PERCEPTION in Architecture

HERE and NOW

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Definitions of space are as diverse as the disciplines in which it plays a fundamental role; from science and philosophy to art and architecture, each field’s perception of space is often simplified or reduced. This consequently denies us access to “new spaces,” whose definitions and perspectives, strategies and impacts on human perception are rarely considered in any cohesive manner. The symposium “PERCEPTION in Architecture. HERE and NOW” invited critical and comprehensive contributions by academics, artists, architects, designers, urban activists and curators to reflect upon new spatial concepts and thus access new spaces of definitions and perspectives, strategies and processes of perception in architecture.
# Table of Contents

Introduction to New Spaces in Architecture ............................................... viii
Claudia Perren and Miriam Mlecek

Chapter One: SPACES turned

Derealisation, Perception and Site: Some Notes on the Doppelgänger Space ................................................................................................. 2
Thea Brejzek and Lawrence Wallen

Spatial Turn – Perception in Architecture ................................................. 11
Annett Zinsmeister

Making Sense of Intensities ....................................................................... 22
Arnaud Hendrickx

Chapter Two: beyond PERCEPTION

An Architecture below Perception ............................................................. 30
Chris Smith

Naturalising Space..................................................................................... 38
Tim Ireland

Unnoticed – The Impact of Spatial Languages through Implicit Visual Perception ................................................................. 47
Matthias Ballestrem

Chapter Three: DIALOGUES proposed

Immediacies of Experience: Textile Spaces — Spaces of Communication ........................................................................ 58
Gabi Schillig

The Space of the Book............................................................................... 70
Marian Macken
Manipulations in Imagined Space ............................................................. 78
Holger Schurk

Chapter Four: urban ACTION

PublicActs: Enquiries and Speculations into Johannesburg's Emergent
Public Realm ............................................................................................. 88
Katharina Rohde and Thireshen Govender

Squatted Space: From the Other to the Subject of Uttered Speech .......... 96
Rena Tavernaraki

Beyond Dualities: Gender and the Possibilities of “Other” Spaces........ 110
Anna Papadopoulou

Chapter Five: sensual IMMERSION

Perceiving Atmospheres: A Phenomenological Exploration................. 118
Malte Wagenfeld

Sensory Modulation: “Snoezelen” in Architecture.................................. 135
Lindsay Webb

Fields of Sensation: Human Action and Interaction in Sensory
Spatial Design.......................................................................................... 144
Gabriele Fowler

From Perceptual Apparatus to Immersive Field of Experience:
Notes on Atmospheric Perception ........................................................... 152
Izabela Wieczorek

Chapter Six: experimental LENSES

Inflection ................................................................................................ 164
Suzie Attiwill

(Re)presenting Embodied Inhabitation Perception of Contemporary
Designed Public Space ............................................................................ 171
Isun Kazerani
Constructed Experiences: An Architecture of Performance .................... 182
William Feuerman

Reflections

Perception Beyond Materiality; or, a Transcendental Glimpse
of Architectural Space ............................................................................. 196
Yannis Zavoleas

Contributors ............................................................................................. 207
PERCEPTION BEYOND MATERIALITY; OR, A TRANSCENDENTAL GLIMPSE OF ARCHITECTURAL SPACE

YANNIS ZAVOLEAS

Introduction: experience in the physical and the digital worlds

More than three decades of precipitated digital evolution have passed, and any of the shock of the first contact with the computer has finally faded away. Navigating in the digital worlds has become more and more natural. The digital worlds are to a large extent recognizable, as many of their characteristics are borrowed from everyday experience, such as the terminology, the formed relationships and the hierarchical order among sets of digital elements. Computer users are now familiar with the idea of digital worlds as mediated platforms supporting common activities, most often related to communication and frequent transactions. Then, is there still anything inherently different from reality in them, often raising doubts that they will at some point be indistinguishable from the physical one that surrounds us?

