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The Human Body in Architectural Theory and Practice

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Abstract. This article deals with representation of the human body in architecture. The human body as a statically balanced symmetrical figure is an antique, time-bound representation of the body and it is important to challenge that image in a modern and more nuanced understanding of being human. To identify some of architecture's reproductions of the human body, we make some historical cuts and exemplify representations of the body in architectural theory. First, we briefly describe the origin of Homo Bene Figuratus (Vitruvius introducing the doctrine of the well-formed body) and the image of the body characterised by geometric proportioning. We then exemplify similar renderings of Reference Man which followed the Vitruvian Man right up to the present. Le Corbusier's "Le Modulor" follows the same path, in a modernist worldview, helped along by Ernst Neufert´s ideas on theory of proportion, first stated in 1936, which standardisation have remained unchanged as essential reference. As a critical response to bodily reductive perceptions in architectural theory, we go beyond Reference Man and seek a broader in-sight into the understanding of human diversity and varieties of bodily abilities. Seen through a Universal Design perspective, a view of the human body as absolute geometric figure inscribed in fixed coordinates has difficulty representing ideas of human beings as a diverse group of bodies. This view also has difficulty representing the idea of the human body as changing through a lifetime. A fixed standard can overlook the human being as diverse in bodies and abilities and even come to leave out significant aspects of design such as health, social wellbeing, and sensory qualities of architecture. In our discussion, we go into more detail about the significance of representations of the ideal human body for the design of architecture and suggest what consequences it may have for architectural practice.

Keywords. Representation, Architecture, Universal Design, Social Wellbeing

1. Introduction

In this article we seek an insight into the understanding of the human body in architectural theory and practice. We also study what consequences reductive renderings of the human body in architecture, may have for society and whom we build for.

The human body inscribed in a precise and measurable matrix has its roots back in time to the first written architectural theoretical thoughts about man and architecture. Though, it is an antique, time-bound representation of the human body, various examples have followed in development of architecture, and it is important to question the applicability of that image in a modern and more nuanced understanding of being human.

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With societal and international movements towards concepts such as Universal Design and Inclusive Architecture, understandings of being human and notions of bodily diversity are changing. These changes are challenging architectural education and practice, in which design of space is expected to align with societal movements. It also challenges architecture's representations of the human body that must relate to new interpretations of the term user, understood as every-body. Building upon the literature study and selected interviews from the PhD project "Generating Inclusive Built Environments through User Driven Dialogue in the Architectural Design Process" we lay out a framework for understanding how the human body is understood in architectural practice and how perceptions of the body leave its imprint on architectural practice. In addition to the literature study the research is covering thirty-two qualitative semi-structured interviews with user representatives[2] and professionals from the architectural field. All interviews with a focus on collaborative work and knowledge creation.

To seek an insight into the relationship between representations of the human body and creation of architecture, we draw on architectural historical sources and exemplify representations of the human body in architecture. As a prerequisite for understanding the background of these historical representations and their relation to architectural practice, we bring in Frank Zölner's works on anthropomorphism [1,2]. First, we briefly describe the origin of Homo Bene Figuratus, Marcus Vitruvius Pollio introducing the doctrine of the well-formed body in De Architectura Libri Decem. This is the image of a perfectly balanced symmetrical body understood as a guiding tool in geometric proportioning of architecture [3]. We then explore similar renderings which followed Vitruvius. Like Vitruvius before him, Leonardo da Vinci derives the measurements of the perfectly balanced body from a grown man, Homo ad Circulum (Vitruvian Man) positioned in the center of a circle, touching a square. Much later in architectural history Le Corbusier's "Le Modulor" follows with a representation of the well-proportioned male body accompanying industrialisation, in a modernist worldview, helped along by Ernst Neufert's standardisations [4].

