

FRANK ZÖLLNER

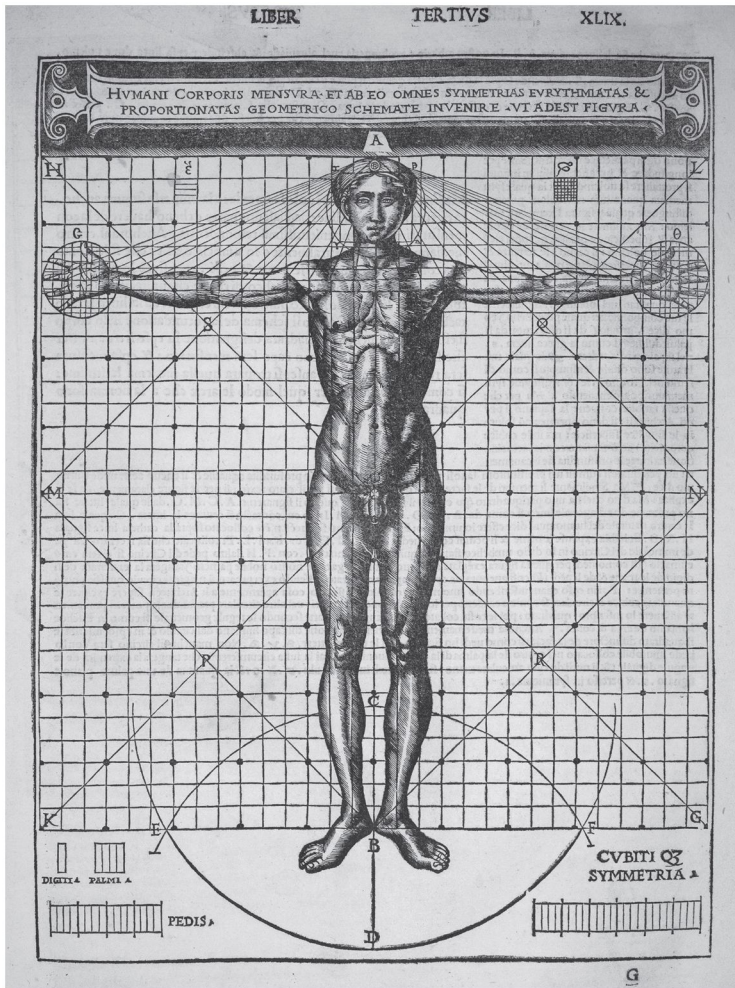
# Anthropomorphism: From Vitruvius to Neufert, from Human Measurement to the Module of Fascism

## ANTHROPOMORPHISM AS A FORM OF THOUGHT (*DENKFORM*)

As is well known, anthropomorphism belongs to the oldest and most prominent forms of thought in the history of culture. However, a glance at how the notion of an anthropomorphic God has been received within religious history shows the degree to which this multifaceted form of thought is a problematic construct. Although in many religious doctrines God is imagined as a white adult male, and the transferral of the human form to a higher being seems to be a constitutive element of religion in general,<sup>1</sup> the fragility of anthropomorphic thought was already remarked on and criticized in antiquity.<sup>2</sup> In the canonical writings of Judaism and Christianity, as well as Islam, the information as to whether or not God can be imagined in human form is nothing if not contradictory.<sup>3</sup> This has inevitably led to lively controversies: for example, in the early church at the turn of the 4th to the 5th century, when the so-called “anthropomorphites” were criticized for their image of God.<sup>4</sup> The consequence of this critique was a monotheistic, *logos*-oriented and strictly transcendental idea of God that tended towards scepticism in relation to an anthropomorphic God.<sup>5</sup>

Be that as it may, from a rationalist point of view, “the inadequacy of anthropomorphism for a coherent interpretation of the world” is evident.<sup>6</sup> Thus, some thinkers have considered anthropomorphism as a primitive stage of religion, or at least one that should be overcome.<sup>7</sup>

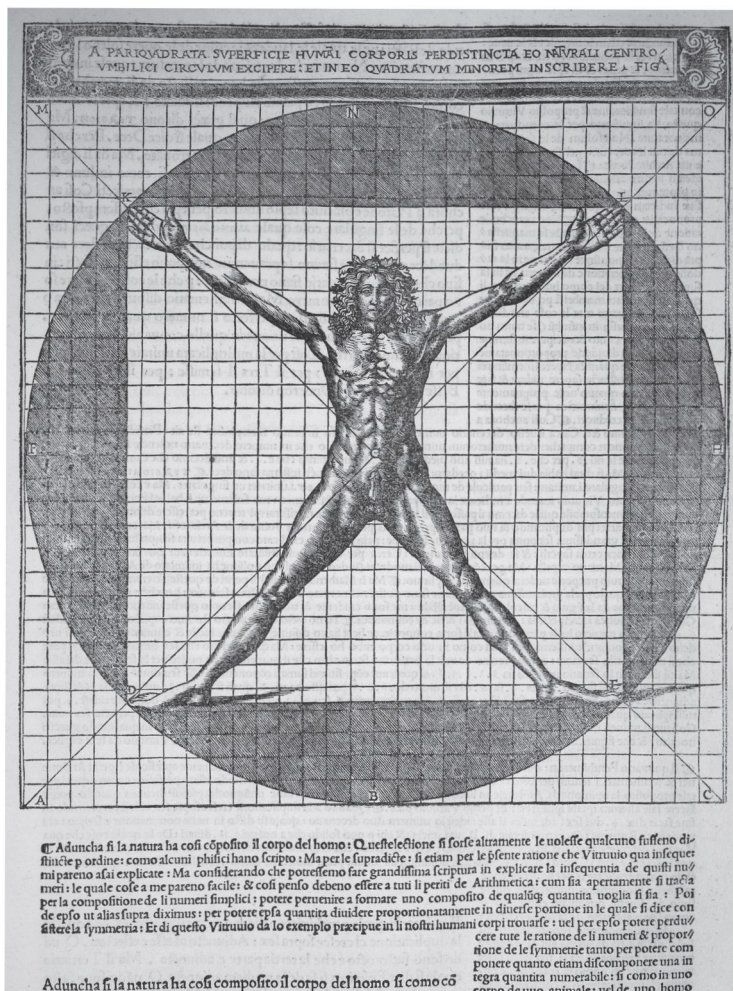
Although anthropomorphism was and still is an idea afflicted with all sorts of contradictions and controversies, it has repeatedly played a role in relation to architecture — both as a form of thought and as an argumentative support.<sup>8</sup> Particularly in theoretical reflections on buildings and their parts — that is, when



1  
CESARE  
CESARIANO /  
"HOMO AD  
QUADRATUM"  
AFTER  
VITRUVIUS /  
1521

architecture is considered in the medium of language — architects, architectural theorists and laypeople have made frequent use of the metaphor of the human body, which was considered as an immediate symbolic model and copy of architecture or its parts. Both the body and the building were defined and metaphorically transcribed with the help of measurements, numbers, proportions

and geometric figures. Hence, the anthropomorphic metaphor has two different forms of expression: firstly, the form or the image of the body itself; and, secondly, its numeric or abstracting translation into numbers and geometric figures.