In response, the first undertaking is to frame what is assumed to be “real” and then to concentrate on physical space, specifically on the perceptive processes by which physical elements are given spatial significance in relation to their material status. The problem of “physicality” turns out to be inseparable from perceptive processes. As technology has evolved, a future is foreseeable in which the digital worlds will appear as convincing as the physical one, offering experiences of equal profundity and richness.
Are digital worlds real or apparitions?

The screenplay of the science fiction film *The Matrix*, by the Wachowski brothers, transfers us roughly two hundred years ahead. It presents the reality of 1999 (the year the film was released) as an absolutely true looking, yet artificial, world. Soon, the terrifying secret is revealed to the characters as well as to the audience — that is, everything is a deception. Streets, buildings, people, common objects, activities and transactions are numerical data making reality as one out of the infinite combinations that has gradually obtained “flesh and bones” and is rendered so convincingly that seems as absolutely truthful, whilst it could equally be any different.

On account of the digital revolution, the “Matrix” scenario emerges as a noteworthy possibility. The hypothesis is terrifying and exciting at the same time, as the worlds made digitally are often exceptionally attractive. Currently, any information flowing into the advanced media networks is either digitally constructed or was converted to digital at some point. Digital infrastructure networks, the vast number of devices connected to it and the binary 0/1 code mediate between information of any kind and the audience.\(^1\) The digital media tools are currently so advanced that the human eye in front of an image on the screen is often incapable of distinguishing between elements that were constructed digitally from those that were real. Moreover, the properties of elements and phenomena of the real world can be quantified and measured digitally in extended detail. As a consequence, someday it will be feasible to describe the entire world by a set of data, and reversely, to construct it directly from this data. What, however, if this day has already arrived, and the world currently assumed as real is nothing more than an apparition, a reality so meticulously rendered, yet a false one, the world of the “Matrix”?

To begin with, it is proposed that an apparition is generally distinguishable from the real world. The term *real* would characterize anything that is generally truthful, objective and original. The notion of reality would encompass any substance or condition that is real, setting up the so-called objective world. In contrast, the term *apparition* would

\(^1\) Such a remark may also be extended in relation to the circulation of information with analog media. In general, for the circulation of information, a medium is needed. Experience with information is always mediated, as there is also a special relationship between the medium and the modes by which information is documented.
describe anything that is phenomenal and illusive, also anything related to imagination and any of its creations, being artificial, nonexistent and unnatural.\(^2\) Thus, the above question describes the possibility of the world being unified, in which it will be impossible to distinguish anything real from anything fictitious.

Vilem Flusser challenges the above hypothesis by comparing the digital worlds to the real one:

> Before our doubting eyes, alternative worlds begin to emerge from the computers: lines, surfaces, and soon also bodies and moving bodies, made up of point elements. These worlds are colorful and emit sounds, and in the near future they will probably also be touched, smelled, and tasted. But that isn’t all, because the moving bodies that will soon be realized through calculation and which are beginning to emerge from computation, will be equipped with the artificial intelligence of Turing’s man, so that we will be able to enter into dialogical relationships with them.\(^3\)

The above builds up the hypothesis that digital elements on the screen will be so tangible that their separation from those of the physical world will be impossible.\(^4\)

Flusser further assesses an element’s status in relation to the density of distribution about its points.\(^5\) For this, he points at Aristotle’s definition of

\(^2\) Dictionary definitions.
\(^4\) Any of the confusion between the real world and an apparition may be attributed to a phase of technological evolution in which everything will be produced with fidelity and with truthfulness being equal to direct experience with reality. It may be noted that information may only be produced upon a medium. The advancement of a new medium [increases the user’s expertise in regards to technologies and techniques being inherent to that medium. Further experience with a new medium raises expertise, specialized knowledge and also awareness about its limitations, a process requiring time, during which the medium generally advances as well, as new ones are being developed. Such a phase difference creates the impression that media constantly evolve towards total integration of mediated worlds and the real one, whereas, in effect, such an end is constantly postponed.
substance. An Aristotelian approach would include the various forms of substance can take as the four causes known as matter, form, energy and purpose. Matter is the raw amorphous mass an element is made of. Form gives shape to mass and is responsible for any significance it will take, as it is promoted to a real being. For this, energy needs to be invested in relation to a specific purpose. An element may either be classified as one of the generally recognized material states — as solid, liquid, or gas — or as a material with minimum structure related to fire, even as one in constant transformation, also described by the known material structures and their combinations, as stated in relativity theory.