As a critical response to the human body as a normative standard figure, we discuss how reductive renderings of the human body as influencing the history of architecture, both in a theoretical and practical sense. Normative renderings of the human body are criticised for having, over time, grown into architectural education and practice and for leaving their mark on our understanding of the body in design of spaces. We draw on architectural historical sources and among others critical perspectives of British Professors of Sociology and Researchers Carol Thomas and Rob Imrie. Both challenge notions of the normative human body, although from different points of view. We also bring forward the discussion to UIA World Congress, Copenhagen 2023 and Nyasha Harper-Michon who as a Next Gen Keynote Speaker and self-proclaimed "Archtivist" spoke about thinking beyond Reference Man.

We discuss how simplified renderings of the human body and fixed standards can overlook the human being as diverse in bodies and abilities and even come to leave out significant aspects of design such as health, social wellbeing, and sensory qualities of architecture. We assume when some bodies are placed in a privileged position, there will naturally be others which are placed in a less privileged position. In our conclusion we evaluate what consequences this may have for society and whom we build for.

[2] Interviews with users which represent examples of bodily diversity. That is physical, mental, intellectual, or sensory impairments such as people with visual impairments and/or hearing impairments, people with communicative and/or cognitive impairments or people with mobility impairments.

2. Representation of the human body in architecture

The Roman architect, engineer and author, Marcus Vitruvius Pollio (c. 75-25 BC) is considered the first architectural theorist who set guidelines for the design and qualities of architecture [4]. Vitruvius is most famous for introducing in his book De Architectura Libri Decem[3], the three qualities of architecture worth striving for Firmitatis, Utilitatis, Venustatis – that is, stability, utility, and beauty. Vitruvius's thoughts have had a great influence on Western architectural tradition and are still referred to when qualities of architecture are debated.

The terms Firmitatis, Utilitatis, and Venustatis have become the subject of many interpretations and are referred to in various architectural contexts. Some interpretations focus on the aesthetic values, others interpret the concepts as balancing architectural quality, a harmony of stability, utility, and beauty. Several architectural trends, including those that shape the field of architecture today, have held fast to Vitruvius' over 2000-year-old assumptions and they are referred to as architectural tradition. That is important in this discussion on the human body in architectural theory and practice. Vitruvius described the practice of architecture as complex and interwoven with several layers of knowledge. According to Vitruvius, the architect should ideally comprehend both theoretical and practical knowledge based on a broad knowledge of sciences and a deep and nuanced understanding of man (Vitruvius, De Architectura 1 p.46). Vitruvius saw that theoretical and practical knowledge must complement each other.

De Architectura Libri Decem, is a comprehensive ten-volume discourse on architecture. In De Architectura, Vitruvius introduced connections between nature, the human body, and the nature of architecture. As the only surviving thesis on architecture from antiquity, De Architectura is considered the first architectural theoretical work and an important source in the discussion of what architecture is. In addition to a range of information on Greek and Roman building tradition, as well as regulations for planning architectural structures and the use of architectural tools, De Architectura contains extensive observations of nature and man. In his search for the ideal architectural structure Vitruvius treated architecture as an imitation or echo of nature. The work led him to the study of what he interpreted as the perfect building, the human body. The abstraction was the well-formed human body (Homo Bene Figuratus), which nature had created with very specific and coordinated measurements, so that the individual joints fit proportionally to the whole. In his thesis, Vitruvius described the human figure as being the principal source of proportion. In Book 3, Chapter 1 page 3 Vitruvius wrote about the human body:

"Then again, in the human body the central point is naturally the navel. For if a man be placed flat on his back, with his hands and feet extended, and a pair of compasses centred at his navel, the fingers and toes of his two hands and feet will touch the circumference of a circle described there from. And just as the human body yields a circular outline, so too a square figure may be found from it. For if we measure the distance from the soles of the feet to the top of the head, and then apply that measure to the outstretched arms, the breadth will be found to be the same as the height, as in the case of plane surfaces which are perfectly square. "

[3] De Architectura Libri Decem was written approx. 30–20 BC and rediscovered in 1414. Often simply called On Architecture in English.