2  
CESARE  
CESARIANO  
/ "HOMO AD  
CIRCULUM"  
/ AFTER  
VITRUVIUS /  
1521

### VITRUVIUS' PROPORTIONAL FIGURE

All elements of the anthropomorphic metaphor can already be found in Vitruvius' *De architectura libri decem* (FIGS. 1–3),<sup>9</sup> the only architectural treatise to have come down to us from antiquity, which provided architectural theory from the

15th to the 18th century with its most important point of reference. Vitruvius initially describes anthropomorphism with the example of Dinocrates<sup>10</sup> and with a study of the Doric column.<sup>11</sup> However, the most comprehensive as well as the most prominent remarks on human measurement as architectural measurement are found at the beginning of his third book. There he writes that the design of religious architecture is based on symmetry and proportion, and that this design corresponds to the right organization of the human body.<sup>12</sup> He even derives the individual measurements themselves, as well as the two geometric figures of the circle and the square, from a well-formed body stretching out its arms and legs, while the navel forms the body's middle point.<sup>13</sup>

Since Rudolf Wittkower's book *Architectural Principles in the Age of Humanism*, published in 1949, Vitruvius' so-called "homo ad quadratum" (FIG. 1) together with his 'alter ego', the so-called "homo ad circulum" (FIG. 2), have been understood as symbols of renaissance architecture.<sup>14</sup> However, on closer inspection it becomes clear that Wittkower retroactively prefixed this figure to his interpretation of renaissance architecture as an emblem that was closer to the symbolically inflected understanding of 20th-century architecture than to the architectural conceptions of the early modern period.

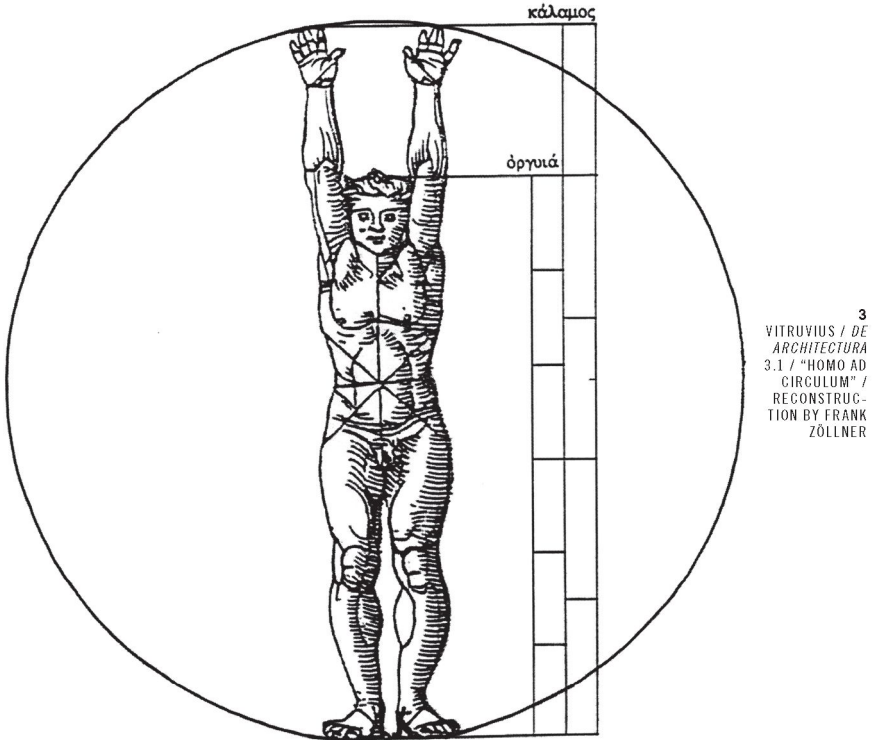
Indeed, the figure described by Vitruvius had no direct influence on the architecture of the 15th and 16th centuries.<sup>15</sup> The anthropomorphic understanding of architecture was not something one could apply directly to architecture since, as a rule, buildings are not actually given the form of the human body.<sup>16</sup> Only the underlying abstract idea of a design could be considered in anthropomorphic terms.

In the following, I shall discuss the importance of this metaphorically meant reference for architects and theorists with examples taken from architectural theory. In doing so, I would like to show how and why the importance of the anthropomorphic view of architecture in the architectural theory of the 16th to the 19th century began a steady decline, and was ultimately called into question. To conclude, I shall examine the resurgence of anthropomorphism in modern and German Fascist conceptions of order.

Vitruvius' discussion of human body measurements relies heavily on ancient building practices and Greek metrology (the science of measurement). This dependency is partly the result of his rootedness in the practice of engineering and building, and partly due to his reception of ancient Greek sources of architectural theory that are now lost.<sup>17</sup> Accordingly, Vitruvius defines measurements as values that approximate the real dimensions of individual body parts.

In the first and third book Vitruvius expressly mentions, as examples of anthropomorphic measurements, *digitus*, *palmus*, *pes*, and *cubitus* (finger, palm, foot, and cubit or ell) among others. He also indirectly mentions the fathom by indicating that the distance between the fingertips of the outstretched arms of a well-proportioned man corresponds to the height of the same man from head

to toe. This measurement, which to all appearances was not even illustrated in the lost original manuscript of *De architectura*,<sup>18</sup> has been correctly illustrated up to the present with the figure of the so-called “homo ad quadratum” (FIG. 2). Since the Renaissance, however, the so-called “homo ad circulum” has been interpreted, probably incorrectly, as a figure with outstretched arms and spread legs (FIG. 1). In his description of the “homo ad circulum”, Vitruvius may well have been thinking of a man with his arms stretched upwards (FIG. 3). Visualized



in this way, the dimension would also correspond to a measurement that was common at the time.<sup>19</sup>

Almost all of the individual measurements mentioned by Vitruvius were part of the anthropomorphic system of measurement that was used in numerous areas of human life — although with local variants that differed considerably.<sup>20</sup> Only with the Metre Convention of 1875 was the human-based measurement system replaced by a geomorphic system obtained from the earth’s circumference — one ten-millionth of the length of the earth’s meridian along a quadrant. This departure from good old anthropomorphism was a decisive event whose consequences have still not been fully accepted by architectural theory.

A certain regret concerning the loss of anthropomorphic measurement can be felt — to mention just one example — in a book that was first published in 1936 by a student of Walter Gropius, Ernst Neufert: the *Bauentwurfslehre* (first published in English in 1970 as *Architects' Data*). This “handbook for the building specialist, client, teacher and student”, which has been translated into fifteen languages and is now in its 40th German edition (2012), is probably the most influential architectural handbook in the world, and it expressly defines “Der Mensch als Maß und Ziel” (literally, “man as measure and goal”. In the English translation of the *Bauentwurfslehre*, this section has been translated as “Man: the universal standard”).<sup>21</sup>

In this chapter (on which more will be said at the end of this essay) Neufert states categorically:

*Even today many people would have a better understanding of the size of an object if they were told that it was so many men high, so many paces long, so many feet wider or so many heads bigger. These are concepts we have from birth, the sizes of which can be said to be in our nature. However, the introduction of metric dimensions put an end to that way of depicting our world.*<sup>22</sup>

Of course, we are born with nothing of the sort! The anthropomorphic systems of measurement that circulated in the most varied forms up to the introduction of the metre as well as the duodecimal system with its complicated fractional calculations were simply not very practical — not to mention the various weight and capacity measurements and the coinage systems. But let us return to the history of anthropomorphism and its steady demise.

