on the human brain perceiving its surroundings, but how should one describe or understand the substance or raw-material innate in any environment? In *Principles of Urban Structure*, mathematician and architectural theoretician Nikos Salingeros



Surfaces reflect maximum information perpendicularly. Flat surfaces thus only have "a single point" of maximised reflection.

Photo: S. M. Sivertsen

(2005) writes about environmental perception through an *information field*. In this field the built environment is primarily defined and experienced based on the information it provides. Salingaros stresses that this information sustains fundamental psychological necessities, which of course again, signals the importance of how architecture communicates visually, and how it conveys information. In this framework Salingaros also connects the actual physical use of space to its available information.

Information is approached through his terms *content* and *accessibility*. Content are the physical elements that are observed, while accessibility is the extent of which information is perceivable to the observer. Salingaros predicts that information that is either too easy, or too hard to read is less likely to be perceived. According to Salingaros (2005), excess information is turned manageable through harmonic [balanced] compositions. He argues that turning information into harmonic compositions is different from removing and minimizing information, although both strategies reduce visual disorder.

The information available in the built environment is categorized by Salingaros as 1) information defined through the organization of elements and sub-elements, and 2) information defined through the direction of surfaces, small-scale differentiation, and the microstructure of building materials.

Light and sound are reflected from the surfaces of any environment. Through several diagrammatic plans and sections Salingaros shows how the amount of information reaching the observer can be tuned by shaping and orienting surfaces. He remarks that for visual and acoustic information to be more readily received horizontally (looking straight ahead in eye-height), surfaces should reflect in different horizontal angles. This is achieved through elements divided into several convex and/or concave shapes, exemplified through fluted columns. Conversely, the even flat wall only offers one primary single point where the observer is standing perpendicular to the element. Looking up, Salingaros illustrates how buildings provide information perceived vertically. In the same way, convex and concave shapes reflect in multiple directions. Ideally, information reaches the observer at eye-height in multiple positions surrounding the element. In the smaller scale, the roughness of the material also decides the reflective properties of a given surface.

With his principles of tuning form and texture Salingaros gives the facade, as surfaces in the built environment, the functional task of providing information to the observer. Salingaros writes that the information in ornament for example, is central in the interplay between architecture and the observer. The information in such detailing is conveyed through structural partition, articulation, or differences in texture or colour.

2.3 The Sense of Order - Gombrich

It has been established that the brain perceives what might generally be referred to as *information*. But how exactly does the brain operate when it reads this information? In his book *The Sense of Order* (1984) art historian Ernst Gombrich's (1909-2001) provides us with a convenient allegory:

Imagine someone climbing some stairs where the height between each step is entirely different. She would in a sense, be forced to stop, and for every step judge how much to raise her feet. Conversely, imagine some other stairs where all the steps are of perfectly equal height. The person ascending would now swoop up these steps quite automatically, not needing to grant the movement much thought or attention.

It is much in the same way that an observer experience patterns through visual perception. The information that is effortlessly available is perceived easily and immediately, while more complex input like the irregular stairs, require attention and effort. In this context, Gombrich claims that humans have an intrinsic *sense of order*. He points at Karl Popper's *Bucket Theory of the Mind* when he argues that perceiving is an active process. Through evolution the human brain has evolved to constantly read information in its surroundings. Not all this visual information makes immediate sense to the observer, especially in childhood, but through observation and practice the brain progressively learns to interpret this input.

The stairs-allegory is based on what Gombrich (1984) refers to as a human feedback-loop that constantly seeks balance. A stairway with irregular steps has no such balance, and it lacks the order needed to "read one's way" up these steps. The process of experiencing through visual perception, he writes, is not based on knowledge as such, but should rather be described as a constant process of testing hypotheses. It is this ability of verification, in a system of observed regularities collected since birth, which Gombrich refers to as our *sense of order*.



Irregular stairs in Old Stavanger, Norway.

Photo: S. M. Sivertsen

2.4 Order and Complexity - Van Geert and Wagemans

The following part of this thesis investigates *how* information in an environment could be systematically characterized. The path leads into the world of psychology, where Dutch Professor of Experimental Psychology Johan Wagemans has particular interests in research into visual perception. Together with doctoral student Eline Van Geert, he have investigated the cardinal terms *order* and *complexity* in their article *Order, Complexity, and Aesthetic Appreciation* (VGW, 2020). Van Geert and Wagemans (VGW, 2020) writes that there has not of yet been any consistent definitions of order and complexity, and this fact has made it difficult to produce definite research results of how humans appreciate these aspects of their visual experience.

They define complexity as the *quantity and fluctuation of the different visual stimuli*. Complexity is linked to historical terms like *variety, diversity, and multiplicity*. They maintain that humans typically prefer moderate amounts of complex stimuli, rather than any of the extremes poles. Order on the other hand, is defined as *how the visual information is structured and organized*. Order is linked to terms like *unity, uniformity, synthesis, harmony, lawfulness, and organization*. Including broader definitions, the terms order- and complexity have been described on secondary levels as *conceptual and semantic, formal and connotative, perceptual and conceptual, form and content, denotative and connotative, and, individual and contextual*, but these aspects are considered less relevant in this context.

According to these initial definitions, order and complexity are not opposites (VGW, 2020). The opposite of order is called *disorder*, while the opposite of complexity is referred to as *simplicity*. Still, order and complexity interact. Where there is a high degree of complexity, order have greater effect, and where there is a high degree of order, complexity is more potent. The authors emphasise that different people will perceive order and complexity, and the balance between them, differently. Because of this, they separate between the physical presence of order and complexity, and how they are perceived by the observer.

Order and complexity are multidimensional, and can therefore appear balanced in one dimension, while they do not in another. The authors exemplify this in a grouping of elements in equal or dissimilar dimensions, like *size, configuration, or orientation*. In one group where there is a great fluctuation of different sizes of elements (high complexity), there can also exist a high degree of order in the same dimension by for example establishing a systematic jump between sizes. There can also exist high order in a different dimension, where all the elements for example forms a clear circle configuration. In a group where all the elements have the same

size (low complexity), there normally does not exist disorder in the same dimension. On the other hand, disorder could rule in another dimension, for example by irregular orientation of elements. Therefore, balance between order and complexity is an interplay between two different systems, and not simply two extremes on the same scale.

Gestalt psychology has been important in defining how visual information is grouped. In keeping with the Law of Prägnanz, the elements in our visual-perceptual field are perceived in what proves to be the simplest and most encompassing manner. The authors refer to Rudolf Arnheim (1954/2004, as cited by VGW, 2020) who wrote that art must be seen "from above", that is primarily with the totality of the organization in mind. On a lower level, the relation between the different parts remains important to the perception of the composition. Others have written about how the essence of aesthetic appreciation is in fact the discovery of the systems which establish order and unity within the total organization.

On the interplay between order and complexity, the authors maintain that symmetry is the method which most potently establishes visual balance. A balance that causes the different elements to compensate each other. Van Geert and Wagemans writes that the brain seems to be sensitive to symmetry, and that research have shown that we prefer *symmetrical* compositions, to those that are *asymmetrical*, however, some articles have shown that a certain asymmetry tend to be appreciated in some cases. The alternative method of the *rule of thirds* (strategically placing elements at 1/3 distance from sides or top/bottom of a composition) has proven to be less potent in establishing visual balance.

A principle of unity in diversity was introduced by Berlyne (1960, as cited by VGW, 2020), while Post, Blijlevens and Hekkert (2016, as cited by VGW, 2020) wrote of a principle of unity-in-variety. The latter was defined as "the maximization of both unity and variety, in order to achieve a balance that offers the greatest aesthetic appreciation". They maintain an asymmetrical relation, where unity (order) is the ruling system in this interplay, and unity is what facilitates variation (complexity). In a later study, however, Post, Nguyen and Hekkert (2017, as cited by VGW, 2020) found that there was no such asymmetrical relationship between order and complexity.

Sometimes the order- and complexity systems interact with opposing effects, Van Geert and Wagemans states. Because complexity can reduce perception of order, and order can reduce perception of complexity. On the other hand, they write that both can be applied to complement the other. Order employs complexity in displaying its ability to organize, while complexity applies order to make itself understood and appreciated. They illustrate this interplay through grouping by similarity in size, which on one hand can be considered as a form of order. On the other hand, this unity in size indicates low complexity, because it causes low variation within the

established order. More complexity increases the number of possibilities in which order can display itself, while low complexity reduce this potential. These possibilities offer both increased quantitative and qualitative ways of establishing order. Increased complexity, for example, could reinforce a symmetry born of order. High complexity and low order demand more processing by the brain, which makes it harder to both understand and appreciate.

Balance is also connected to the flow of visual information, which is to what extent it is easily processed by the brain (VGW, 2020). This flow could run smooth despite of high complexity when it is stabilized by high order. Ease of processing could also prevail where there is high order and lower complexity, but it will often result in lower aesthetic appreciation. Experienced flow is also connected to constant perceptual predictions of our visual environment. Too much uncertainty (complexity) will result in confusion, and too little (order) boredom.

The terms *pleasure-based appreciation*, and *interest-based appreciation* of visual information was introduced by Graf and Landwehr (2015, as cited by VGW, 2020). The first represents an autonomous process based on stimuli and smooth flow of visual information, while interest-based appreciation refers to a controlled process, driven by the conscious observer when there is difficulty in processing. Van Geert and Wagemans suggest that visual information with high complexity and poor flow, is solely perceived through interest-based appreciation. This is because the order, which the observer attempts to establish in poor-flowing information, is necessary to balance high complexity. Correspondingly, visual information of low complexity and improved flow does not require this balance, causing the information to be read unconscious and immediately.

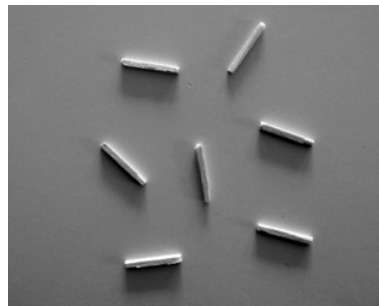
2.5 Illustrating Order and Complexity

The following table summarizes the dimensions of order and complexity, and the methods of order described by Van Geert and Wagemans (2020).