2.1. Homo ad Circulum

It was such passage which later inspired Leonardo da Vinci to create Homo ad Circulum[4] or The Vitruvian Man, around the year 1485-1490. In drawing, Leonardo examines the Roman architect's theory that the well-formed human body can fit into a geometric construction, a circle, and a square. Leonardo adjusted Vitruvius's measurements slightly and went a step further by also examining the human body in motion. The Vitruvian Man portrays the human body in two positions with its arms and legs in different positions. The man is inscribed in a circle and in a regular square and with a series of classical length indications marked on the figure and on a scale below the figure. They are called Human Proportions and are Da Vinci's proof that there is a mathematical and proportional explanation of how the human body is built. In the text about man, Leonardo da Vinci reproduces the ideal measurements that Vitruvius had indicated, in a slightly altered form. Above the drawing is written:

"Vitruvius, the architect, in his work on architecture, says that the measurements of the human body are distributed by nature as follows: 4 fingers make a palm, 4 palms make a foot, 6 palms make a cubit; 4 cubits make the height of a man. And 4 cubits make a step, and 24 palms make a man; and these measurements he used in his buildings.

If you open your legs so wide that they reduce your height by 1/14, and spread and raise your arms until your middle fingers touch the height of your head, you must know that the center of the spread limbs is at the navel, and the space between the legs is an equilateral triangle."

Leonardo da Vinci's fascination with anatomy as mathematics and geometry is clearly expressed in his very extensive description of the Vitruvian Man's body as a geometric figure. Below the drawing is written:

"The length of a man's outstretched arms is equal to his height. From the hairline to the underside of the chin is one-tenth of a man's height; from the bottom of the chin to the top of the head is one-eighth of a man's height; from the top of the chest to the top of the head is one-sixth of a man's height. From the crown of the chest to the roots of the hair is the seventh part of the whole man. From the nipples to the crown of the head is the fourth part of a man. The greatest width of the shoulders contains within itself the fourth part of a man. From the elbow to the tip of the hand is the fifth part of a man, and from the elbow to the armpit is the eighth part of man. The whole hand is the tenth part of man; the beginning of the genitals marks the middle of the man. The foot is the seventh part of man. From the sole of the foot to below the knee is the fourth part of man. From below the knee to the beginning of the genitals is the fourth part of the man. The distance from the bottom of the chin to the nose and from the hairline to the eyebrows are each the same, and like the ear, one-third of the face.[5]"

Leonardo da Vinci was fascinated by the illustrations of man depicted in geometric figures, which were sketched in the work of Vitruvius. These drawings often painted

[4] Homo ad Circulum or L'uomo Vitruviano is in the Gallerie dell'Accademia in Venice, Italy.

[5] The Notebooks of Leonardo DaVinci Vol. 1 pp. 182-3
https://mymodernmet.com/leonardo-da-vinci-vitruvian-man

man placed in the center (microcosm) surrounded by symbols of the astronomical and astrological worldview (macrocosm). Despite Leonardo da Vinci's fascination, he broke with this tradition and left man alone. In Leonardo da Vinci's own drawings, it is mainly the human body who figures and with a scientific and mathematical precision.