#### **ANTHROPOMORPHISM AND LEVEL OF THEORY (*THEORIENIVEAU*)**

The metaphorically meant comparison between body and architecture was also formulated in the Middle Ages, and independently of Vitruvius.<sup>23</sup> There, however, the comparison did not serve as a planning schema, but merely as the basis for the subsequent interpretation of a building.<sup>24</sup> Also to be placed in this tradition of anthropomorphic projection are the art and architectural theorists of the Quattrocento.

One example is the Sienese architect, engineer and painter Francesco di Giorgio Martini (1439–1501). Although the anthropomorphic comparison between building and body can be seen in the various versions of his extensive writings on the theory of architecture, it is especially evident in the early and intellectually less developed version of his architectural treatise. When, around 1480, he made a direct comparison between a building's plan and elevation and the human figure, he was simply combining a medieval view of anthropomor-

phism with Vitruvius' proportional figure.<sup>25</sup> Although, from the point of view of an anthropomorphic idea of architecture, Vitruvius' proportional figure did not offer anything essentially new to the Sienese engineer and architect, it provided him with the opportunity to give an antique cast to medieval anthropomorphism. Similar approaches and motifs can also be found in the art theoretical writings of Lorenzo Ghiberti<sup>26</sup> and Antonio Averlino, called Filarete.<sup>27</sup>

As a figure of thought and argumentative support, anthropomorphism thus made an appearance in the early stages of theory formation, and particularly among those theorists for whom, due to their status as craftsmen, it was a means to social advancement.

Evidence of this is also to be seen in anthropomorphism's dwindling effectiveness towards the end of the Quattrocento, attested to in an exemplary way by Francesco di Giorgio's abovementioned treatise, the second version of which gave less prominence to anthropomorphism than the first, which represented a more primitive level of theory.

The only claim of relevance anthropomorphism still had towards the end of the 15th century was as a rather naïve argumentative support. One might think of Leonardo da Vinci, who used the metaphor of the building as a body in a number of drafts of his letters in order to vie with the professional architects in Milan.<sup>28</sup> However, this decidedly low level of theory formation obviously did not achieve the desired effect since, as is well known, Leonardo got the short end of the stick in relation to the local Lombard architects.<sup>29</sup>

The description of Vitruvius' proportional figure in Cesare Cesariano's Vitruvius commentary published in 1521<sup>30</sup> is another example of a lower theoretical level. Cesariano came from a modest social background and suffered unspeakably at the hands of his extraordinarily vicious stepmother, whose machinations he mentions in his Vitruvius commentary — not without bitterness. There, he describes how, equipped with a compass, straightedge and his Vitruvius commentary, he acquired the courage to escape the poverty and the schemes of his stepmother<sup>31</sup> — of all things with the instruments that guarantee the right measurement in architecture. Cesariano attempted to advance his social standing with the Vitruvius commentary.

Cesariano describes his understanding of the anthropomorphic system of measurement in detail with the example of Vitruvius' proportional figure (FIGS. 1–2). In doing so, he explains in concrete terms the significance of the anthropomorphic measurement for architectural design and on-site measurement, also mentioning the necessary instruments. Accordingly, the man in the square illustrates the “*symmetriata quadratura*”; that is, he shows the possibility of determining, with the help of geometry and the anthropomorphic measurements, the size of all planes (FIG. 2). The measuring instruments Cesariano individually names are measurement standards of various dimensions such as the *bacculo ligneo*, with the length of an ell, and longer measuring instruments

such as the six-foot *trabucco*, the fathom (Greek: *orguia*) illustrated in Vitruvius' "homo ad quadratum", and the ten-foot *pertica*, the longest standard measuring bar.<sup>32</sup> While describing these instruments, Cesariano emphasizes that the measurements required for surveying land or buildings are taken directly from the human body.

Cesariano's text manifests an understanding of anthropomorphic measurements that is immediately compatible with the views of Vitruvius. This precise understanding is explained above all by the circumstance that Cesariano was a practically trained architect and surveyor. He therefore possessed detailed knowledge of surveying practice, which, in relation to the instruments used and the measurements derived from anthropomorphism, was largely identical to the practice at the basis of Vitruvius' formulation.

Although his illustrations of the Vitruvian man cannot be counted among the most beautiful of the genre, it becomes clear in the accompanying text that, as a theorist, Cesariano took the derivation of architectural measurements from the human body especially seriously. As was the case for the theorists of the Quattrocento, his practical training made him especially susceptible to the theoretical concept of anthropomorphism.

#### MUSICAL HARMONY VERSUS ANTHROPOMORPHISM

Whereas the architectural theorists of the early Renaissance, who were still practically trained, used Vitruvius' proportional figure to procure the sanction of antique theory, the succeeding generations of architects and theorists show a slightly more detached attitude to anthropomorphism. For them musical proportion was more important than the direct metaphorical derivation of architectural measurements from the body. Hence, the leading architectural theorists of the Renaissance — Leon Battista Alberti in the 15th century<sup>33</sup> and Andrea Palladio in the 16th century<sup>34</sup> — based their ideas on musical harmony. For these theorists, who either had a higher social standing (Alberti) or a higher level of theory as a result of intellectual advancement (Palladio), the metaphor of human measurement hardly played a role anymore.

In the place of the metaphorically intended comparison with human measurement, attempts were increasingly made to derive whole buildings and their parts from measurement ratios that exactly corresponded, or were thought to exactly correspond, to musical intervals such as the fourth, fifth or octave. A well-known example is the church of San Francesco della Vigna in Venice, for whose reconstruction one simply postulated certain proportions, as an aid to conviction, so to speak.<sup>35</sup>

The extent to which theory formation left anthropomorphism behind while also being raised to an abstract level is shown by the author of the most impor-



tant Vitruvius commentary of the 16th century, Daniele Barbaro, a significant humanist and prominent member of the Venetian patriciate. In the second edition of his Vitruvius commentary, which was first published in Latin in 1556 and then in Italian in 1567, the proportional figure is no longer even accorded an illustration. Moreover, Vitruvius' anthropomorphic measurements have been entirely replaced by a proportional system based on musical harmonies<sup>36</sup>, without any relation to ancient systems of measurement.

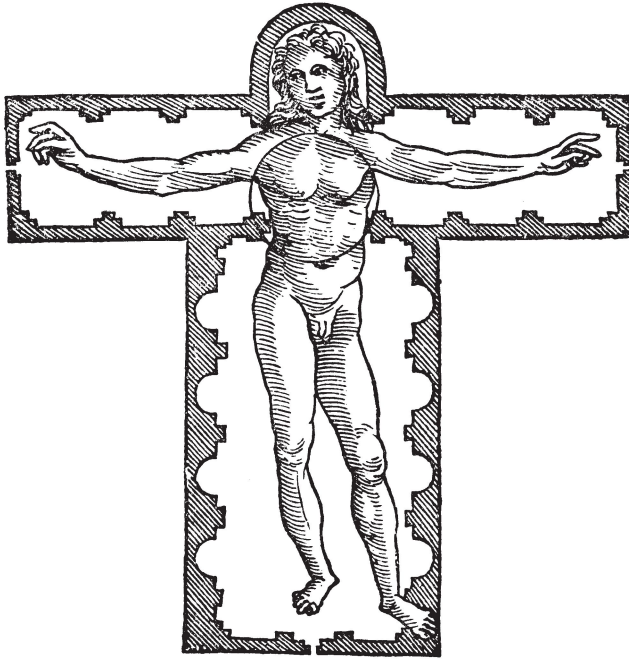
Barbaro's proportional system eventually found its most complete theoretical reception and practical deployment in the Vincentian architect Andrea Palladio, whose architectural treatise no longer accorded anthropomorphism any importance. This was above all due to the fact that intellectually agile authors such as Palladio, as well as his mentors Alberti and Barbaro, replaced an anthropomorphically conceived building ideology with the rational proportional conception of music theory. Music theory could indeed be converted into building practice,<sup>37</sup> as well as be plausibly related to cosmic harmonies considered from a similar musical standpoint.<sup>38</sup>