Dimensions of order and complexity	<i>Orientation (direction)</i> <i>Colour</i> <i>Size</i> <i>Shape</i> <i>Configuration (figure)</i>
Methods of order	<i>Grouping</i> <i>Symmetry</i> <i>Repetition</i> <i>Grading</i> <i>Configuration (figure)</i>
The methods of grouping (as a method of order)	<i>Similarity (e.g. colour or shape)</i> <i>Proximity (position)</i> <i>Common fate (e.g. common direction)</i> <i>Symmetry</i> <i>Continuity</i> <i>Closure</i>

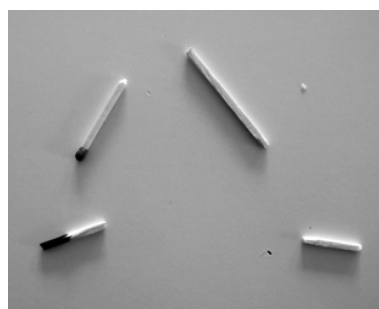
It is also possible to imagine other dimensions and methods of order than those named by Van Geert and Wagemans. *Alignment* would be an example of another method, and *light reflection* another dimension. One could also imagine different sub-dimensions like the *saturation of colour*.

The following illustrations are based on images found in Van Geert and Wagemans (2020) where they illustrate the workings of order and complexity through different examples.



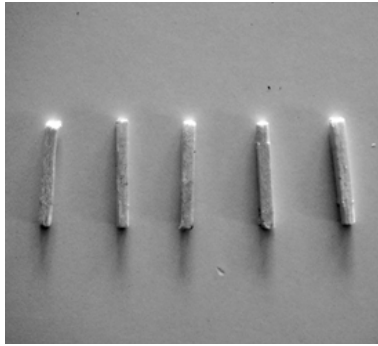
(1)

Image 1: Composition where both complexity and order is low. The complexity is low because the pieces are all the same in the dimensions of size, shape and colour. Some complexity is however present as quantity of different orientation. Few methods of order are present, except repetition in the dimensions of size, shape and colour.



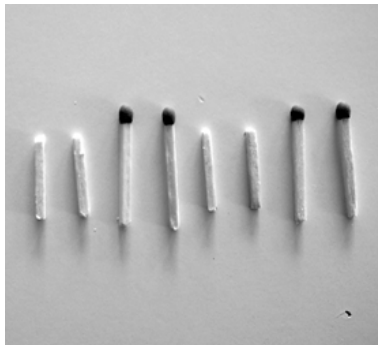
(2)

Image 2: Order is further reduced as repetition in size is removed. Complexity increases in the dimensions of size, shape and colour, as new pieces are added.



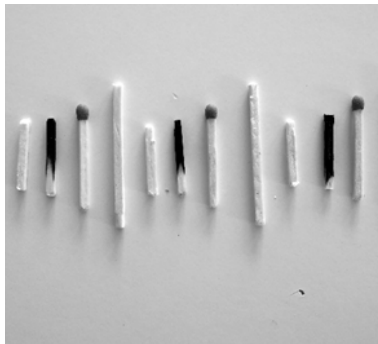
(3)

Image 3: Complexity is again reduced in the dimensions of orientation, size, shape, and colour. Order is increased as repetition, symmetry and alignment are present.



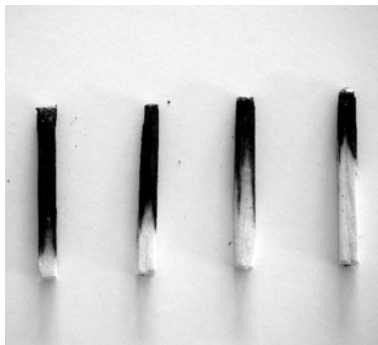
(4)

Image 4: Complexity is increased when a new piece is introduced. Repetition is now present in two distinct elements.



(5)

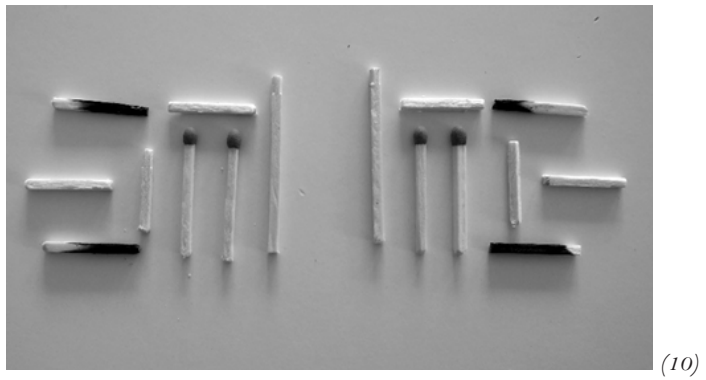
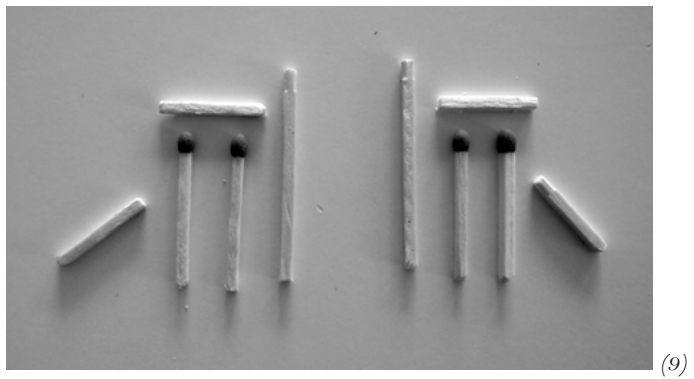
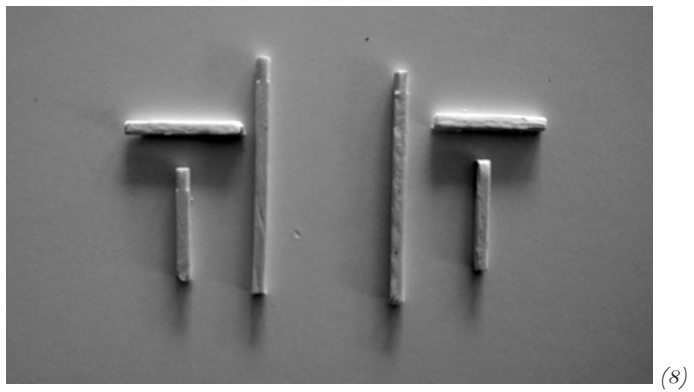
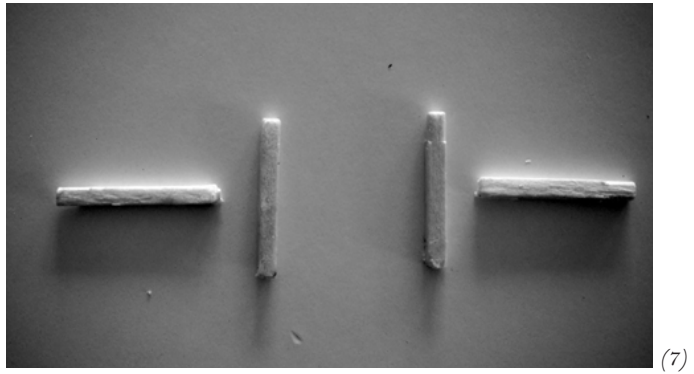
Image 5: Complexity is increased in the dimensions of size, shape and colour, as four distinct entities are present. Order is allowed to show its potential as the four elements are repeated, as well as graded in the dimension of size. This image possibly comes close to a threshold where the observer does not immediately grasp the composition but is allowed to discover the order that is present.

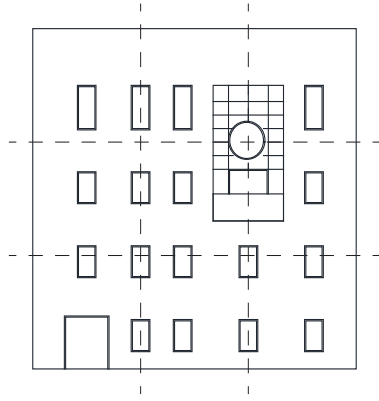


(6)

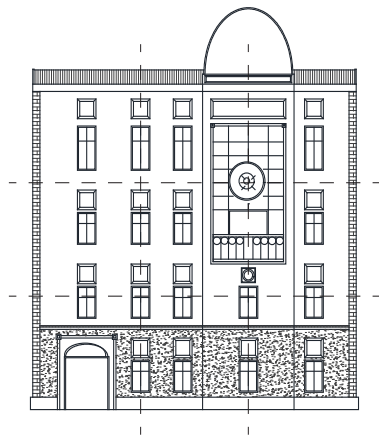
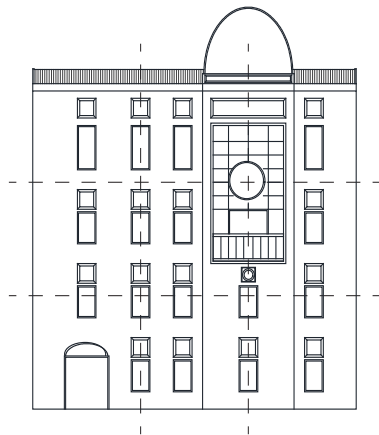
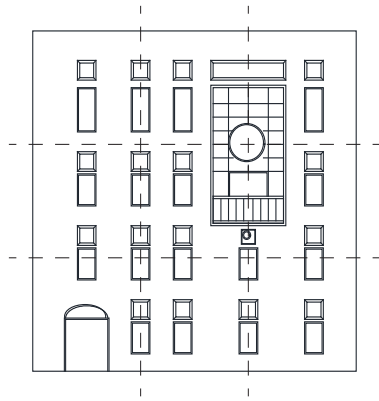
Image 6: An example of order through grading in the dimension of size and shape within each entity, at the same time as repetition in the dimensions of size and shape is present in the outline of each unit.

Image 7-10: The potential of order is increased through symmetry, as complexity increases. Van Geert and Wagemans stated that symmetry is the method which most potently establishes visual balance.





The following drawings illustrate complexity in a facade, as increased in tiers. The predominant method of order applied is the *rule of thirds*.



The increase in complexity provides the brain with something to discover, while readability is maintained by order.

PART I

Chapter 3

Variation and Rhythm



Variations on a brick in Lübeck, Germany.

Photo: S. M. Sivertsen

3.1 Orientation and Variation - Lozano

"... however we analyse the difference between the regular and the irregular, we must ultimately be able to account for the most basic fact of aesthetic experience, the fact that delight lies somewhere between boredom and confusion" (Gombrich, 1984)

Variation is a term that frequently appears in the public debate, but it also appears in memorandums and official municipal guidelines for development areas. Variation is often used to refer to any subject's "change in amount or level" (Cambridge Dictionary, 2021). Urban planner and architect Eduardo Lozano (1974) provides a more specific definition, which might be more fruitful in the context of visual perception.