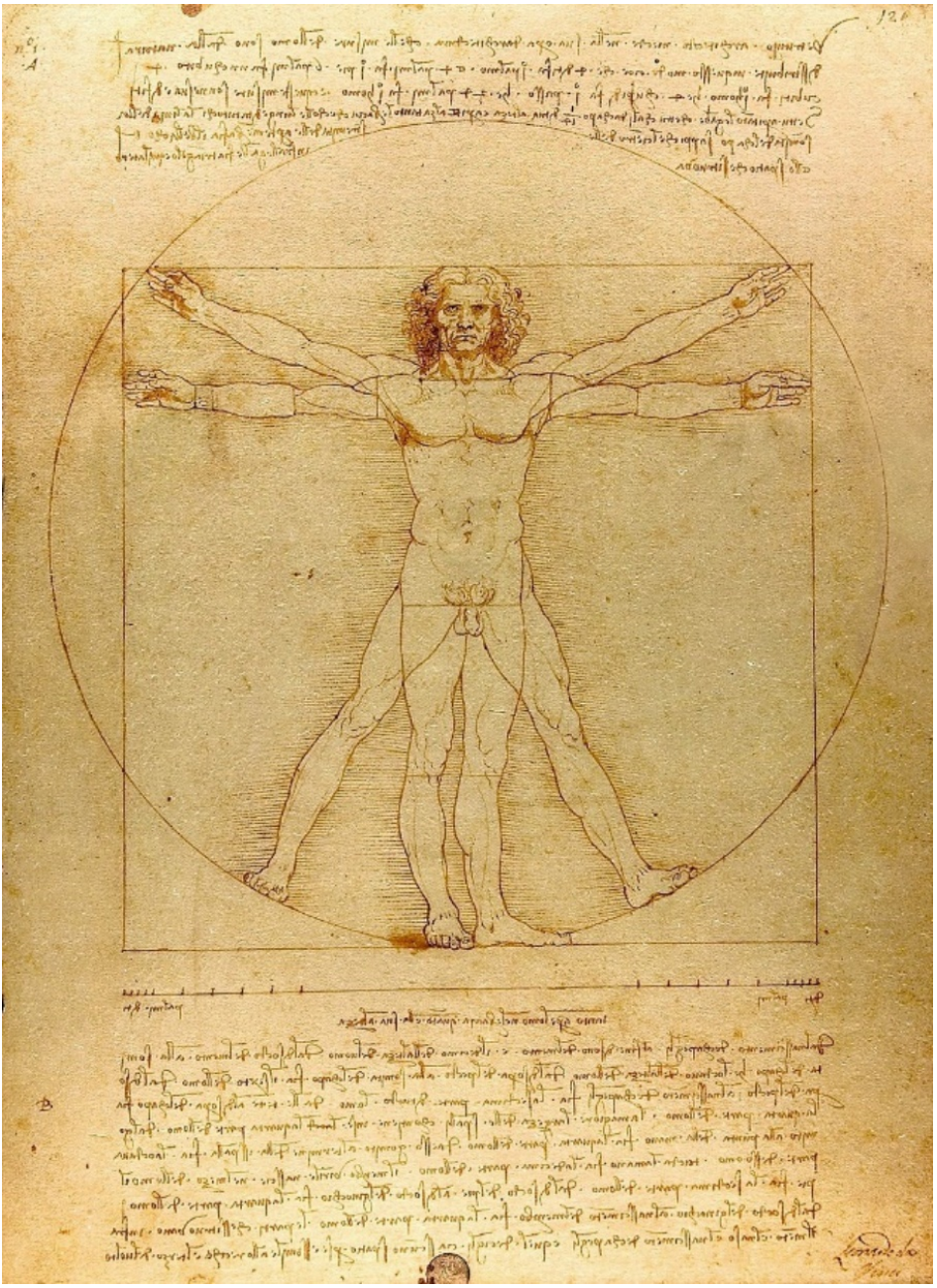

Figure 1. Leonardo da Vinci's Vitruvian Man. Demonstration of the perfect ratios and proportions found in human anatomy [source: wikimedia commons].

The Vitruvian Man was originally an attempt to establish a scientific basis for the art of painting, which was otherwise considered only a craft, to demonstrate the perfect ratios and proportions found in human anatomy. Leonardo da Vinci's drawing has later been interpreted as the essence of Renaissance humanism and Renaissance man's view of the world as a cosmos, a harmonious and ordered whole. The drawing of the Vitruvian Man has become an allegory for Renaissance humanism, which places man at the center of its understanding of the world.

2.2 Bodily reductive representations in architecture

The Vitruvian Man reaches right into the present day and is today a well-known drawing that is referred to in several different contexts. In architecture, similar renderings of the human body have followed the Vitruvian Man, often as proportional models for dimensioning or as an anthropometric[6] standardisation tool. These representations of the body are used in several architectural standards to convey relationships between body and space. The stylised illustrations can be seen as a metric[7] tool for understanding the relationship between the body and architectural functions [4].

We will get closer to the consequences which an image of the normative human body as a reference or geometric measuring instrument can have in the creation of architecture. We also touch on how architects are criticised for delimiting or excluding bodily diversity in their works.