#### THE PROVISIONAL END OF ANTHROPOMORPHISM

A far more radical questioning of the anthropomorphic conception of architecture took place in the French architectural theory of the 17th century. This break was carried out most clearly by Claude Perrault's French Vitruvius translation first published in 1674 and again in 1684.<sup>39</sup> In the footnotes to Vitruvius' text, Perrault presents his own views on proportion, which are decisively opposed to all previously known traditional conceptions, and hence also to those of Vitruvius himself. Perrault categorically rejects a traditional theory of proportion that could be applied to architecture like a law of nature. In his commentary on the origin of the Doric column, whose proportions Vitruvius derived from the length of the human foot (see above), he even explicitly goes against the hitherto prevailing conception. As he writes, proportions in architecture have nothing natural about them; they do not follow incontrovertible rules such as those derived from the dimensions of the stars or from the parts of the human body. Rather, architects establish the proportions of a building based on an agreement ("*consentement*") determined by tradition and custom.<sup>40</sup> Hence, the foundation of beauty is not human measurement but the power of human custom. Perrault's uncompromising rationality, which also placed him in strong opposition to his period's absolutist academic doctrine of art, is yet to be surpassed.

Of course, Perrault's break with the anthropomorphic theory of proportion did not go uncontested.<sup>41</sup> Nevertheless, his influence can still be felt in theories from the 18th to the 20th century.<sup>42</sup> Accordingly, Bernardo Galliani, in his 1758 Vitruvius commentary, pays little attention to human proportions. In fact

Galliani explicitly opposes an all too serious conception of anthropomorphism, even criticizing the commonplace circulated by Pietro Cataneo in 1567 that the proportional figure directly underlies the ground plan of Christian church architecture (FIG. 4).<sup>43</sup>



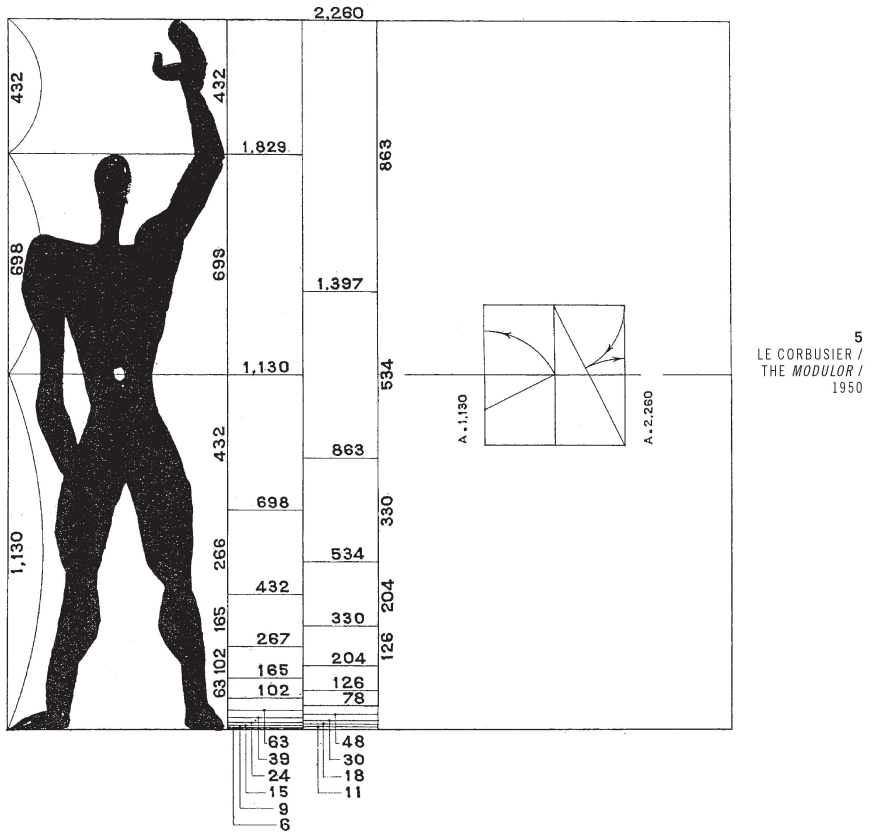
4  
PIETRO  
CATANEO /  
TREATISE ON  
ARCHITECTURE /  
1567 /  
CHURCH PLAN

The renunciation of man as the measure of all things was further reinforced by the introduction of the metre in the 19th century. Although the human body was still occasionally compared with the building and its parts,<sup>44</sup> the importance of architectural anthropomorphism was on the wane, even as a nonbinding metaphor. Thus, at the beginning of the 19th century, Jean-Nicolas-Louis Durand (1760–1834) contested the relation between the human body and architecture, rejecting for example the derivation of the proportions of a column from the measurements of the human body. He suggested using arbitrary proportions.<sup>45</sup>

Other theorists, such as Eugène Emmanuel Viollet-le-Duc (1814–1879) and Auguste Choisy (1841–1909), formulated a concept of proportion that was dependent on structural analysis and geometry.<sup>46</sup> In the 18th century, English theorists began to argue along similar lines.<sup>47</sup> Although in Anglo-American culture anthropomorphic measurement and duodecimal calculation remained significant into the 20th century, an empirical, rationally determined attitude led to the renunciation of anthropomorphism as a figure of thought.<sup>48</sup>

THE RETURN OF ANTHROPOMORPHISM IN MODERNITY

Another reason for the renunciation of anthropomorphism in the 18th and 19th centuries should be searched for in industrialization, which favoured an empirical and functional conception of architecture. Nevertheless, in the 20th century the serial production of single building units accompanying industrialization seems to have stimulated the renaissance of an anthropomorphic theory of proportion. It is entirely in this sense that we should examine probably the best-known attempt to revive architectural anthropomorphism: namely, the *Modulor* (FIG. 5) of the Swiss painter and architect Le Corbusier. Indeed, one of