He holds that humans require environments that offer combinations of different visual information, supported by findings by social scientists. White (1959, as cited by Lozano, 1974) showed with his findings that individuals prefer environments that are "interesting" and that changes. He maintained that this indicated that variation is important in meeting the needs of the individual's need for sensory stimulation and promoting psychological development. Rapoport and Kantor (1967, as cited by Lozano, 1974) found that most people preferred complex and varied environments, to those that were simple and less varied. Hall expressed himself more dramatically on the lack of variation: "as he moves through space, man depends on the visual messages received from his body to stabilize his visual world. Without such body feedback, a great many people lose contact with reality and hallucinate" (Hall, 1966, p. 66, as cited by Lozano, 1974).

Lozano emphasises the duality of variation and orientation, which both must be said to depend on man's fundamental ability to sense and receive information visually. He applies the terms *low-order* and *high-order*, which are not to be confused with the degree of order as defined by Van Geert and Wagemans. Low-order refers to simplicity and unity, while high-order is connected to complexity and that which "defies full understanding" (Lozano, 1974).

Orientation is simply defined, by Lozano, as "the awareness experienced by an observer of his own location in a given environment... the result of a successful match of visual clues generated by the environment, and perceived and understood by the observer, with cognitive structure and/or images stored in the observers memory" (Lozano, 1974, p.399). He connects orientation to that which makes the environment predictable, to unity and simplicity. The opposite of orientation is referred to as confusion, which on the other hand, relates to environments of high complexity, and few hints of simple or predictable information.

Variation is defined by Lozano as "the characteristics of an environment made up of sets of similar, but not equal elements that belong to a common and recognizable taxonomy/typology, perceived by the observer in terms of the rhythmical differences appearing within commonalities unifying the set" (Lozano, 1974, p.402). Variation is connected by Lozano, to that which makes environments unpredictable, often high complexity. The opposite of variation

is referred to as monotony, which characterizes environments with low complexity and many simple and predictable elements.

Gombrich (1984) on his end points to the Latin proverb *variato delectate*, that is "variety delights". He writes that simple visual patterns easily display their order and become boring and redundant, while more complex patterns provide our perception with something to process, something unpredictable. Lozano, again, makes a comparison with the written message: "the more probable the message, the less information it gives. Clichés, for example, are less illuminating than great poems" (Wiener, 1967, as cited by Lozano, 1974). Gombrich states that simple patterns are not necessarily more or less likely than complex patterns, but they are easier to remember because they are more easily constructed. He compares perception of order to the act of assembling, perhaps first and foremost represented by the brick wall. He suspects the reason why such very geometrical shapes are preferred and dominate human order, could be because they rarely appear in the natural world.

Lozano emphasises the importance of considering orientation and variation as an interplay. He maintains that simple environments do not necessarily support orientation. Monotony interferes in visual differentiation of different elements, which prevents the observer from interpreting direction and distance. More fundamentally the human eye is designed through biological evolution, for changing environments. Because of this, monotonous environments could be considered as a form of sensory deprivation. Lozano illustrates through Evans and Piggings:

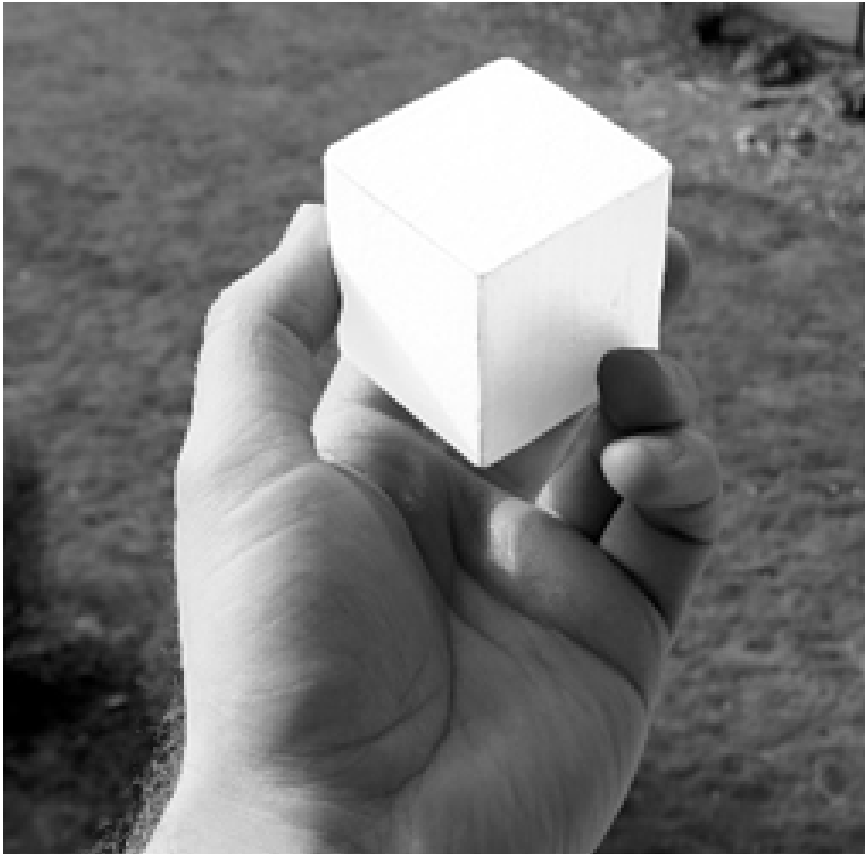
"the eye reacts with exceptional speed to a flickering target viewed peripherally and is sometimes surprisingly inattentive to familiar more centrally placed objects...for a 'steady' environment seldom, if ever, occurs in nature. What would happen to the physical system if it were confronted with an unchanging [environment]? The target in view soon becomes perceptually unstable and finally actually disappears from view, [although] disappearances are by no means permanent, and the part of the image which vanishes generally returns to view within seconds, after which some other part of parts disappears." (Evans and Piggings, 1966, as cited by Lozano, 1974)

Similarly, Gombrich (1984) writes that "when the expected happens in our field of vision we cease to attend, and the arrangement sinks below the threshold of our awareness".

In the same way Lozano (1974) argues that high complexity, does not automatically secure highly varied environments. Like monotony, confusion prevents differentiation of visual elements. Lacking an understandable rhythm, all possibilities of predicting the information disappears, preventing perception and appreciation of variation, by that one could state that no

variation is present at all.

Creating pleasant and human environments requires a balanced interplay between both orientation and variation. Lozano (1974) stresses that one does not cancel the other, but rather that they complement each other. The need for orientation is covered through simple and predictable elements, while the experience of variation and surprise depends on complex elements, which only offer prediction and understanding to a certain extent.



Gombrich (1984) compares the difficulty of anticipating the turning of a piece of coal (rock) to the ease of a regular cube. The experience of variation depends on the degree of surprise - within the limits of being recognisable.



Being less expected, the turning of the piece of coal offers more *new* information. The cube, on the other hand, offers more information that is *known, or expected*. The latter constitutes *redundant information*.

This mechanism is based on the object's visual character, but also on the cube being easier to remember, and therefore easier to predict. Gombrich's (1984) supposition is that being easier to remember, the object is also easier to construct, both mentally and physically.

Photo: S. M. Sivertsen

3.2 Rhythm - Rasmussen

Rasmussen (1959) introduces his chapter on rhythm with reference to variation: "In the world of architecture, you can also experience delightful examples of subtle variation within strict regularity" (p. 127). Rasmussen like Lozano describes variations *on a theme* when he writes that houses in an old street individually belong to a common type and period, that are tied together in a common plan and framework.

On the part of strict rhythm Rasmussen brings us to the Quirinal in Rome. A place that contrary to the "diversity of the medieval city", offers "not only brighter and airier regions but (also) greater clarity...Man has brought order out of chaos; the hill has been tamed" (Rasmussen, 1959, 129). Rasmussen explains the grand scale and the great simplicity of the Quirinal Palace. He describes its rhythm as "like the opening chords of a great symphony (the medieval city) which, in an *andante maestoso*, prepare the ear for complex adventures" (Rasmussen, 1959, p.130). In addition, he writes that the Rue de Rivoli has a similar effect on Paris, something to compare the rest of the city with. In New York he describes the Rockefeller Center as "with its great monotony, has given New York a keynote it would otherwise lack" (Rasmussen, 1959, p.130).

Rasmussen reminds us that rhythm is a term that is borrowed from other forms of art that contain the element of time, like music and dance. In manual labour rhythm also plays an important part. The work becomes easier to perform when the motions are alternated regularly, he writes. This is because the "change from one set of the other takes place with such regularity that it is unnecessary to begin all over again each time. The motions are so nicely adjusted that one seems to give rise to the next without conscious effort, like the swinging to and fro of a pendulum" (Rasmussen, 1959). It is natural to connect these thoughts to those of Gombrich, which describes the human "sense of order", and the ease or difficulty of reading information.

Rasmussen writes that the experience of architecture demands time, although architecture itself has no such dimension. Experiencing architecture, he explains, does not involve manual labour but mental work: "The person who hears music or watches dancing does none of the physical work himself but in perceiving the performance he experiences the rhythm of it as though it were in his own body. In much the same way you can experience architecture rhythmically – that is, by the process of re-creation..." (Rasmussen, 1959, p.135).

In connection with the discussed *environmental images* of Lynch (1960), which are shared by large groups of people, Rasmussen also writes that "Rhythmic experience spreads easily from one person to another. A crowd of people who are gathered together to watch dancing or some sport event, or

to hear music, can be completely absorbed by the same rhythm" (Rasmussen, 1959, p.135).

3.3 Texture and Colour - Rasmussen

On the role of colour in architecture, Rasmussen (1959) unambiguously states that:

"when a painting loses its colour it no longer exists as a work of art, but this is not true of architecture, for the art of building is first and foremost concerned with form, with dividing and articulating space... In architecture colour is used to emphasise the character of a building, to accentuate its form and material, and to elucidate its divisions" (p.215).