One researcher who pays attention to understandings of the human body in relation to architecture and in particular Universal Design is English professor Rob Imrie at Goldsmiths University of London. Through his research work, Imrie has, among other subjects, dealt with a critical perspective of the architect's normative or bodily reductive notions. Imrie sees reductive renderings of the human body having an impact on today's architectural education and practice and he is backed up by several research findings. Imrie's studies are based on observations which show that architects rarely relate to the human body in their design strategic considerations. Imrie notes that architectural practice only lightly touches the physiology and sociology of the body. Imrie also sees architectural journals as reflecting architects' attention to form and aesthetics devoid of references to human bodies or human activity [5]. Imrie notes that when architects relate to the human body, it is often in the image of the normal body, and he challenge what he calls the dominance of body-reductive notions in architecture. Imrie believes that a limited understanding of the human body has major consequences for who the architect is designing for. With a limited understanding of the human body as physiologically diverse, the architect designs for a limited number of users [5,6]. One of Imrie's theses is that the ancient architecture-historical renderings of the human body are still present in the field of architecture. He does not see this as a British phenomenon; the consequences are seen as a worldwide problem. Drawing upon studies from the Danish PhD project "Generating Inclusive Built Environments through User Driven Dialogue in the Architectural Design Process", implications are that this is very much the case. Here too, interviewees from the architectural field rarely relate to users as a diverse group of bodies, but instead rely on a predominant standard body. Moreover, if other bodies are included

[6] Anthropometry, from the Greek anthropos: human, and metron: measure.

[7] In mathematics, a metric space is a set where a distance is defined between elements in the set. In an architectural context, the elements are seen as distances between the human limbs and functions.

in the design process, it is more as an afterthought, compensating ad-on designs[8] for bodies that deviated from the "normal body". Unintendedly, this notion encourages a design thinking which separates accessibility and architecture, so that accessible solutions appear as special add-on designs detached from the architectural concept, hence also solutions that separates abled bodied from disabled bodied [7,8,9]. With a feminist perspective Carol Thomas advances these observations and include both gender and ability. Thomas points out how reductive notions of the normal body not only exclude other bodies in physical structures; more importantly, physical structures leave their mark on societal structures. According to Thomas material barriers such as lack of accessibility are not only a problem because of physical exclusion and marginalisation, it creates relational barriers in the lives of the excluded [10]. Thomas´ observations are supported by the earlier mentioned PhD project where interviewed users with impairments find that, at times architecture instead of supporting opportunities, contributes to regulating how one as a human being can unfold and interact with others [8,9]. In Disability, Space, Architecture, Jos Boys discuss not only disability but also ability and dis/ability as a means of rejecting the normalisation of the body in design of architecture. Boys believes that students and architects can learn more about creativity and innovation by embracing many different bodies in their design thinking. Rob Imrie agrees. In the article *Architects' conceptions of the human body*, Imrie investigate how far and with what consequences a reduced understanding of the body supports contemporary architecture. Imrie discusses architects' understanding of the body in a historical perspective and compares this with interviews of architectural course leaders from four British architect schools as well as interviews with 41 practicing architects. The results from Imrie's study pointed, among other things, to insufficient teaching about the body as physiologically diverse in architectural education. Teachers and supervisors at the selected schools also found that teaching about social and sensory aspects of users' interactions with buildings was lacking. He also noted that the complexity of the human body's interaction with architecture was rarely addressed or documented in the students' assignments [5 p.55].

Now, twenty years after Imries observations, young architect and self-proclaimed "Archtivist" Nyasha Harper-Michon argues that Reference Man is still very much alive. As a Next Gen Keynote Speaker at UIA World Congress, Copenhagen 2023 Harper-Michon claimed that the one thing standing between us and achieving inclusive built environments is our long and biased love affair with Reference Man. Harper-Michon argue that our focus on Reference Man leaves an absence of empathy with other bodies and completely disregard women, children, the elderly, LGTB+, people of color, people with disabilities and even most men [11]. So, even though the Vitruvian Man is an antique, time-bound archetype, similar body-reductive representations of the human body have followed architectural theory and practice right up to the present day. Hence representation of the human body and technical standards are still based on an idea of the "normal body" [12,13,14]. A publication such as Architects' Data by Ernst Neufert and Peter Neufert is an important reference in that context. Neufert’s ideas on theory of proportion and anthropometric representation of the human body first stated in 1936, have remained largely unchanged in all 43 editions and translations 22 of Neufert Bauentwurfslehre. This encyclopedia dealing with ergonomics and functional building layouts is used in education and architectural professions worldwide [2]. Another well-