Consequently, an element is real if it is classified according to a recognized material structure. The classification of all elements in reference to materiality would make up the list of all materials. This list is meaningful specifically for distinguishing elements with recognizable structure from those being impossible to confirm. Elements designated as fake may be those having unidentifiable material status, commonly seen as being nonexistent or belonging exclusively to fictitious worlds, although still being addressed somehow or given a vague sort of character. In this respect, the inability to distinguish real elements from fake ones portrays the possibility of a technologically advanced future in which all elements

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5 “Everything is digital, i.e., that everything has to be looked at as a more or less dense distribution of point elements, of bits. Hence, it becomes possible to relativize the term ‘real’ in the sense that something is more real the denser the distribution is, and more potential the more scattered it is. What we call ‘real,’ and also perceive and experience as such, are those areas, those curvatures and convexities, in which the particles are distributed more densely and in which potentialities realize themselves.” Flusser, “Digital Apparition,” 245.

6 Manuel De Landa suggests such a categorization of matter, in reference to the Aristotle: “Aristotle’s famous four elements — fire, earth, water and air — may reflect his awareness … of what today we know as the three main states of aggregation of matter — the solid, liquid and gas states — plus the state with least structure, the plasma state represented by an open flame.” M. De Landa, “Philosophies of Design: The Case of Modeling Software,” in Verb Processing Architecture Boogazine (Barcelona: ACTAR, 2001), 135.

7 The relation between mass and energy is grounded in Einstein’s Special Theory of Relativity (1905), described by the equation \[ E = mc^2. \]

8 An apparition developed exclusively by mental operations, that is, without any external stimulus, may be described in a similar manner. In that case, the subject experiences an apparition through operations in which he or she attaches irrational meaning to elements that are either present or imaginative. Generally, apparitions are perceived to be caused by external or internal causes, referring to false stimuli and fictitious elements.
will be inseparable, as the real world can be diffused into any apparition and vice versa. 

The above provision raises a personal intonation to the discussion on reality, as with it Flusser turns a pure philosophical and/or scientific question to one involving the subject and the perceptive operations during the classifying process. His approach agrees with cognitive theories of cybernetics stressing the impotency of complete objectivity, striving instead for dynamic models of system interaction between observer and environment. As Omar Khan remarks, “[O]ur perception of light, sound, heat, touch, taste or smell is not to be found in the nervous system but is partly a function of the observer describing the correlation of these sensations to himself;” that is, meaning does not reside in the object, but it is created through feedback operations between the systems involved.

An attempt to tackle the processes constructing meaning in a systematic manner requires drawing attention to the modes of interaction between observer and environment. Generally, an element is perceived by stimuli picked by the sensory organs. Affirming an element’s relevance to the real world or to an apparition requires assessing the sensory stimuli by which it is perceived as true or false. If assessment about a stimulus refers back to the attributes of the element, then judgment would neither be intrinsic to the element nor point straight at the stimulus that element instigates. As such, between the natural sciences and physics on the one hand and the cultural mechanisms that set up the logic function of mind on the other, a set of perceptive mechanisms ought to be scrutinized, ones that frame any utterance as inherently conditioned upon terms that provide the only solid foundation as principles and methods for the progress of any inquiry. Consequently, claiming stimuli as true or false, also elements as real, material and existent, or as imaginary, immaterial and fictitious, also worlds as real or apparitions, would always be disputable.