It is evident that Rasmussen still considers colour as representing a powerful architectural tool. For him, colour is used to emphasise composition, or to reinforce connections between separate spaces. He warns about applying colour solely as exclamation marks to structural elements or to changes in material, risking a collection of separate details rather than a coherent whole. Rasmussen believes that colour should be used primarily to reinforce the intrinsic character of a space, as it were.

The colour plane is described as an alternative to form, exemplified by Rasmussen through his writings on the effect of concave and convex form. He describes Corbusier's early white villas as weightless compositions of colour, derived from cubist art from the early 20th century. According to Rasmussen, Corbusier was not primarily interested in the volume of the villa itself, but rather the infinitely thin border that defines it. To Rasmussen colour applies information to the plane, for example where light tones indicate lightness, and darker surfaces communicate heaviness.

The primary effect of texture in architecture is illustrated by Rasmussen through clay vessels and weaved baskets. Where clay hides or abstract structure similarly to stucco, the weaving of a basket displays structure much in the same way as bricks do. He writes that materials of "poor textural effect" are often improved by applying relief or ornament, while materials of higher quality can manage on their own without such applications. He exemplifies this through white concrete, which he thinks is superior to grey concrete, but still benefits from relief. Perhaps one could dare to assume that Rasmussen would categorize Carrara marble as a material that could do without artificial application.

Rasmussen's writings on the colour plane raise the question of whether colour alone is the best medicine for the grey, monotonous box. Solely emphasising colour without form, could reinforce the city as a collection of abstract colour planes. The description of Corbusier's villas indicates the colour plane as the adversary of tactility, where concave and convex form would be its champion.

PART I

Chapter 4

Summary of Established Theories



Neues Museum, Berlin.

Photo: S. M. Sivertsen

4.1 Foundations of Visual Perception

A fundamental prerequisite found in the discussed theories is that our physical surroundings can be considered as a field of information, where the human brain receives primarily, in this context, visual input. It might be useful to remember Lynch (1960) who wrote of the environmental image that “we must consider not just the city as a thing in itself, but the city being perceived by its inhabitants” (p. 3).

Stecker (2019) wrote of three different levels of consciousness in experiencing visual information. What is here identified as *information mode* refers to the autonomous state of subconsciously scanning the environment for information. The following tier is the *aesthetic mode*, where the observer is consciously aware of the immediate positive or negative perception of his or her surroundings. Finally, *artistic mode* refers to a higher level of awareness which is not immediate but rooted in a cognitive process and based on knowledge.

Graf and Landwehr (2015, as cited by VGW, 2020) introduced two different terms relating to appreciation of visual information. Of these, *pleasure-based appreciation* represents an experience where the brain autonomously and unconsciously processes stimuli from a smooth flow of visual information. *Interest-based appreciation* on the other hand, refers to a controlled and conscious experience where flow is less present, and information more difficult to process. It seems only natural to connect these two terms to Gombrich's (1984) *stairs-analogy*, where he compared the acts of walking in steps of equal, and unequal height. In the second illustration, flow, as it were, is not present and one has to consciously observe and calculate each step, whereas the proportional steps offer autonomous movement.

Van Geert and Wagemans suggests that information of high complexity and poor *flow*, is solely perceived through interest-based appreciation. This is because the order, which the observer attempts to establish in poor-flowing information, is necessary to balance high complexity. Correspondingly, visual information of low complexity and improved flow does not require this balance, causing the information to be read unconsciously and immediately.

Flow, then, could make information more available, but it will also make it more predictable. Gombrich (1984) writes that simple visual patterns easily display their order and become boring and redundant, while more complex patterns provide our perception with something to process, something unpredictable. Evans and Piggings emphasised the human biology when they described the eye as a process of evolution: “for a ‘steady’ environment seldom, if ever, occurs in nature” (Evans and Piggings, 1966, as cited by Lozano, 1974). Since the eye is adapted primarily to changing

environments, stability “soon becomes perceptually unstable and finally actually disappears from view”. Lozano (1974) wrote that such simplicity could challenge orientation, which again is no less than our perceived awareness of location in the world.

4.2 Order and Complexity

The initial definitions of order and complexity are elementary to this thesis. It was shown that it would be imprecise to consider them simply as two extremities on the same scale. Van Geert and Wagemans demonstrated a more accurate stance with two differing scales, where *complexity-simplicity* relates to the quantity of different visual stimuli, and *order-disorder* relates to how (and to what extent) the visual information is structured and organized.

In their system the separate dimensions of order and complexity lie in the object's physical properties, its colour, size or shape. These dimensions are then employed in different methods of order, in repetition, symmetry or grouping. Colour for example, can be graded, repeated or grouped. Increasing the number of different colours raises complexity as quantity of input, while the extent of organization heightens or lowers order.

4.3 Variation and Rhythm

The essence of *variation* as defined by Lozano (1974), is that it describes unequal aspects of an environment, but only if they share similarities that connects them in a distinct typology. It is not sufficient to simply compose several elements that are different from one another, which is not variation but merely dissimilarity, or *contrast*. This designates variation as a form of repetition (a method of order) where the repeated element is altered but still recognizable, as it is in music. Variation, however, is different from other methods of order - grouping, grading or symmetry - because they create order, where variation shuffles it. These methods of order, unlike variation, does not rely on being unpredictable.

Variation is not merely a method of order. Lozano indicated that variation is essential in accommodating the human demand for sensory stimulation. Apparently, variation can decide if the aspect of an environment is perceived at all, connected by Gombrich (1984) to the Latin proverb *variato delectate*, “variety delights”. Like Lozano, he emphasised variation as that which is unpredictable - that gives the brain something to work on. In this way variation is connected to richness of input, but like complexity it needs order to be perceived and appreciated. Repetition is then the touch of order, while alteration is the work of complexity.

the physical environment
(the information field)

complexity - simplicity

order - disorder



methods of order

creates order

regular
remembered
expected



variation
shuffles order

altered
unexpected

monotony
complete regularity

contrast
breaks order
(new order)

different
not predictable



visual hypothesis
visual perception
(Gombrich`s feedback loop)

experience of flow, balance and harmony
conscious perception
(interest-based appreciation)
unconscious perception
(pleasure-based appreciation)



orientation

awareness of location and "the self"

A New Model of Visual Perception

S. M. Sivertsen

PART II

Chapter 5

Developing Established Theories



Meeting orders in Pompeii.

Photo: S. M. Sivertsen

5.1 Observations in Nature



Nature's rhythm. Photo: S. M. Sivertsen



Man's rhythm in Chilehaus, Hamburg.

Photo: S. M. Sivertsen

It seems typical throughout history to connect the dichotomy *nature versus man-made*, to an image of the former as wild, chaotic and complex, while the latter is attributed order. This might be another example of mixing up order and complexity, treating them as extremities of the same system. The accuracy of looking at nature as something *disordered and complex*, and the built environment as *ordered* will be questioned here.

First, our visual perception will be studied through nature. The information field after all, does not take into consideration whether something is "natural" or "man-made". If one returns to Stecker's *modes of experience* (2019) it seems apparent that we experience the world primarily in *information mode*, and more rarely in *artistic mode*. It is possibly only when one finds himself in this heightened awareness, and especially for architects, that the distinction *building* versus the *totality of a landscape* (inhabited or not) first come to dominate our perception. Not to mention that it can be difficult to make the distinction between natural or artificial, particularly in areas that have been inhabited over long periods of time. However, it should be stated that the type *building*, for most humans is established in memory and can be distinguished as elements, just like trees, whether we are consciously or unconsciously experiencing our visual-perceptual field.

In Antiquity and later Renaissance, western architecture often leaned on Pythagorean proportions in a way similar to experiencing music. Rasmussen (1959) wrote that even though scale and proportion play important roles in architecture, the comparison between visual perception of architecture and listening to music should be considered primarily as a metaphor. The human eye does not sense deviations in visual proportions nearly as sharply as irregularities in musical tones. On the part of the masters of the Renaissance, it is absolutely possible that they were fully aware of the limitations of this comparison.

It is often the case when studying rhythm in architecture, that it is considered something quite rigid and literal. Openings, pillars, columns and ornaments were the distinct architectural elements that used to create rhythm. Rhythm is a term in architecture that is borrowed from music, and nor should we consider the perception of visual rhythm being sensed equally sharp as to when we listen to music. This implies for example, that the distinction between visual elements does not have to be based on complete uniformity, but rather as being similar or comparable to each other. The elements, then, can have some dimensions of order where they share similarities, and others where they do not.

If one looks closely, and remember established definitions, order in the forest is not hard to find. Tree trunks are entities that are repeated in the dimensions of size, shape, colour, texture and orientation. The trees, with



Order implements its method of repetition to establish a rhythm of the anticipated types 'branches' and 'leaves'. The final touch of unanticipated variation creates the visual melody of 'beech'. Photo: S. M. Sivertsen

their branches and leaves, through the methods of order, are repeated, graded, grouped and form recognizable figures. Naturally, the trunks are not repetition of identical figures as is seen in architecture. They do not have to be. They are variations of the typology of tree, whether they are called birch, pine or beech.

Biological evolution has thus created visual order in nature. The different species are entities that are repeated because they are distinct, and they are often visually perceived as grouped because they share the same strategy of survival. The plants are all united in a common ambition, stretching for the sunlight that runs the photosynthesis.

The complexity of the forest is created through an enormous amount of colour values of the same hue. There are great variations of trunks and different orientations of branches. If, again, one remembers that the human visual perception is more forgiving than when it listens to music, and for example considers hue before colour value, then the forest does not seem as complex any longer. Sometimes, for some, even the forest can feel simple and monotonous.

When visual elements or entities are discussed, it might be worth remembering the laws of Gestalt Psychology. As mentioned earlier, the *Law of Prägnanz* for example, tells us that the entities in the visual-perceptual field will be perceived in what turns out to be the simplest and most encompassing manner.

Rhythm is regular and continuous repetition, something that is established and remembered, and thus predictable. Variation on the other hand, is altered repetition. Variation is unexpected where rhythm is expected. Music, of course, is more than classical music, and in some genres, rhythm is more dominant than in others. Perhaps nature more than anything is a form of jazz, where many examples of contemporary architecture would be "frozen hip hop".