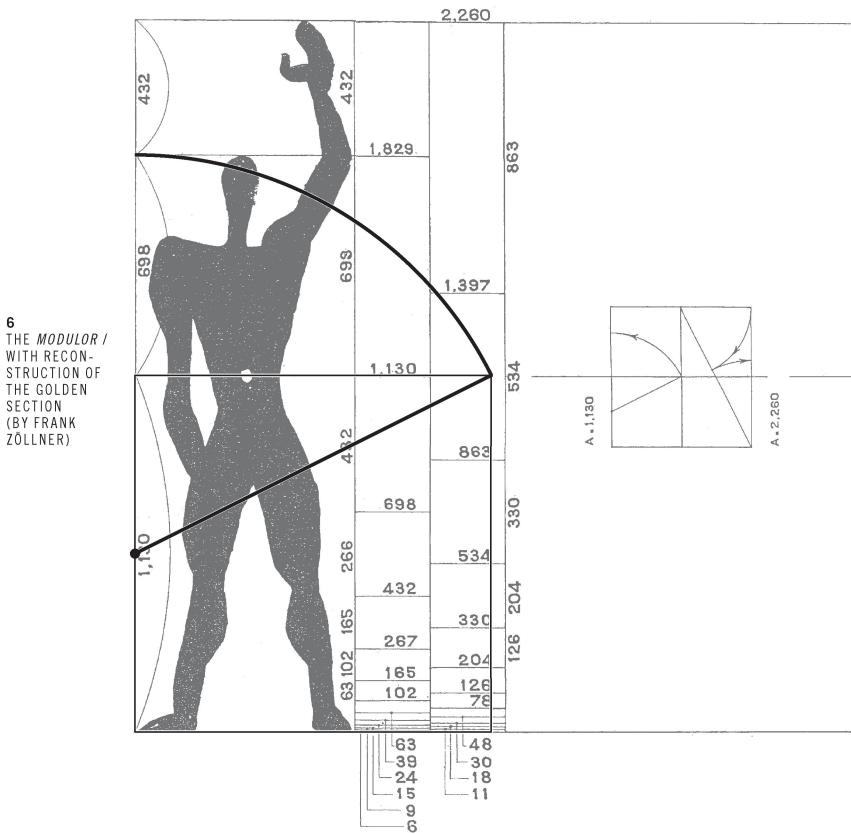


the basic concepts of the *Modulor* is its relation to serial production and the standardization of architectural parts.<sup>49</sup>

Already in the years between 1910 and 1911, Le Corbusier anticipated the *Modulor* in his reflections on a proportional system based on the golden sec-

tion.<sup>50</sup> However, as Eckhard Leuschner has recently been able to show, the *Modulor* should also be understood in the context of certain ideas of the 1920s and 30s about harmony and order.<sup>51</sup> Le Corbusier developed rather more concrete steps towards the *Modulor* in 1943 in Paris. Finally in America, in April 1947, he made his proposals public. The definitive text version of the *Modulor* was completed in November 1948.<sup>52</sup>

Le Corbusier's description of the *Modulor*'s genesis has become the subject of legend. According to Le Corbusier, the proportional figure was conceived during Germany's occupation of France as a reaction to the mental hardship and material needs of the time.<sup>53</sup> As a system of measurement Le Corbusier intended the



*Modulor* to take into account man's average dimensions while also being based on nature's mathematical law of proportion. To achieve this he transferred the golden section to the dimensions of the human body. The figure's height was initially determined at 175 cm, but subsequently changed to 183 cm. With his arm

raised above his head, the figure has a height of 226 cm; the distance from navel to toe now measures 113 cm.<sup>54</sup>

The artist provides two explanations for the growth of his proportional figure: firstly, well-built policemen in English detective novels were six feet tall, which corresponds in the metric system to a height of 183 cm; secondly, this measurement would give rise to a larger number of correspondences between the metric system and the anthropomorphic measurements of Anglo-American culture.<sup>55</sup> Especially the first of these two explanations gives us reason to suspect that Le Corbusier did not take the *Modulor* quite as seriously as its later adherents (see below). Indeed, Le Corbusier's allusion to the size of policemen in detective novels testifies to a rather relaxed attitude in his treatment of "natural laws", which in the general idea of measurement dealt with here are taken entirely seriously as "innate" (see above) and eternal.

The relation of the dimensions selected by Le Corbusier to one another corresponded approximately to the proportions of the golden section. The Swiss architect developed the number and proportion series while crossing the Atlantic in a "terrible storm" and in a heavy sea swell. As a system, however, the number series of the golden section, devised "in the tumult of the waves", which seems to have impressed Le Corbusier like an event of nature,<sup>56</sup> presents several problems. As is well known, the golden section leads to irrational number relationships, which are hardly suited to architectural practice. Hence, the golden section was rarely used in architecture.

Le Corbusier's use of the golden section was not his only recourse to an earlier tradition. Like Vitruvius before him, Le Corbusier derives the size of the body from the height of a grown man. The man with the raised arm was also an old acquaintance since this is surely what Vitruvius meant with his "homo ad circulum" (FIG. 3). As anthropomorphic measure, this was also common in ancient and Byzantine metrology, as well as in modern building practice. Thus, with his propagation of the golden section as well as his proportional figure, Le Corbusier stood in a long-outlived tradition.

Le Corbusier's *Modulor* was directed expressly against the introduction of the metre and the decimal system. For Le Corbusier the metre was abstract, bloodless and unfeeling, and its use had brought about the slackening of architecture.<sup>57</sup> Le Corbusier's polemic probably conceals an attempt to defend modern architecture against its critics. Due to its renunciation of ornament and its machine-like quality, this architecture had been described as cold, empty, boring and soulless since the 1930s — for instance, by the German philosopher Ernst Bloch, who emigrated to the USA in 1938.<sup>58</sup>

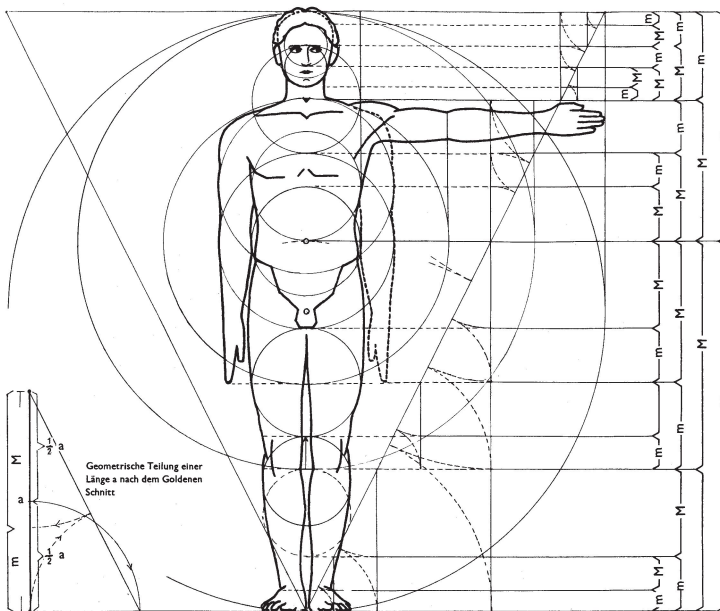
Hence, anthropomorphism's resurrection in the form of the *Modulor* could be understood as a utopia expressing the desire for a human architecture. Be that as it may, Le Corbusier enlists anthropomorphism in one of his attempts to legitimize the rationality of his architecture which had been characterized

as “technoid” with a coolly calculated combination of “eternal” laws of proportion and organic looking natural forms. His argumentation can be summarized approximately as follows: the spiral form of the sea snail found on the beach is governed by the same measurement ratios of the golden section as the *Modulor* and therefore the male body. Accordingly, the mathematics of nature to be found in the proportions of the sea snail and the body served the Swiss architect in his “self-styling as a poet of architecture”<sup>59</sup>.