9 Flusser, “Digital Apparition,” 244.
Next, physical space and the elements making up spatial experience are being examined. Specifically, spatial experience — as any of the significances appointed to space, including properties, limits and life cycle — is broken down into the stimuli by which all elements are perceived. The following process is applied: First, an element is reduced to the stimuli by which it is picked by the sensory organs. This method is used to describe any of the elements making space such as walls, floors and slabs, and it is further applied to elements of any material structure. As it is shown, spatial significance may be assigned to any element that is perceived under specific conditions, as space/time or mass/energy phenomenon;\(^{13}\) moreover, an area may be allocated for any element, as a space field in which it is perceived. Reversely, the properties of space may be described in relation to the stimuli caused by the elements picked by the sensory organs. Apart from those elements being undisputedly real, other less tangible ones may still be registered as reflections, mirages, optical deceptions or illusions; they may even be related to the digital worlds of the computer, the computer games, the Internet and the holograms, including all sorts of virtual, alternative, abstract and fictitious worlds, generally termed as “apparition.” Respectively, the meaning of “space” is being reviewed, so that it grants the potential to assign spatial significance also to elements whose material status is currently unclear or unspecified. These elements may be those composing worlds that are purely imaginative, yet ones that in a future moment will be scientifically proven.

**Formation of spatial perception**

Spatial perception is constructed through cognitive operations in which different elements are given related meaning. In describing the process, an element is registered as sensory stimuli and picked up by the sensory organs, acting as recording devices. Perception is developed as the spatial outlining of an element’s ability to be registered to applicable organs. Space’s attributes depend on the elements, the stimuli they incite and the sensory organs.

\(^{13}\) Einstein, in the General Theory of Relativity (1915), developed the idea that space, time, mass and energy are one unity. Matter defines the geometry of space/time, as the field in which any phenomenon, even mass, takes place; in simple words, matter produces space/time in which matter takes place. In effect, relativity theory abolished previous assumptions that treated space/time as a precondition to other events.
An element is picked up within certain distance, so it may be attributed spatial significance in the outlined area also according to the stimuli it creates. Spatial significance may be assigned to solid elements, such as those for spatial definition. For example, a wall is perceived primarily through vision. Each side defines the area in which the wall is perceived. Moreover, the wall suspends the circulation of air and other elements, including people, animate beings and inanimate objects, odors, temperature, sound and light, generally any sort of mass/energy. The area’s properties at any point — in relation to the observer’s position — depend on the wall’s properties. Hence, the view is directed towards one side as it is blocked to the other, as the wall is offered as a reference to orientation. Respectively, the areas defined by a semi-transparent wall share some properties; for example, light travels through it. A slab defines areas above and below, perceived primarily by vision and also touch, as stepping. The ground floor is capable of supporting heavy structures, and additionally a void is created by digging in it. Similar descriptions may be attributed to all solid objects — for example a billboard, a seat and other furniture — in general of all properties and sizes — such as a cup or a pencil — as they define areas above, below, around, into and in any relation to them.

The same process of space definition may apply to elements of any material structure, mass or energy. A gas for example occupies a particular area in which it is perceived by the senses of smell and vision, to a lesser extent. An odor defines an area, too; for instance, the kitchen and the bathroom may better be identified with respect to their characteristic smell. A sound also defines space as the particular area in which it is audible. The spatial properties depend on that sound, as the area actually extends to a distance in which the sound signal is noticeable. As with sounds, a light defines the area it illuminates. In general, elements triggering sensory stimuli in a particular area also affect the properties of that area. For example, elements perceived mainly by the sense of touch define the area in which they can be reached, including solids (a surface or a handrail), liquids (the water of a swimming pool) and gas, especially if it is thick or warm. The same applies to elements perceived by the sense of taste. This is not in fact common, but it is possible to distinguish between two pools filled with chlorinated and salty water — by tasting the water. Blind people perceive space primarily by the senses of hearing, touch and smell, in further support of this view.