[8] By *ad-on designs* we mean sub-elements of architecture such as accessible door widths, wheelchair ramps and arrangements of accessible toilet facilities.

known example is the French architect Le Corbusier´s Le Modulor, an anthropometric scale of bodily proportions that he used in both the creation of his art and architectural works[9]. This model is like The Vitruvian Man depicted in numerous publications and applied in architectural education and practice. Le Corbusier's understanding of the body follows the same path as Marcus Vitruvius Pollio, now in a modernist worldview. Le Corbusier sought the purity of the geometric ideal in his work and turned to the Renaissance to find a system of composition and proportion that could complete his works. He studied the golden ratio (le nombre d'or) which he used in his art productions for 20 years. From Le Corbusier's fascination with the golden ratio grew the proportional system Modulor d'or or le Modulor, which he used in his artistic and architectural works. According to Le Corbusier, Le Modulor should be understood as the relationship between man and architecture based on a mathematics and geometry found in nature [15]. The idea was that all size ratios in a building could be determined based on the model, so that human proportions were incorporated in architecture. At first, Le Modulor man´s height was based on a French man's height of 1750 mm, but it was changed to 1829 mm in 1946 because as Le Corbusier said, "*Have you never noticed that in English detective novels, the good-looking men, such as the policemen, are always six feet tall?"* [16 p.221].

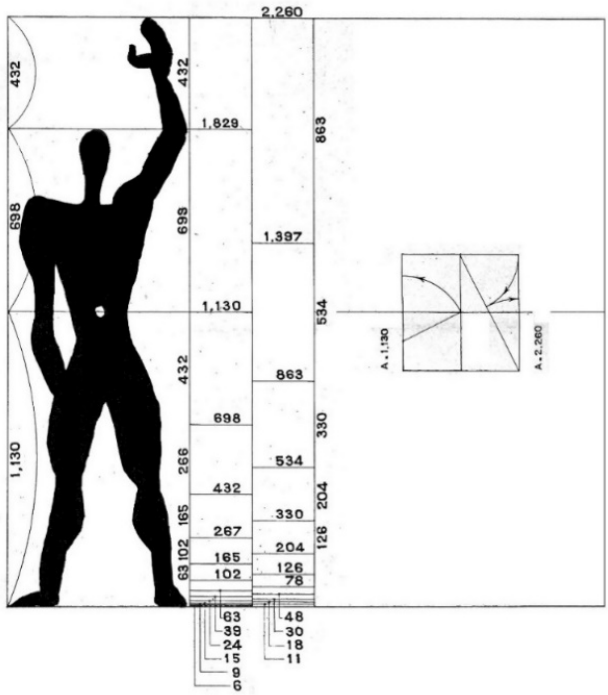

Figure 2. Le Corbusier's Le Modulor, anthropometric rendering of the human body [source: alamy].

[9] Le Modulor was used by Le Corbusier to determine the composition of the Chapelle Notre Dame du Haut, Ronchamp in France (1955), but the system was also used on a much larger scale in Le Corbusier's planning and design of the Indian city of Chandigarh (1952) at the foothills of the Shivaliks, Himalayas.