### THE MODULE OF FASCISM

Twentieth-century anthropomorphism is made up not only of attempts at the theoretical legitimization and poetical heightening of rationalist and functionalist architecture; it also acts as a banner for certain ideas about order that result from industrial standardization and the assembly of architectural components as well as the political motives of the time. To finish, I would like to consider the latter connection with the example of the anthropomorphic ideas of Ernst

DAS MASS ALLER DINGE



7  
ERNST NEUFERT /  
BAUENTWURFS-  
LEHRE / 1936 /  
PROPORTIONAL  
FIGURE

Neufert (1900–1986) mentioned at the beginning, which are a central component of both his *Bauentwurfslehre*, first published in 1936, and his *Bauordnungslehre*, first published in 1943.<sup>60</sup>

Neufert's ideas on the theory of proportion, first stated in 1936, have remained unchanged in all 39 editions of his *Bauentwurfslehre* that have appeared up to the present. Only their position and weight within the book, which has been continuously extended over the years, has been slightly modified. While in the early editions the section "Der Mensch als Maß und Ziel" was a key part of the introduction of the *Bauentwurfslehre*, modern editions have shifted these programmatic remarks to the second chapter, thus slightly weakening their fundamental significance.<sup>61</sup>

Originally, however, Neufert placed the greatest value on the anthropomorphic foundation of his conception of architecture and his ideas about standardization. This is shown, for example, by a previously overlooked prepublication of the *Bauentwurfslehre*.

In the spring of 1935 the section "Der Mensch als Maß und Ziel" had already been published in the *Monatshefte für Baukunst und Städtebau* as a prelude to the later book publication. Already here, the guiding themes are human measurement and the demand for the standardization of all architectural components.<sup>62</sup>

The proportional figure already included as an illustration in the 1935 prepublication as well as in all editions of the *Bauentwurfslehre* (FIG. 7) is based largely on the related theories of Albrecht Dürer and supplemented by the measurement system of the golden section. For this, Neufert draws on Adolf Zeising's text *Der Goldene Schnitt* from 1884 as well as more concretely on Ernst Mössel's speculations on the laws of measurement governing earlier architecture, which appeared in 1926 and 1931.<sup>63</sup> Neufert writes the following about Mössel's now outdated theories<sup>64</sup>:

*According to Ernst Mössel's extensive and very precise (calculated) investigations, the vast majority of classical buildings can be seen to be based on the Golden Section. The pentagon or pentagram has a natural relation to the Golden Section. However, its special measurement ratios found less use.*<sup>65</sup>

These remarks have been omitted from more recent editions of the *Bauentwurfslehre*. Its editors clearly recognized that Mössel's obscure proportional measurements based on the golden section could no longer provide the theoretical grounding for a serious architectural handbook. In the newer editions Mössel's remarks have been replaced by Le Corbusier's *Modulor*.<sup>66</sup> Yet even in current editions numerous diagrams of a broad range of obscure measurement procedures such as the pentagram are presented without in each case an explanation being added.<sup>67</sup>

However, a number of more detailed explanations are found in Neufert's *Bauordnungslehre*. In it he not only takes seriously Le Corbusier's humorous six-foot justification of the *Modulor*,<sup>68</sup> but he also once again advances the pro-

portion series of the golden section, now with the help of racist neologisms, as an eternally valid law of measurement and beauty:

*Through the natural selection derived continuously over millions of years from his own sense of beauty, man forms himself into an ideal of the beauty that dwells in him [...]. Beyond this, this proportion series seems, in the sense of Greek thought, to represent the general law of nature's germination [allgemeine Sprossungsgesetz der Natur] independent of man and his feelings.<sup>69</sup>*

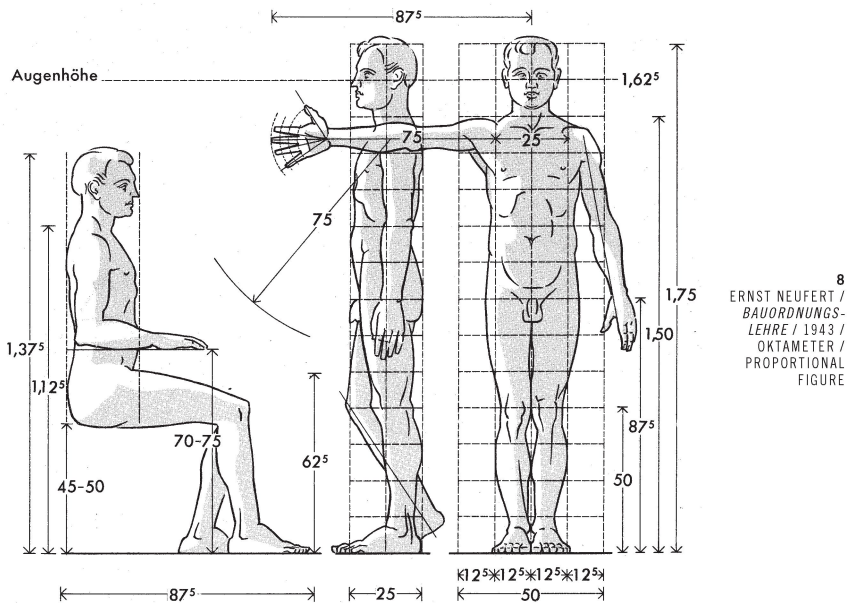
How elastically one can interpret anthropomorphism and its supposedly 'natural' laws of proportion is also shown by the concrete development of Neufert's anthropomorphic ideas of measurement in the 1930s and 40s. If his 1936 *Bauentwurfslehre* was still largely of a technical nature, in a number of essays as well as in his 1943 *Bauordnungslehre*, he also adds ideological elements that Walter Prigge has recently seen as having a "symbolic relation to the Fascist articulation of body ideals".<sup>70</sup>

In the 1940s, namely, Neufert developed his proportional figure into a special modular system, the so-called *Oktameter*. In doing so, he changed a few concrete measurements of the figure. Man's body height remained the same as that of the proportional figure of 1936 at 175 cm; however, the height of the shoulders increases from 143 to 150 cm. In this way, man as "the measure of all things" becomes more compatible with the module of the *Oktameter* of 12.5 or 125 cm. This module, which is found in the most varied body parts and positions (FIG. 8), did not correspond to a 'natural' law of proportion, but to the "system measurement" ("Systemmaß") of brick that was developed at the time as an industrial standard.<sup>71</sup> Furthermore, the *Oktameter* module was also compatible with the 250 cm unit spacing ("Achismaß/Tafelmaß") that the *Luftwaffe* had initially developed for the construction of aircraft hangars and that was also used in the construction of housing for workers building the *Autobahn*, as well as in timber construction. It eventually became a general construction standard.<sup>72</sup>

In 1943, in his foreword to the *Bauordnungslehre*, the Minister of Armaments and War Production for the Third Reich, Albert Speer, explained the deep political and strategic importance of standardization in the *Oktameter* with the following words: there should now be no "parliamentary discussion" in questions of construction since "total war demands the concentration of all our forces, even in the building industry. Extensive standardization for the economization of technical resources and for the development of rational serial production is the precondition for an increase in output, which is necessary for the accomplishment of our great building tasks"<sup>73</sup>. Neufert himself used a similar choice of words when describing the essence of standardization in the building industry as follows: "[T]he emphasis lies on the identification of corresponding, rational building constructions on the basis of found measurement ratios, as



they are required by total war.”<sup>74</sup> With these remarks, in retrospect, Speer’s and Neufert’s ideas about order and the theory of proportion acquire a rather macabre relevance, since on 18 February of the same year, in his famous speech in the Berlin Sportpalast, the Reich Propaganda Minister Joseph Goebbels had used very similar words. His speech peaked in ten rhetorical questions addressed to the mesmerized audience, the most famous of which is still: “Do you want total war? If necessary, do you want a war more total and radical than anything that we can even imagine today?”<sup>75</sup> Neufert himself would not have been indifferent to this question, since already in a 1942 text, “Systematische Baunormung im Aufbruch”, he had stated only a little less vigorously that the purpose of the