Music, however, in continuing the metaphor, is not only rhythm but also melody, which itself contains rhythm. In the forest the trees are typologies that are established. They are repeated and they can be predicted, creating visual rhythms. Every tree is a variation of a rhythmical repetition of a typology. This rhythm is exceedingly rich compared to one, two, one, two, like much man-made order. Rasmussen (1959) wrote about rhythm that:

"The simplest method, for both the architect and the artisans, is the absolutely regular repetition of the same elements, for example solid, void, solid, void, just as you count on, two, one, two. It is a rhythm everyone can grasp. Many people find it entirely too simple to mean anything at all. It says nothing to them and yet it is a classic example of man's special contribution to orderliness. It represents a regularity and precision found nowhere in Nature but only in the order man seeks to create"

In the last sentence Rasmussen possibly illustrates the point here, because

order is not a an antagonistic force, which man makes in opposition to nature, because order is itself found in nature. Perhaps one should rather state that man emphasises order that is uncovered in nature. Man have picked the order of nature apart to make it easier to grasp, perhaps sometimes too easy.

5.2 Where Melodies Meet



The meeting of two differing species, two contrasting types, two orders. Photo: S. M. Sivertsen

Where two different types meet, like with the two different species of trees in the image to the left, one should separate between the meeting of two single trees and that of two groups of trees. For rhythm to exist it must be allowed to establish itself as a continuous pattern of repetition. Two lone trees belonging to different distinctive species cannot establish a rhythm: it needs groups of trees. Arriving at an absolute definition of how many members of a certain typology that need to be present before one could speak of any rhythm is beside the point. There needs to be enough repetition for the rhythm to establish itself, for the observer to be able to remember and predict how the rhythm goes, and recognise what order the variation adheres to.

In Old Stavanger, Norway, one can find an example from the built environment. Here, one finds a coherent area with an established common rhythm. The rhythm consists of repetitions of surfaces with visual properties that are similar: white painted timber cladding and red orange roof tiles. The surfaces are not homogeneous, they consist of clearly recognizable variations of the types *weatherboard* and *roof tile*. The openings of the facades are repeated, not accurate in positioning, but similar in size and shape. The houses have different sizes, different number and placement of windows. Some houses have blue doors, and other yellow, without ever breaking the overarching rhythm.



Old Stavanger; Photo: S. M. Sivertsen

It would seem like the area illustrates visual rhythm achieved through one or more *dominant orders*. The white timber walls, closely followed by the red orange roofs, seem to tie the area together through rhythm, because they dominate the information field. These surfaces form predominant shapes, that in size and continuity dominates visually over other shapes like windows and doors. These dominant surfaces vary. The span of variation in texture and colour is more subtle than those of shape and size. Just like the trees in the forest, the surfaces are allowed to be more similar in some dimensions than in others. Perhaps because of the subtle variations of colour and texture, the area is tied together, allowing more divergence in other dimensions. Order here, is introduced through repetition of dimensions, symmetry in the house figures themselves, and possibly, alignment of surfaces.



*The dominant order of Old Stavanger abruptly contrasted with differing orders at its periphery.
Photo: S. M. Sivertsen*

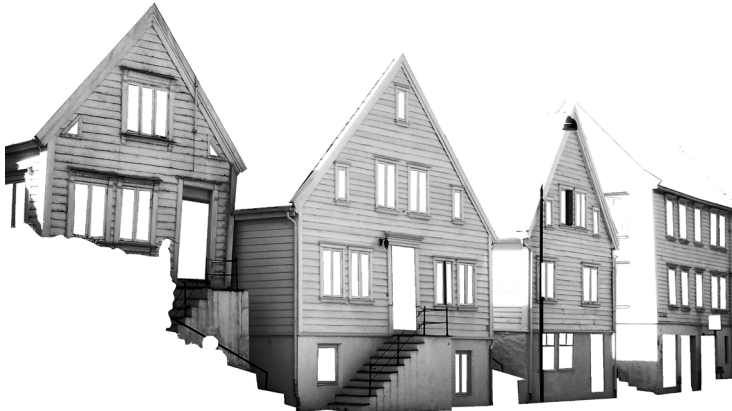
Some of the buildings in Old Stavanger contradict the established rhythm of the dimensions of the dominant order: colour, texture, shape and size of the white timber walls. Still, they do not seem to break the overarching rhythm, but rather acts as apparent and surprising variation within a whole. Single houses do not form any competing melody. The periphery of the area is a different matter, where the observer is met with contrasting buildings. These new surfaces clearly conclude the melody because the order is no longer present.

On the other side of the harbour area Vågen, lies a building that attempts to cultivate this vernacular architecture found in the historical city. It can be argued that the facades (in reality singular) do not follow the established rhythm or order, but conversely creates the beginnings of a new wobbly song. The pitched roofs and the colour hue which are close to historical conditions becomes subsidiary to different dominant dimensions, which now seem to consist of steel sections supporting a contrasting fenestration. The predominant shapes left from the traditional "punctured" openings disappear when the windows are designed after modern principles of maximizing daylight.

True, the steel structure is similar in the dimension of colour, being white, but it seems distant in every other dimension. The dominant dimensions of the historical type have apparently been broken, and no neighbouring entities adopts the rhythm which the building attempts to establish. Then again, this new rhythm might not be obvious nor desirable to evolve.



Old Stavanger with a modern attempt at cultivating the vernacular architecture in the background. Photo: S.M. Sivertsen



Comparing the orders of vernacular architecture in Old Stavanger (upper) to modern attempts at evolution (lower). The diagrams below illustrate the predominant-figure that ceases to display the dominating order in the modern rhythm.

Photo: S. M. Sivertsen

Next to the city centre square of Stavanger, lies a modern exemplar of a different kind of rhythm. Again, this meeting can be described through the dimensions of order. The ruling dimensions in this case involves the size and shape of the fenestration. These dimensions constitute similar variation on a theme beyond the individual building. Although, it is uncertain whether it is the figure (fenestration) or the ground (cladding) that manifest the dominant order. The fill of the fenestration in the buildings, are contrasting for example in the dimension of colour. However, being agents of subordinate dimensions of order, they still do not break the overall sense of a repeating rhythm.

The rhythms found in the individual buildings are simple. It is in the meeting of these that "melody" is read by the observer through variation. This is not to say that visual melody cannot be experienced through individual facades, but in this instant the melody is found in the coming together of buildings.



Individually there is only simple rhythm, but coming together these buildings form visual melody. Photo: S. M. Sivertsen

In Ystad, Sweden, one can find the expressive facades found on the image below. The dimension of colour itself is contrasting between the gables, but the overall type is merely altered. The order or rhythm of repeating gables does not appear broken; thus, the contrasting colour dimension must be subordinate. Interestingly, it is the contrast in the colour dimension which emphasises variation. The coloured sections are otherwise alike in the dimensions of texture, shape and size. The dominating brick and roof tiles, as modern products, have little variation.



Variation through contrast in a subordinate order - in the colour dimension of the gables.. Photo: S. M. Sivertsen

5.3 Type or Element?

Questions that naturally presents themselves in this discussion is what constitutes a *visual type*, and what constitutes a *visual element*? In many ways, type and element, are one and the same, and they are both used in this thesis. "Visual element" is here generally used in assessing the degree of complexity in a visual environment, and in describing what is being ordered through repetition, symmetry or other methods. Naturally, a window as an element, could also constitute a type, whose repetition either portray monotony, variation or contrast. Type is also generally and perhaps more conventionally, used in the larger scale of street, district and city.

The hues of colour - *purple, blue, cyan, green, yellow, orange* and *red* - are cultural constructs. They represent cultural conventions to light in *ranges* of wavelengths, rather than *absolute* colours. Different cultures have differing ranges, which can sometimes even indicate different hues, within the same physical wavelengths (AlterSpark, 2021).

Now, just like hues, types are constructs and never absolute. When we percieve specific hues, it is because certain wavelengths dominate. These dominating wavelengths could be evident, or other times quite faint. This is followed by different observers that have a hard time with agreeing on the "correct" hue. Correspondingly, the dominant order of a facade or a street could be either evident, or faint.

Visual type is not always *closely* linked to other levels, such as *functional type*, although it would always be hard to see them as completely independant. Other times, different frameworks overlap and live in reciprocity. An example of such a framework is the *organisational type*, or plan-essence, found in Rudolf Wittkowers diagrams of Palladio's villas. Note that this is not merely the type *villa*, but *Palladian villa*. Wittkower shows that these villas are variations of an organisational type, and this relates directly to their visual character.

In one of these villas, Villa Foscari, Rasmussen writes that "The facade design reflects the interior disposition in which a large barrel-vaulted central hall rises to the height of the pediment...Above the basement the outer walls present a pattern of large blocks in dimensions corresponding to the thickness of the walls - both outer and inner".

Interestingly, Rasmussen writes that Colin Rowe found the same proportioning, and the same organisational type, as it were, in Corbusier's house in Garches. Rasmussen writes: "But while Palladio used his system to give the rooms fixed and immutable shapes and harmonic interrelation in proportions, Le Corbusier has, if anything, suppressed his supporting elements so that you are not aware of them and have not the slightest feeling of any system in their placement." As is obvious in this case, nor does organisational type necessarily reflect its exterior visual character.

5.4 Illustrating Variation and Contrast Through Diagrams

Experiments on the dimensions of colour hue- and saturation.

Repetition and alignment of predominant shapes (cladding) constitutes the dominant order, while the fenestration portray a secondary order.



Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	monotony	monotony
Size	monotony	monotony

Note that as an encompassing dominant order of monotony and variation is replaced with contrast order itself is broken.



Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	variation	monotony
Shape	monotony	monotony
Size	monotony	monotony

Complete monotony does not constitute "visual melody" because it contains only rhythm without variation.



Dimension	Dominant order	Secondary order
Colour hue	variation	monotony
Colour saturation	variation	monotony
Shape	monotony	monotony
Size	monotony	monotony



Dimension	Dominant order	Secondary order
Colour hue	monotony	contrast
Colour saturation	monotony	variation
Shape	monotony	monotony
Size	monotony	monotony



Dimension	Dominant order	Secondary order
Colour hue	contrast	monotony
Colour saturation	variation	monotony
Shape	monotony	monotony
Size	monotony	monotony



Dimension	Dominant order	Secondary order
Colour hue	contrast	contrast
Colour saturation	variation	variation
Shape	monotony	monotony
Size	monotony	monotony

Experiments on the dimension of size.

Repetition and alignment of predominant shapes (cladding) constitutes the dominant order, while the fenestration portray a secondary order.



Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	monotony	monotony
Size	monotony	monotony

In theory the size dimension could challenge or replace the dominant order, so that the order of the fenestration at some stage becomes dominant.



Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	monotony	monotony
Size	monotony	variation



Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	monotony	monotony
Size	monotony	contrast



Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	monotony	monotony
Size	variation	variation



Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	monotony	monotony
Size	contrast	monotony



Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	monotony	monotony
Size	contrast	contrast

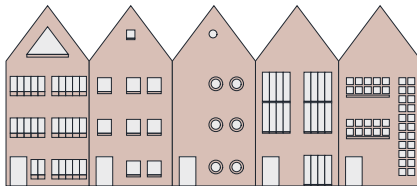
Experiments on the dimensions of shape (figure).

Repetition and alignment of predominant shapes (cladding) constitutes the dominant order, while the fenestration portray a secondary order.



Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	monotony	variation
Size	monotony	(variation)

In theory the shape dimension could challenge or replace the dominant order, so that the order of the fenestration at some stage becomes dominant.



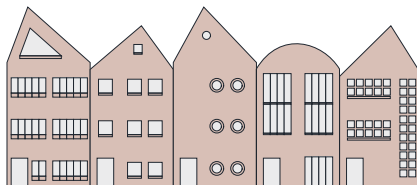
Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	monotony	contrast
Size	monotony	(contrast)

Split relationship between variation and monotony in dominant order.

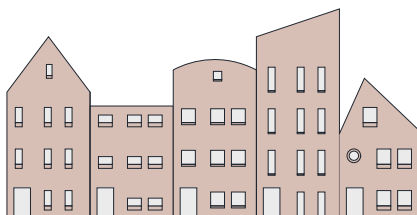


Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	variation	variation
Size	(variation)	(variation)

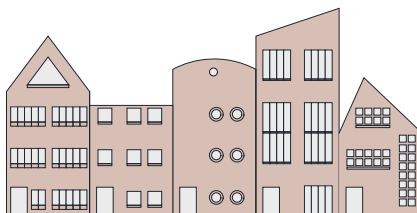
Split relationship between variation and monotony in dominant order.



Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	variation	contrast
Size	(variation)	(contrast)



Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	contrast	variation
Size	(variation)	(variation)

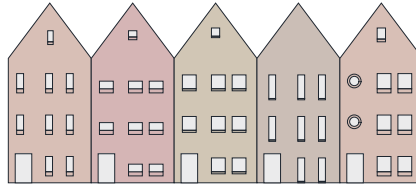


Dimension	Dominant order	Secondary order
Colour hue	monotony	monotony
Colour saturation	monotony	monotony
Shape	contrast	contrast
Size	(variation)	(contrast)

Experiments on the dimension of shape and colour combined.

Split relationship between variation and monotony in dominant order

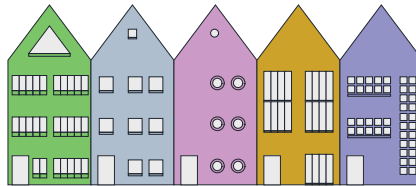
Total variation in secondary order
(4/4 dimensions)



Dimension	Dominant order	Secondary order
Colour hue	variation	variation
Colour saturation	variation	variation
Shape	monotony	variation
Size	monotony	(variation)

Split relationship between contrast and monotony in dominant order

Total contrast in secondary order
(4/4 dimensions)



Dimension	Dominant order	Secondary order
Colour hue	contrast	contrast
Colour saturation	contrast	contrast
Shape	monotony	contrast
Size	monotony	(contrast)

Total variation in dominant order
(4/4 dimensions)

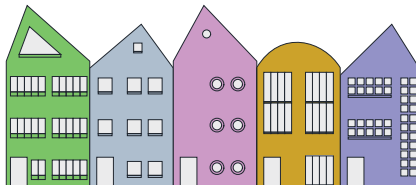
Total variation in secondary order
(4/4 dimensions)



Dimension	Dominant order	Secondary order
Colour hue	variation	variation
Colour saturation	variation	variation
Shape	variation	variation
Size	(variation)	(variation)

Split relationship between contrast and variation in dominant order

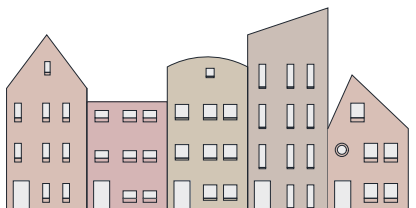
Total contrast in secondary order
(4/4 dimensions)



Dimension	Dominant order	Secondary order
Colour hue	contrast	contrast
Colour saturation	contrast	contrast
Shape	variation	contrast
Size	(variation)	(contrast)

Encompassing variation in dominant order
(3/4 dimensions)

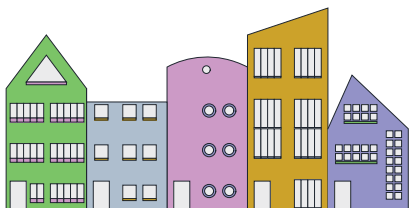
Total variation in secondary order
(4/4 dimensions)



Dimension	Dominant order	Secondary order
Colour hue	variation	variation
Colour saturation	variation	variation
Shape	contrast	variation
Size	(variation)	(variation)

Encompassing contrast in dominant order
(3/4 dimensions)

Total contrast in secondary order
(4/4 dimensions)



Dimension	Dominant order	Secondary order
Colour hue	contrast	contrast
Colour saturation	contrast	contrast
Shape	contrast	contrast
Size	(variation)	(contrast)

5.5 Orientation in Stavanger City Centre versus the Jättåvågen District

Studying experienced sightlines in the immersive experience of the city

Jättåvågen is a former industrial site that previously served the regional oil industry, which left the area in the 90s. The area has ever since been transformed and embodies contemporary urban planning and architecture. Stavanger City Centre on the other hand, could trace its origins back to the 11th-12th centuries. Although the two examples represent very different historical conditions and municipal strategies, a comparison on the effects of orientation is considered relevant.

As shown in the figures below, Stavanger City Centre constitutes a more complete and vibrant compilation of longer sight lines that upholds orientation, and shorter broken sight lines that introduces elements of surprise. The Jättåvågen district on the other hand, is defined by reduced fragmentation of sight lines, as well as an increased portion of longer sight lines. The effect, when compared to the situation of the city centre, is a district that over-emphasises orientation and lacks the elements of surprise. The long uninterrupted sight line of Jättåvågeveien is particularly "brutal" in the sense that the dimension of orientation completely overrules experienced variation as described by Lozano (1974). The observer might find it useful to remember Gombrich's (1984) metaphor of turning a regular cube in your hand, versus a lump of coal. The first condition involves no surprise, while the latter case does. And the experience of surprise as we have seen is connected to the experience of variation.



Greater fragmentation is seen in the experienced sight lines of Stavanger City Centre (right), compared to Jättåvågen (left).

5.6 Order and Complexity in Contemporary Facades

Facade A



Facade A in Jättävågen, portraying low complexity. Four primary visual elements seen on the right side. Photo: S. M. Sivertsen

This facade in Jättävågen consists of four primary visual elements as illustrated in the image, and complexity is thus considered low. The primary methods of order found are repetition and alignment. No apparent symmetry is present, except perhaps when some sub-elements are considered in isolation. Grading in size or colour is not present where the dimensions are visually contrasting. Low complexity will generally result in lost potential for order to express itself.

The dominant dimensions of order (due to its sheer extent) seem to belong to the stone cladding (alternatively imitating). The dimensions of the stone cladding are repeated in horizontal sections vertically in the facade. Some degree of variation is present in texture and colour value within the separate stones of the cladding.

The meeting of the primary visual elements is one of contrast, not variation. There are no dimensions which are similar and can be said to be variations on a common theme, except the grey hue that divides the window ribbons. The dimensions of size, shape (proportions) and texture are however dissimilar, and results in perception of contrast rather than variation.



Facade A in Jättåvågen, portraying low complexity, and stark contrast.
Photo: S. M. Sivertsen

The relation to rhythm is one of simplicity, with a clean break between “one” and “two”. Perhaps if the meeting between the primary elements were closer to variation, not contrast, the rhythm would have a more subtle and smooth flow. The result is rather a collection of broken fragments of music, more so than the harmonious melody of the forest.

The facade is part of an extensive office complex found at the entrance to the Jättåvågen area. A push-and-pull effect is used to delineate the wings of the building, with the tallest volume found at the centre. The central volume is dominated by a dark steel cladding, which replaces the light stone cladding of the wings. It is as always speculative to guess the intentions of the client or the architect. It will however be assumed that this example embodies contemporary wishes to implement variation and fight monotony.

The problem, of course, is that the volumes exemplify contrast, which has been explained, is different to variation. The subordinate window ribbons are continued in both volumes, but the dominant dimensions of the cladding segments seem to break rhythm and order, where variation would merely shuffle, or even simply poke at it. Order is reported broken because the *methods of order* rule a set of established *dimensions*, and when the dimensions are completely replaced the ruling order itself is discharged.

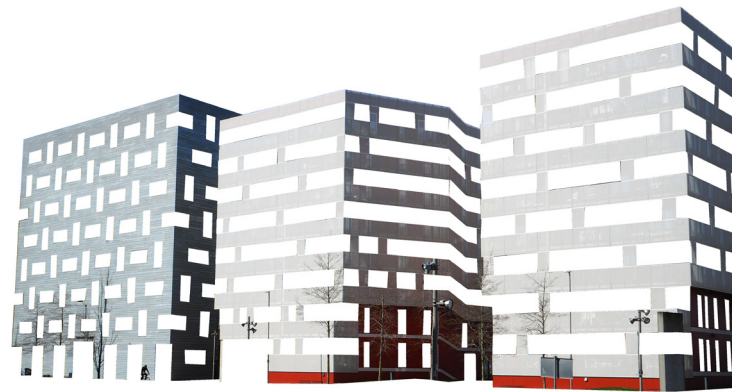
Facade B



*facade B in Jättåvågen. Two primary visual elements seen on the right side.
Photo: S. M. Sivertsen*

Facade B in Jättåvågen produces two primary visual entities, which itself signals low complexity. The elements do however show increased complexity within their distinctive types. The openings are framed by five different hues in the colour dimension, and the size dimensions are also comparable with proportions that are not too dissimilar. The two different orientations of the openings also slightly increase complexity, which again intensifies the potential of order to establish horizontal repetition and repetitive diagonal alignment.