Rob Imrie has challenged the dominance of what he sees as bodily reductive notions in architecture. Among others, he points to Le Corbusier and his understanding of the body as a proportional tool [5 p.48]. In Le Modulor, Le Corbusier, like Vitruvius, sought the relationships between man, nature, and architecture. In this way, Corbusier leaned on an understanding of the human body that Marcus Vitruvius Pollio introduced in De Architectura Libri Decem (30–20 BC), now in a modern context. This hindsight is one of the observations that Imrie view as problematic [17]. Another aspect that is problematises is Vitruvius' and later Le Corbusier's glorification of the perfectly formed body. Idealised renderings of the human body are criticised for having, over time, grown into architectural education and practice and for leaving their mark on architecture as exclusionary. Le Modulor represents the normative and well-proportioned male body. As a result of that mindset and because Le Corbusier's is considered an architectural authority, Imrie sees modern architectural design calibrated to similar standards [5 p.48].

The French architect, who was also an urban planner, furniture designer, writer, sculptor, and painter, is seen as one of the central figures of modernism. Le Corbusier's architecture has had and still has an enormous influence on architectural education and architectural practice. Therefore, Imrie also faces headwinds in his criticism of Le Corbusier, especially from the field of architecture. In the criticism, it is important that Imrie has no education in architecture or architectural history and is therefore moving into a field of knowledge that is not his own [18]. Another aspect is Le Corbusier's position as a role model. Le Corbusier is regarded by many as one of the "masters of modern architecture" and is hence a "living authority" in the field of architecture. We note that one's critical eye might overlook that Vitruvius and Le Corbusier are considered, in contemporary architectural discourse, as products of their time. As a product of modernity, Le Corbusier embraced a general enthusiasm for the new times characterised by scientific and industrial progress. As industrialised construction developed, modernism became an efficient machine, which was difficult to reverse, and several critical voices have since pointed at modernism as a co-creator of "dehumanising architecture".

We question notions which reduce bodies to a singular type as useful in future designs of architecture. With societal and international movements towards concepts such as Universal Design and Inclusive Architecture, new considerations of bodily diversity are challenging architectural education and practice, which is expected to align with societal ambitions. It also challenges architecture's representations of the human body that must relate to new interpretations of the term user, understood as every-body. When we use the term Universal Design in this article, we refer to the definition outlined by architect, Ronald L. Mace in the 1980s:

"Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" [19]

In the United Nations Convention on the Rights of Persons with Disabilities (CRPD) Universal Design is introduced as means to generate Inclusive Environments which reduce barriers and limitations. In article 2, universal design is defined as:

"the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" [10]

The human body as absolute geometric figure inscribed in fixed coordinates has difficulty representing ideas of human beings as a diverse group in bodies and abilities. This figure also has difficulty representing the human body as changing through a lifetime as understood in universal design thinking. It is limited in its representation on the human body and limiting in its understanding of who we build for [12,14]. Nevertheless, we see reductive renderings of the human body influencing architectural education and practice and argue that these renderings have an impact on to which extent architecture is designed for every-body [11].

2.3 Reflections

Although the thoughts of Vitruvius and Le Corbusier do not seem to be taken up unreflectively in the modern architectural discourse, both have had a great influence on how the human body is understood and portrayed in architecture.

We would like to challenge Reference Man and question the applicability of that image in a modern and more nuanced understanding of being human. Firstly, we challenge the notion that the relationship between man, nature, and architecture lies in the mathematics and geometric composition advocated by Vitruvius and Le Corbusier. The renderings of the body as anatomy, lines, measurements, and proportion can not stand alone in creation of spaces for the sensuous nature of the body [20,21,22]. Secondly, bodily reductive notions can overlook the human being as diverse in bodies and abilities and even come to leave out significant aspects of design such as health, social wellbeing, and sensory qualities of architecture. Le Modulor exemplifies how the search for an ideal human figure creates a basis for discussion in modern understandings of body and architecture. If architecture is created based on the harmonious, symmetrical, and well-proportioned male body with a full height of 1829 mm. and with the navel placed at a height of 1130 mm., must one assume that the architecture is not created for human bodies that are not inscribed in the modular system?

We assume when some bodies are placed in a privileged position, there will naturally be others which are placed in a less privileged position. What consequences may this have for society and whom we build for?