Respectively, an element is attributed spatial significance as it affects the area it is perceived in. A wall may be assigned spatial significance in
respect to its influence on the properties of the areas it defines. The stimuli are intensified by getting closer, as the wall’s spatial significance increases too. By moving away, the wall’s spatial significance diminishes and is practically ignored when the observer goes out of the area of its power or if the wall disappears; in that case, the spaces that were once separated are now joined, forming a new space defined by other elements. Spatial significance may be assigned to sonic and other signals, and the properties of the emerging spaces relate with the intensity, the duration and the distance from the source. Elements are assigned spatial significance in respect to the observer’s position, and the properties of the outlined area are related to the sensory stimuli that element activates.

Spatial perception at any point is set as the aggregate of the spatial significances of all elements in that point. For example, spatial significance is assigned to a wall with an opening. When a window or door opens, communication begins between the areas once separated. The opening acts temporarily, periodically and contrary to the wall’s main functioning, causing dynamic changes of its spatial significance. In the case of a sonic, visual or other signal, and if there is no obstacle, then the spatial properties in the respective field weaken gradually by moving away from the source, along with the diminishing of the signal’s intensity. By inserting an opaque wall, the signal is interrupted, causing significant changes in space’s properties. A similar effect in lesser intensity applies if the wall is semi-transparent. Generally, an element influences the intensity by which other elements are perceived. As a consequence, the spatial significance of an element is related to all elements perceived at specific point.

The properties of space at a specific point are related to the spatial significance assigned to each of the perceived elements. For example, space’s life cycle (its significance to time), may be viewed as the aggregate of the distributed significances of the elements being present during certain time period. An element affects varying the properties of space and is responsible for any change. Technological devices such as a television set, a sound system or a traffic light may be assigned spatial significance in regards to the emitted signals. Such devices affect the properties of space temporarily and periodically, depending on whether they are switched on or off. An element operating temporarily or periodically may be called a spatial substructure, a term generally referring to the capacity of specific elements to reveal, vanish or transform space and to influence its properties temporarily. Space’s properties return to a previous condition if the element being responsible for a change is no
longer active or if it disappears, for example, when a wall is demolished, an opening is shut off or a light or sonic source is turned off.\textsuperscript{14}

Elements interfering with space properties act as “spatial generators.” In assessing walls, slabs and columns, the proposed term picks on their significance, and the same is also true for any element of solid or other material structure. This term may also describe electromagnetic phenomena. The spatial significance of electromagnetic signals refers to their capacity to influence the properties of space as they transfer energy from the source of emission to a space point. Solids may be described similarly to liquids, gas and electromagnetic fields, as they define space within their volume. Hence, a solid yields distinctive attributes to its volumetric space related to its material properties, also affecting the properties of waves of energy transmitted through it. In effect, elements of any material structure act as spatial generators.

In summary, spatial perception may be described in relation to all elements registered by the sensory organs. Space’s properties and meanings, its transformations and life cycle may be reduced to the stimuli caused by any element. An element causing stimuli is assigned spatial significance. Assigning spatial significance to an element depends on the comparative mode by which it influences space’s properties, resulting from the interaction with other elements. In reverse, an element influences the properties of the space in which it is perceived. With proper sensors, measuring systems and scales, it is possible to approximate the degree of its influence on the spatial properties at a specific point, also in relation to other elements. Spatial perception is the result of the interaction among all elements registered as sensory signals at a specific point.

**Conclusion: reality beyond materiality**

The idea that every element contributes in the formation of spatial perception influences common understanding on the notion of space: how it is identified, how it interacts with various activities and how it is

\textsuperscript{14} Perceptions of space and time make up space/time. Any of the properties of space/time, such as distance and duration, depend on the sensory stimuli creating experience. Beyond, before or after the specific space/time a stimulus is perceived, no signal or change is registered, thus any observation about space and time referring to that stimulus is impossible. Space/time is outlined by the potential to register matter as mass or energy, in respect of relativity theory. Here the focus is on space, whereas time may be explained in a similar manner.
affected by them. Perception is a highly mental construct, being the outcome of interrelations among various sensory stimuli, caused by elements of any material structure. These elements may form hierarchies and dependencies also at varying timeframes, with some being more active, permanent, primary and dominant, and other ones being more temporary/periodical, discrete and subordinate.