The predominant figure of the cladding might seem to host the dominate order, not only due to its extent, but also because it is unbroken. This element portrays subtle variation in the dimensions of size, colour value and texture that seems to support perceptual flow. Because it is not discontinued in a simple overarching rhythm of one, two, one, two, the variation within the material itself is allowed to strengthen the rhythm with a component of something unexpected. In facade A the ruling rhythm of broken segments of cladding did not allow its material to do the same, although the material did have its own variation and rhythm.



facade B in Jättävågen next to its neighbouring buildings. The dominant order of found in the predominant figure of the cladding seen below. Photo: S. M. Sivertsen

The meeting between facade B and its neighbours, is certainly one of dimensions. The question is whether these represent opposing orders, or if they belong to a common rhythm. The neighbouring blocks, which are variations on a common block typology, have predominant cladding figures with similarities to facade B. The correlation is found in the rectangular, punctured fenestration with their "broken corners", which allow a continuous overarching shape. The size dimension of this shape is also comparable in the facade and all its North-Eastern neighbours. The size dimension considering the fenestration seems to be further off, although the shape dimension for the same element is similar. The colour and texture-dimensions are weakly contrasting, except for an interesting repetition of red orange found dominantly in the neighbour, but only subtly in facade B. The two facades are similar in some dimensions, while different in others, yet it would be an overstatement calling it a melody. A conclusion, if such a thing is necessary, might be that this meeting is floating about somewhere around the threshold between contrast and variation.

Facade C



*Facade C in Jättävågen. An example of mixing up the effects of order and complexity?
Photo: S. M. Sivertsen*

Next to the local train station there is another building that could further illustrate the contemporary relationship with the principles of order and complexity. Facade C has only two primary visual elements. The windows portray three variations of a recognizable type. Order is found in repetition, grouping and alignment of these variations. The design could however suggest that the principles of order and complexity have been considered as extremities of the same system, and not as two distinct mechanisms as they should. Perhaps in the attempt to increase complexity, or implement variation, windows are removed from the underlying grid or shuffled. Unless the strategy manages to emphasise an existing order, it can only cause increased disorder, which is not to be confused with complexity. In this case the contrast between cladding and fenestration possibly supports the effect of disorder established in the shuffling of windows.

Disorder is lack of organization, and not the same as variations of a recognizable type, like thousands of values of the same brick hue. These are variations of a rhythm far more complex than the established rhythm of three variations of a window. It should be stressed that there need not be any contradiction between visual balance of order and complexity, and approaches that are driven primarily on conceptual ideas or functional advantages.

Facade D



*Contemporary use of colour planes in facade composition.
Photo: S. M. Sivertsen*



Removing the contrast found in the dominant order (cladding) emphasises variation found in secondary order (fenestration).

Colour plane-composition seems to be a typical visual strategy in contemporary facades. Guessing the architects intentions in the individual cases will as always remain speculative. It might represent attempts at creating harmonious compositions, an effort in reducing or preventing local monotony, or a result of ruling aesthetical trends emphasised by the client or architect. On a more speculative note, it might be that technological development in facade elements, or the market of available building materials, has supported the development of colour planes in recent decades. As discussed, Rasmussen (1959) suggested that the primary role of colour was to emphasise specific elements of a composition or to signal and highlight spatial relations, like the entrance to a building.

The two buildings above portray low levels of complexity, followed by a low potential for order. The dominant order is found in the repetition of contrasting colour planes, whose rhythm is one of absolute simplicity. There seems to be a mismatch in this order, and the contrast which is devoted to its destruction. The two primary colours contrasts heavily both in hue and in the dark value of the redish, and the light value of the greenish. Alternatively, these two colours represents two separate orders, in whose battle for attention there is no clear winner.

The secondary order of the fenestration, which seems to be heavily suppressed by the heavy contrast of the colour planes, portrays variation, where the dominant order is regular and monotonous. The fenestration represents variation because the windows are similar in size, shape, texture, and colour.

PART III
Chapter 6

Discussions



The complex, ordered, sometimes monotonous, and sometimes varied, environment of Orangerieschloss, Potsdam. Photo: S. M. Svendsen

6.1 Findings

Order and Complexity

Van Geert and Wagemans suggests that order and complexity should be seen as two distinct systems. Namely, the two scales of *order-disorder*, and *complexity-simplicity*. The former relates to to how (and to what extent) visual information is structured and organized, while the latter relates to the quantity of different visual input.

Order in contemporary architecture is typically limited by a strikingly consistent paradigm of *low* complexity. The impression one is left with is comprehensive sympathies towards simplicity, and conversely, general aversion towards complexity. Van Geert and Wagemans, in general terms, stated that *medium* complexity is preferred by the human brain. The consistent low complexity of contemporary architecture will typically reveal its order quite instantly, leaving the brain with very little to work with, very little to discover or uncover. Rapoport and Kantor (1967, as cited by Pyron, 1972) similarly wrote that "urban design has been simplified and cleaned up to such an extent that all it has to say is revealed at a glance. A range of meanings and possibilities has been eliminated. This leads to a loss of interest. In the simple environment there is not enough to observe, to select, to organize; there is an excess of order".

As the reader will remember, Lozano stressed that simple environments do not necessarily support orientation. This could interfere with visual differentiation of different elements, which prevents the observer from interpreting direction and distance. These environments, where the available visual information drifts outside the boundaries of perception, can be considered *sensory deprivation*.

Some contemporary facades portray intentions of increased complexity through decreased order. This signals a "misunderstanding" where disorder and complexity is considered one and the same, and order and complexity as working within the same framework. These attempts at increasing complexity will unfortunately, simply decrease order, while complexity stays at low levels.

It seems natural to remark that architecture prior to the 20th century, on a general note, had higher levels of complexity, and therefore also higher potential for order. There is, however, no *style* whose character alone allows a balanced visual relation between order and complexity. These mechanisms should transcend style, because they are universal, and found so close to the core of human visual perception.

Variation and Rhythm

The definition of *variation* given by Lozano, is that it constitutes *that which is similar but not equal within an established typology*. Now, both contemporary verbal language and built examples of architecture, signal a quite different definition: that variation simply constitutes *that which is different*. A better term for this, however, might be *contrast*.

The difference between contrast and variation is not necessarily, simply that the former is "too different", and that the latter is just "the right amount of different". A more helpful way to look at it is that variation *shuffles* order, while *contrast* breaks it. Variation acts within an established order, while contrast is the beginning of a new order.

The main issue, of course, is not simply wrong use of words. The problem arrives when one tries to implement contrast (wrongly referred to as variation) as a cure for monotony. As stated in the beginning of this thesis: in developing the built environment one would risk implementing the wrong medicine, and only make things worse, if decisions are based on inaccurate diagnoses.

The term *rhythm* has been frequently used in this thesis. Both rhythm and variation, more than the *methods of order* in general, relate not only to the physical properties of architecture, but how it is visually *read* by the brain. Since the typical meeting between many contemporary buildings is one of contrast and not variation, there is no experience of visual rhythm. The observer has to "start again" with every building - because the urban fabric is utterly unpredictable - and is rarely allowed to discover coherent urban visual melodies that can be read with interest and flow.

An important remark is that in a paradigm where the "medicine of variation" is understood as *contrast*, individual facades will struggle for distinctiveness. Now, variation depends on repetition or similarity where it is allowed to alter. In a contemporary built environment where nothing is repeated, and everything is contrasting, variation can not exist. The insufficient diagnosis of "everything looks the same", thus risks causing the implementation of the wrong medicine. Historically, Lozano (1974) writes about the Medieval master masons "[who had] the ability... to build whole towns based on variations of common types, at a consistent visual-quality level" (p. 412).

The visual rhythm and coherence found in admired historical and vernacular districts often seem to portray what has here been referred to as one or more *dominant orders*. These orders represent altered repetitions (variations) of *types* in certain dimensions, such as colour, texture, shape and size. In this context the less precise everyday-discussion of "fitting in or not" could be replaced by an assessment of rhythm, variation and contrast.

Soft Cities

In his book *Soft City* (2019), David Sim as a representative of contemporary urban design philosophy, advocates the strategy of *plot-by-plot development*. Described by Sim (2019) as “a pluralistic approach with many different interpretations, economic models, and specific architectural solutions”. These thoughts resonate to a certain extent with the Medieval cities developed through vernacular processes. In the “modern Medieval city”, *Caroline von Humboltsweg*, in Berlin, Sim (2019, p. 39) writes that “...combining both very attractive private and highly individualized situations for living and working, this block makes for a more lively public realm and more interesting pedestrian experience, showcasing a variety of contemporary architecture...”. And in Vauban, Freiburg “...this diversity makes for visual interest and promotes public life, facilitating orientation and making walking more rewarding. The diversity also makes for identity and pride, both for individual homes and for the community having a distinct and recognizable neighborhood...” (Sim, 2019, p. 39).

Sim’s emphasis on active ground floors, functional layering or temporal flexibility is not in question here, but rather the implications of such anarchy in visual planning. In a paradigm where variation equals contrast and “that which is different” it is hard to see how coherent visual melodies, with rhythm and variation, can originate.

This confused interpretation of variation is seen, for example, in the public strategies for the new development Brunnshög in Lund, Sweden. On the public website of the municipality every plot is presented as distinctive projects with its own rhythm, and unique hierarchy of dominant and secondary orders. The municipal stance is indicated in their aesthetical definition of a *mixed district*: “the buildings within an area vary in style, in height, in materials etc... increase in buildings per block, and increase in architects and developers who share the commissions, generally results in greater mix of architecture...” (Lunds kommun, 2013).

Variation is a general term that is used to describe “change” or “difference” in many particular aspects. The width of the sidewalk can vary, functions on street level can vary, the size of apartments can vary, and sometimes a vague, general desire for “variation” in a district is expressed as an end in itself. This might be the reason why there is so much confusion concerning *visual variation*. Being so commonly associated with *contrast*, a conversion to the alternative term of *altered repetition* might be profitable where precise language is of the essence.

6.2 Advice for the Attentive Architect and Committed Citizen

In the beginning of this thesis it was deduced that the language which is currently being practiced in describing and discussing the visual character of architecture has considerable gaps. This might well be the case both for the general public, as well as within the architectural profession.

As for the general hypothesis, the short answer is a positive one: existing theories were indeed found, that could offer an improved framework which has the potential to afford more fruitful discussions on common ground. The reader will also remember the aims that were presented. Namely, to rediscover and expand the *apparatus of terms* so as to:

1) improve the framework for discussions concerning the visual character of the built environment, both among the professional, and the committed citizen.