When ideas about the ideal human body become a dominant discourse, they come to form an obvious social reference point in relation to what we instinctively understand about and associate with a human being. It results in a certain view of being human through which able-bodied people are automatically favored and privileged. More importantly, notions of the ideal human body have over time supported ideas on which ableism is based [23]. The idea of a standard body, that all people have similar anatomical proportions, by which society should be organised accordingly. Representation of the ideal human body in architecture is an example of how ableism is institutionalised, e.g. through educational institutions, and which in turn is reproduced when architects set up the framework for the lived life.

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10 https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html

We argue that representation of the ideal human body in architecture also has resulted in unconscious cognitive biases which have been learned through education and socialisation. When the ideas of the ideal human body continuously are reproduced in the educational systems, and people who get an education are predominantly able-bodied, those who design the framework for society will often tend to design for themselves and their own body as a biased reference point. This happens because ideas of the ideal human body become a dominant discourse which is allowed to stand unchallenged and appears to us as obvious and self-evident. This contributes to the idea of the ideal human being internalised by us and which, among other things, emerge in the design of cities, buildings, products, etc. In psychological research, the phenomenon is described as in-group and out-group bias. This implies that we as human beings have an unconscious tendency to favor people who are like us and do the opposite to people who are not. This is in many ways the core of structural ableism: that certain ideas and notions trickle down through different layers of society and are allowed to define how we arrange our societal, political, social, and architectural structures [23,24].

When architectural structures are built for the privileged able-bodied in a way that some are excluded, and physical structures are not supporting opportunities for participation for every-body, this naturally has consequences. This both for society and the individual. Consequences appear in the form of fewer having the opportunity to receive an education, enter the labor market or form and maintain relationships with others. In relation to the latter, British researcher Carol Thomas (1999) points out how material barriers create relational barriers in the lives of the excluded. By that she argues that people with impairments are excluded from interacting with and having relationships with others. According to Thomas, there is a relation between material barriers such as lack of accessibility and people's opportunity to develop as human beings through togetherness, interaction, and social wellbeing. The physical constructions of society influence the social constructions of human relationships. That people with impairments socialise less with their family and friends than others is supported by several studies [25,26].

Research show how lack of accessibility is perceived by children and young people with impairments as a direct message that they are not welcome and are worth less than others [27]. Furthermore, for many it is one of the primary reasons why they cannot be with their friends and family to the same extent as others, which in some cases results in loneliness and exclusion from central arenas in their everyday life [28]. Being present and having the opportunity to interact with one's friends gives children and young people, a sense of belonging and a knowledge of the "social history" of events that forms the basis for further interaction and conversations. If you are first left out of the social history, it can be difficult to build up again, with further exclusion as a result [28].

Unequal opportunities for participation in society, because of material barriers, also have an impact on how and to what extent people with impairments can be part of public space. In order, to design urban spaces and architecture for more, reflections on human diversity and variations in body functions and senses are fundamental. When this is not the case, some are left out of society's collective consciousness. By that we argue that as a society we overlook human beings as diverse in bodies and abilities and even come to leave out that societal structures must reflect that diversity.

With Universal Design as a lens, a publication such as Architects' Data and Le Corbusier's use of a modular human body can be problematised as simplistic and unvarnished. In addition to the body being reduced to geometry and mathematics it is reduced to one body [29].

In 2010 a new architectural handbook Raumpilot, by Thomas Jocher and Sigrid Loch was published in Germany [30]. Here too, measurements of the human body form an important foundation for further considerations on urban planning and architecture. However, these measurements of the human body are no longer illustrated with one well-proportioned male body. Instead, a wide range of bodies are represented in the handbook. The body representations, without being subjected to a reduced ideological understanding of the human body, embrace gender, age, body types and abilities, all put in everyday life situations. This handbook seems to seek a broader insight into the understanding of human diversity and varieties of bodily abilities. Driven by societal and social movements, more and more modern and young design studios are critical of fixed stereotypes and show an interest in the value of human diversity in lived spaces (e.g. Joel Sanders, Katarina Bonnevier, Sasha Costanza-Chock). Recent publications such as Raumpilot may possibly in time replace Neufert's Bauentwurfslehre and pave the way for a more nuanced understanding of the human body in architectural theory and practice.

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