Moreover, spatial perception may be reduced to the stimuli by which every element is registered at a specific point. The event of registration of stimulus by a sensory organ — the retina of the eye, the membrane of the ear, the mechanisms of touch, the addends of taste and smell, also to any natural or artificial organ — is a moment of energy exchange, in which matter is transferred from the element source to applicable receptors. Any consequent characterization of elements is the result of interpretive, comparative and evaluative operations based on prior knowledge and experience, also founded upon definitions, assumptions and hypotheses, setting established criteria. These criteria evoke Aristotle’s account on substance. Substance is identified along with the classification of its status as a mass/energy phenomenon, also through space/time transformations, even as a material structure in constant transformation. In physics, the above definition expresses the inseparable relationship among space, time, mass and energy set out by the General Theory of Relativity. In that regard, spatial significance may be assigned to elements of any status, being empirically or scientifically recognized.

Common assumptions about space should acknowledge how spatial experience is created, including elements other than solids. Descriptions of space as a vessel that carries, facilitates or shelters human activities, also as a precondition upon or in which life is performed, are based on the assumption of a static perception about space, ones not communicating space’s dynamic character, it being a complex phenomenon of different actions put together by all elements interacting as agents informing and informed by each other. The formed synapses are happening at a much more intricate level of interactions among everything registered to the senses, including reflections, mirages and all other signals, even elements belonging to virtual, digital, interactive and alternative worlds, also holograms and other kinds of narration, in short, anything described as an “apparition.”

Additionally, there are a number of factors upon which judgments about reality are inevitably conditioned, mainly referring to the indirect relationship between a stimulus and its meaning. As Fechner observes, a
stimulus does not release proper sensations directly, but only when a living brain has the living nerves to transmit the effect of the stimulus to the brain.\textsuperscript{15} Acquired knowledge produces awareness causing awakening about a stimulus, being a set of internal operations of body and mind that up to then were unnoticed.\textsuperscript{16} Moreover, as stated in recent theories of cybernetics, absolute objectivity is untenable, framed instead upon the observation that an element’s characteristics are defined through comparative assessment of related stimuli, being dependent on, and subjective to, the observer. Consequently, what is currently set outside of accepted norms about reality may in a future moment be viewed as real.

At the margins of this rather unsettling realization, one may compensate with the fact that it is possible to describe spatial perception by breaking down each of the elements into the stimuli they produce and then by measuring and converting them to data. Ideally, such a process would be extended to include activities in space, also ideas, even our own selves. Reality may be described as a result of infinite numerical combinations, which was given “flesh and bones” due to materialization processes. Admittedly there are similarities between such cognitive processes on the one hand and those with which the computer “renders” the elements of the digital worlds; thereby, it is reasonable to consider the reality in and with which we cohabit as being digital — that is, similar to the “Matrix.”

The symposium’s main theme has set the conditions to tackle theories related to spatial perception ranging from architecture and art, to media, sociology and psychology and also to computer science, cybernetics, philosophy and physics. It has suggested an interdisciplinary discourse with the aim to interrogate and then to link theories of different origin largely considered as being foreign to each other. The outcome may serve as testimony to a dialogue of great complexity and depth, setting the ground for insightful speculations about architecture, further enriching our awareness about reality.

\textsuperscript{15} Fechner, “Elements of Psychophysics,” 146.
\textsuperscript{16} New discoveries and innovations may emerge from an established setting, gradually cultivating a new belief in the replacement of previous ones. Pinch and Bijker analyze this specific issue, thus attributing social significance to the content, the causes and aspirations of the natural sciences. Pinch and Bijker, “The Social Construction of Facts and Artifacts,” 20–28.
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