① Maßproportionen des menschlichen Körpers in Baumaßen

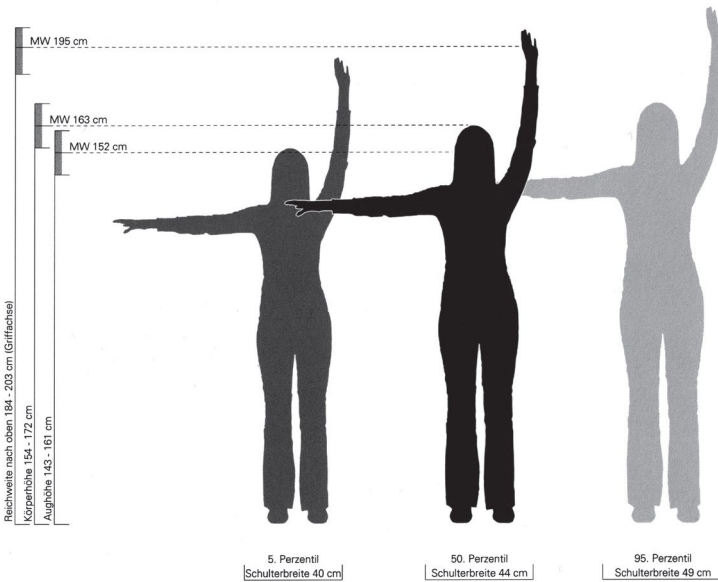
anthropomorphic standardization of the *Oktameter* is “the accomplishment of our enormous tasks in the East”.<sup>76</sup>

According to Neufert, the architects of the day, by using standardized numbers, would stand in the great tradition of the ancients.<sup>77</sup> With regard to the concrete numbers used for the aims of standardization, Neufert also employed anti-Semitic undertones, discouraging the use of the number seven since it is used in “many ritual activities, especially in the case of Jews everywhere”.<sup>78</sup> Accordingly, in Neufert’s *Oktameter*, it was man or his measurement and module that was adapted to the desirable standards, not the other way round.

The standards propagated in those years and their legitimization in laws of measurement stood under the sign of the “enormous construction tasks in the East”<sup>79</sup> and thus in relation to the “Generalplan Ost”,<sup>80</sup> which had a racist “Vernichtungskrieg”<sup>81</sup> as its condition, and the conquering of “Lebensraum” in the East as its goal.<sup>82</sup>

Of course, this connection does not discredit the figure of thought of anthropomorphism as such, but it does feed a suspicion that prompts me in conclusion to ask: Was it human measurement that determined architectural design, or was it the real or supposed necessities of design that has determined our idea of human measurement? Rather than man being the measure of all things, was it not rather the things — or, as in the case just treated, the political circumstances — which dictate our idea of human measurement?

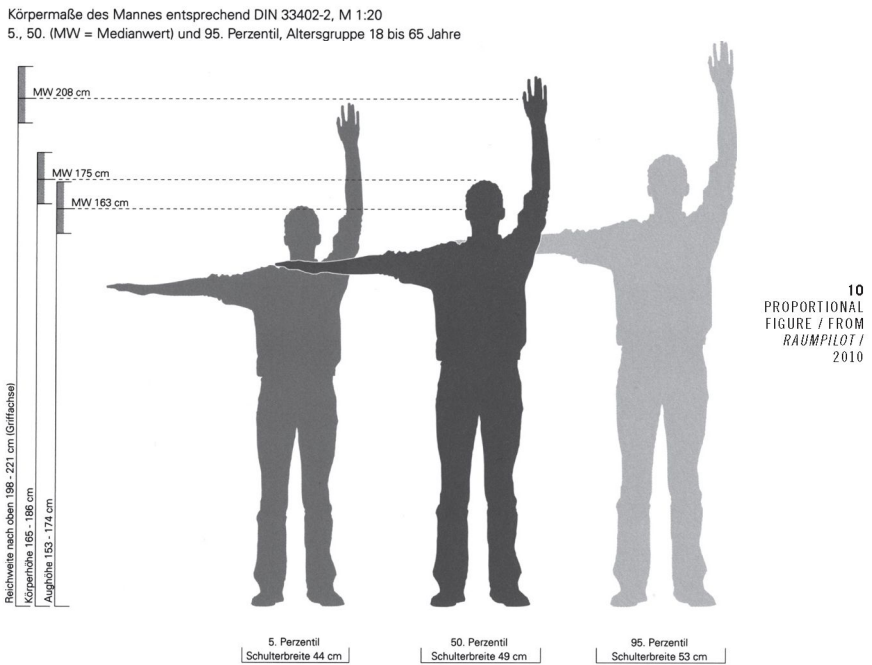
Körpermaße der Frau entsprechend DIN 33402-2, M 1:20  
 5., 50. (MW = Medianwert) und 95. Perzentil, Altersgruppe 18 bis 65 Jahre



9  
 PROPORTIONAL  
 FIGURE / FROM  
 RAUMPILOT /  
 2010

## EPILOGUE

During the work on the present essay, an architectural handbook has been published under the title *Raumpilot* that may possibly replace Neufert's *Bauentwurfslehre*. Here too, under the heading "Anthropometrie", human measurement forms an important foundation for further considerations on the planning and building of architecture. However, these remarks are now freed of ideological ballast, and human measurement is no longer illustrated with a naked male, ideal and standardized body, but with clothed figures of both sexes (FIGS. 9–10). The selected measurements, without being subjected to an ideological system, consider man or woman — and thus not only the perfect man — in his or her real activities.<sup>83</sup>



## NOTES

This essay relates to my earlier publications on the same theme (see notes 8 and 19). In most cases I have modified my previously published positions and provided updated bibliographic information. The considerations on anthropomorphism oriented to the history of religion as well as the remarks on Ernst Neufert's ideas about order are treated for the first time here.

For their suggestions, I would like to thank Christoph Kleine, Heinz Mürmel, Hubert Seiwert (Leipzig), Martin Behet, Roland Bondzio (Münster and Leipzig) and Christoph Schnoor (Auckland).

1 See *Encyclopædia of Religion and Ethics*, edited by James HASTINGS, 13 VOLS., Edinburgh: T. & T. Clark, 1908–1926, VOL. 1, pp. 573–578 (F. B. JEVONS) · Stuart Elliott GUTHRIE, *Faces in the Clouds: A New Theory of Religion*, Oxford: Oxford University Press, 1993 · *Die Religion in Geschichte und Gegenwart. Handbuch für Theologie und Religionswissenschaft*, 4th edition, edited by Hans Dieter BETZ, DON S. BROWNING, Bernd JANOWSKI, and Eberhard JÜNGEL, 9 VOLS., Tübingen: Mohr Siebeck, 1998–2007, VOL. 1, cols. 525–526 (Gebhard LÖHR) · *Lexikon für Theologie und Kirche*, 3rd edition, edited by Walter KASPER, with Konrad BAUMGARTNER, Horst BÜRKLE, Klaus GANZER, Karl KERTELGE, Wilhelm KORFF, and Peter WALTER, 11 VOLS., Freiburg: Herder, 1993–2001, special edition 2006, VOL. 1, cols. 734–737 (Hans-Walter SCHÜTTE).