2) provide principles that would increase awareness for the architects, and other involved parties that give form to the built environment, also, with human visual perception consciously in mind.

With these aims in mind, this final chapter will summarize the totality of observations and the expanded theories, with some general advice for all parties involved in shaping the built environment.

Initially, it is through writers outside of the architectural profession that the theoretical foundations are established: a revitalised foundation of architectural order in visual perception. A final time, the reader should remember the words of Kevin Lynch, that "we must consider not just the city as a thing in itself, but the city being perceived by its inhabitants" (Lynch, 1960, p. 3). It is this *perception* that constitutes the theoretical fuel of this work. Such intricate concepts, naturally, brings the work outside of conventional architectural theory.

Rasmussen wrote that "It is not enough to see architecture; you must experience it." (Rasmussen, 1959, p. 33). Inspired by these words one should also be aware of that architecture *is not merely seen; it is also read*. Architecture, on a most fundamental level, constitutes *information* in the observer's visual-perceptive field. It does not matter what *mode of visual perception* one finds himself in, *consciously* or *unconsciously* observing, the built environment is always read by the brain.

Sometimes, the information is hard to grasp, and the brain finds itself desperately seeking *order*, like the climber of Gombrich's irregular steps. Alternatively, the brain might simply surrender. Other times, information is easily read, autonomously, often by a quite indifferent brain. The bored, deprived brain yearns balanced, yet intriguing, visual environments, where it reads with *flow*, and finds something to discover, again and again.

The conscious architect should therefore have knowledge of the cardinal terms of *complexity* and *order*. Pragmatic definitions maintain that complexity constitutes *the quantity and fluctuation of visual input*, while order is *the hand that organizes these visual elements*. Complexity and order - although they usually interact - are thus two distinct systems and not extremities in a shared framework. The former moves on the scale of *complex - simple*, and the latter adheres to *order - disorder*.

Order operates through the *methods of order*, and among these one finds *repetition, symmetry, alignment, gradient, and grouping*. This list is not necessarily exhaustive. The *dimensions of order* is the "what" that is organized by the methods of order. These dimensions, also non-exhaustive, include *colour (hue, value, and saturation), size, shape/figure, orientation, and texture*.

The distinct mechanisms of complexity and order operates in the visual environment in an intricate interplay. In general, it could be stated that complexity depends on order to make itself readable, while order demands complexity to demonstrate its potential for organization. When these two systems operate proportionally one could speak of balance or harmony in visual perception.

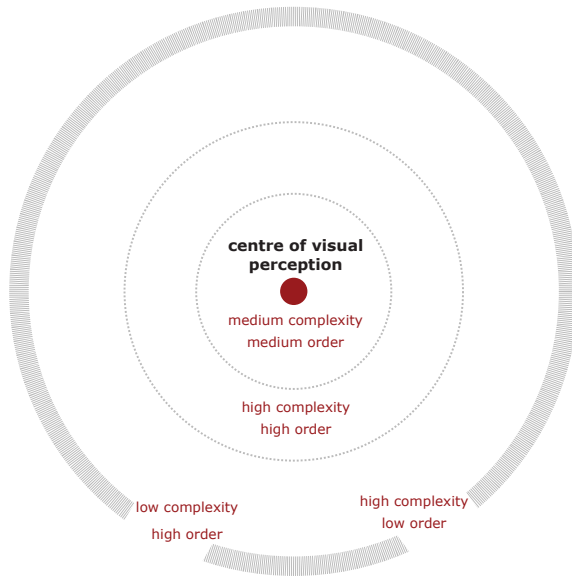
The conscious architect should also be able to differentiate between the terms *variation* and *contrast*, which both adheres to the superior mechanisms of complexity and order. To begin with, order is created by its methods of order, which constitutes that which is *regular* and *expected*.

Rhythm is a term in architecture borrowed from other forms of art that involves time. In visual perception, as in music, rhythm is characterized by regularly repeated elements. Elements that the observer can read and remember, and thus is able to predict.

Monotony is the complete regularity of remembered order. Variation on the other hand, shuffles existing order, and unlike rhythm, it cannot be predicted exact because it is *altered regularity*. Rhythm is thus *expected*, while variation is *unexpected*. Variation activates the brain and moves order from the peripheries of perception towards its centre.

Predominant *contrast* is different to variation because it does not work within an established order, but rather breaks it and begins anew. Contrast is something which is different, while variation is that which is similar but not equal - within an established typology. This does not, of course, imply that contrast is undesirable in the built environment. Nature, for example, is full of wonderful contrast, but the conscious architect should be aware of how the different mechanisms operate.

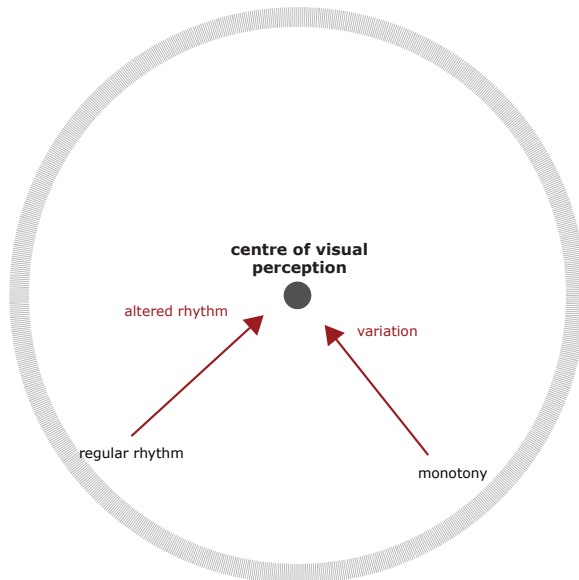
boundaries of visual perception



a circle of visual perception showing the effect of different combinations of order and complexity. Medium complexity was emphasised by Van Geert and Wagemans, here shown at the centre with a matching degree of medium order.

The area outside the boundaries of visual perception represents information not read. Experienced by the brain as sensory deprivation.

boundaries of visual perception



a circle of visual perception showing the effect of variation and altered rhythm. Variation "pushes" information from the peripheries of perception to its centre.

Rhythm found in the man-made order of architecture is usually strikingly regular: identical elements in one-two, one-two, or sometimes one-two-three, one-two-three. This goes for Classical architecture as well as Modern architecture, the pre-eminent difference is that Classical architecture almost always have higher complexity and increased sub-divisions of rhythm.

With these ancient, established conventions of simple rhythm, it is perhaps no wonder that nature is seen as a representative of infinite disorder and complexity. While the latter might be close to the truth, the former is highly questionable. Order in the forest, for example, is not hard to find. The leaves on the trees are not identical, but we see leaves and we are correct when we predict this repeating rhythm to continue. The leaf becomes expected, and thus constitutes a rhythm, which is order. The leaves have shared visual properties, described through the dimensions of order, which constitutes a *type*. This type varies and the leaves are not identical readings of one-two, one-two, like the columns and windows of a classical facade, but it is still a rhythm, with variations. Variation in combination with rhythm, naturally, is not completely unpredictable, but rather discernible as a surprising alteration of something predictable.

The classical facade can be highly *complex*, but this is not to be confused with *varied*. The ordering hand of this complexity is often completely regular, surprising to some it could thus be described as quite monotonous. When studying one of the many highly complex, and ordered, church facades of the Italian Renaissance or Baroque masters, it is evident that monotony in itself, is not undesirable. The lesson perhaps, is that variation and altered rhythm, more potently moves a facade, or any visual environment, to the centre of perception, where a balanced relation between complexity and order does not exist.

When one moves up in scale from the singular facade, and beyond the dominion of the particular architect's office, one can sometimes observe overarching rhythms that transcends absolute regularity. Rhythms that start to remind us just a little bit of that of the forest. This constitutes *urban visual melody*.

This visual melody incorporates both rhythm and variation. Built environments where such melodies are found have established *dominant orders* that does not portray monotony, but variations of a common type. These dominant orders tie together comprehensible districts in a shared rhythm of similar visual elements. The principal method in such orders seems to be repetition. The existence of a dominant order demands that this is a repetition of visual elements that share a similar character in the dimensions of order: shape/figure, colour and size. It is not always easy to determine a singular dominant order, or where it is found, but it typically seems to manifest itself in the superior size of the cladding or predominant figure of the individual facade.

These segments of surface often decide if a meeting between buildings *contrast* or *vary*. It should be marked that it is primarily contrast in the dominating segments that breaks existing order. Contrast in secondary orders can sometimes constitute variation within a typology. This is not a contradiction because it is in the dominant order that a type is chiefly identified.

Similarity in the dimension of shape/figure seems to be of particular importance in establishing dominant orders, but this also indicates that contrast in this dimension more potently breaks existing order. Conscious use of colour is perhaps sometimes neglected by architects, but it should be noted that as a dimension it also seems to play an important part in solidifying a dominant order.

The existence of visual melodies, including variation and rhythm, does relate to the cardinal systems of complexity and order, and their combined balance. Earlier in this thesis it was surmised that the *rhythm of repetition* is the touch of order, while the *variation of alteration* is the work of complexity. And this might seem to have some relevance in the larger scale of district and city, because all variations of a common type could illustrate high complexity and great quantity, if the alterations are considered distinct visual elements.

Conversely, some might claim that these variants do not constitute more elements than the singular type they belong to, just as they would consider the forest as simple because all the variations of trees only belong to a singular species. Considering many variations as high complexity, would also indicate high levels of order, because it increases the potency of the rhythm of order. On the other hand, if these variations are seen only as a singular element, it would indicate decreased order because it would have lost the very same potential to organize.

All the individual buildings that belong to a common typology, should still consider how they operate within the systems of complexity and order. Moderate complexity, not too low nor too high, is preferred according to Van Geert and Wagemans (VGW, 2020). This complexity needs an equally moderate level of order required to install balance.

In the architecture and urbanism of the recent decades, it is often the case that as far as rhythm goes, every building is an island. They are embodied and predominant contrast. Therefore, in the scale of the street, district, or city, one could rarely see any rhythm at all, because rhythm needs more than one or two elements to settle. Whenever we appeal for more variation, we should keep in mind that it requires the rhythm of repetition. The unexpected, after all, demands that something is expected. Streets or districts do not need much more than a single visual melody. Cities are different, cities should be symphonies, and these are the places *where melodies meet*.



Human regular rhythm, and nature's varied, yet recognisable rhythm.

Photo: S. M. Sivertsen

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Simon Myklebust Sivertsen

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