2 See XENOPHANES (25, fr. 15) with his often-quoted remark: “But if horses or oxen or lions had hands or could draw with their hands and accomplish such works as men, horses would draw the figures of the gods as similar to horses, and the oxen as similar to oxen, and they would make the bodies of the sort which each of them had.” (XENOPHANES of Colophon, *Fragments. A Text and Translation with a Commentary* by J. H. LESHER, Toronto: University of Toronto Press, 2001). For further sceptical positions regarding anthropomorphism, see Esther J. HAMORI, “When Gods Were Men”. *The Embodied God in Biblical and Near Eastern Literature*, Berlin and New York: Walter De Gruyter, 2008, pp. 35–64 · Andreas WAGNER, *Gottes Körper. Zur alttestamentlichen Vorstellung der Menschengestaltigkeit Gottes*, Gütersloh: Gütersloher Verlagshaus, 2010, especially pp. 43–44.

3 See *Anthropomorphism and Interpretation of the Qurʾān in the Theology of al-Qāsim ibn Ibrāhīm*, edited with translation, introduction and notes by Binyamin ABRAHAMOV, Leiden, New York, and Cologne: E. J. Brill, 1996, pp. 1–18 · WAGNER, *Gottes Körper*, pp. 41–51 · Othmar KEEL, “Warum im Jerusalemer Tempel kein anthropomorphes Kultbild gestanden haben dürfte”, in: *Homo pictor*, edited by Gottfried BOEHM, Munich and Leipzig: K. G. Saur, 2001, pp. 244–282 · Angelika BERLEJUNG, *Die Theologie der Bilder. Herstellung und Einweihung von Kultbildern in Mesopotamien und die alttestamentliche Bilderpolemik*, Freiburg (Switzerland): Universitätsverlag | Göttingen: Vandenhoeck & Ruprecht, 1998, pp. 3–5, 35–39, 286–288.

4 On this see the case study by Dimitrij BUMAZHNOV, *Der Mensch als Gottes Bild im christlichen Ägypten. Studien zu Gen 1,26 in zwei koptischen Quellen des 4.–5. Jahrhunderts*, Tübingen: Mohr Siebeck, 2006 · In general see also *Historisches Wörterbuch der Philosophie*, edited by Joachim RITTER, Karlfried GRÜNDER, and Gottfried GABRIEL, 13 VOLS., Basel: Schwabe, 1971–2007, VOL. 1, cols. 375–378.

5 Ibid.

6 Martin SCHEWE, *Rationalität contra Finalität. Spinozas Anthropomorphismuskritik als Element seiner Methodenlehre*, Frankfurt am Main, Bern, and New York: Peter Lang, 1987, p.73: „die Unzulänglichkeit von Anthropomorphismen für eine schlüssige Interpretation der Welt“ · See also WAGNER, *Gottes Körper*, p.46.

7 Julian HUXLEY, *Ich sehe den künftigen Menschen. Natur und neuer Humanismus*, Munich: List, 1965 (first in English under the title *Essays of a Humanist*, London: Chatto & Windus, 1964) · See also *Religion in Geschichte und Gegenwart*, col. 524 · WAGNER, *Gottes Körper*, p.46 · Fritz MAUTHNER, *Wörterbuch der Philosophie. Neue Beiträge zu einer Kritik der Sprache*, 2 VOLS., Munich and Leipzig: Georg Müller, 1910, VOL. 1, p.26, and VOL. 2, p.91.

8 See Paul von NAREDI-RAINER, *Architektur und Harmonie. Zahl, Maß und Proportion in der abendländischen Baukunst*, Cologne: DuMont, 1982 · Frank ZÖLLNER, *Vitruvs Proportionsfigur. Quellenkritische Studien zur Kunstliteratur des 15. und 16. Jahrhunderts*, Worms: Wernersche Verlagsgesellschaft, 1987 · John ONIANS, *Bearers of Meaning. The Classical Orders in Antiquity, the Middle Ages and the Renaissance*, Princeton: Princeton University Press, 1988, pp.162–165 and passim · Bruno REUDENBACH, “Die Gemeinschaft als Körper und Gebäude. Francesco di Giorgios Stadttheorie und die Visualisierung von Sozialmetaphern im Mittelalter”, in: *Gepeinigt, begehrt, vergessen. Symbolik und Sozialbezug des Körpers im späten Mittelalter und in der frühen Neuzeit*, edited by Klaus SCHREINER and Norbert SCHNITZLER, Munich: Wilhelm Fink, 1992, pp.171–198 · Joseph RYKWERT, *The Dancing Column. On Order in Architecture*, Cambridge, MA and London: The MIT Press, 1996 · Marcus FRINGS, *Mensch und Maß. Anthropomorphe Elemente in der Architekturtheorie des Quattrocento*, Weimar: VDG, 1998 · Ivan MUCHKA, “Anthropomorphismus in der Architektur um 1600”, in: *Rudolf II, Prague and the World*, edited by Lubomír KONEČNÝ, Beket BUKOVINSKÁ, and Ivan MUCHKA, Prague: Artefactum, 1998, pp.57–63 · *Body and Building. Essays on the Changing Relation of Body and Architecture*, edited by George DODDS and Robert TAVERNOR, Cambridge, MA and London: The MIT Press, 2002 · Frank ZÖLLNER, “Anthropomorphismus. Das Maß des Menschen in der Architektur von Vitruv bis Le Corbusier”, in: *Ist der Mensch das Maß aller Dinge? Beiträge zur Aktualität des Protagoras*, edited by Otto NEUMAIER, Möhnesee: Bibliopolis, 2004, pp.306–344 · Annette HOMAN, *Spielräume des Glaubens. Anthropomorphismus in der Architekturtheorie und die Umwandlung von St. Maximin in Trier*, Berlin: wvb Wissenschaftlicher Verlag Berlin, 2005, pp.77–96 (overview).

9 On Vitruvius and his reception, see Lucia A. CIAPPONI, “Vitruvius”, in: *Catalogus Translationum et Commentariorum: Mediaeval and Renaissance Latin Translations and Commentaries. Annotated Lists and Guides*, 9 VOLS. (so far), Washington, DC: Catholic University of America Press, 1960–, here VOL. 3, 1976, edited by F. Edward CRANZ in association with Paul Oskar KRISTELLER, pp.399–401 · Georg GERMANN, *Einführung in die Geschichte der Architekturtheorie*, Darmstadt: Wissenschaftliche Buchgesellschaft, 1980 · L. CALLEBAT, P. BOUET, Ph. FLEURY, and M. ZUINGHE-DAU, *Vitruve. De architectura. Concordance. Documentation bibliographique, lexicale et grammaticale*, 2 VOLS., Hildesheim, Zurich, and New York: Olms-Weidmann, 1984 · Heiner KNELL, *Vitruvs Architekturtheorie. Versuch einer Interpretation*, Darmstadt: Wissenschaftliche Buchgesellschaft, 1985 · Pier Nicola PAGLIARA, “Vitruvio da testo a canone”, in: *Memoria dell'antico nell'arte italiana*, edited by Salvatore SETTIS, 3 VOLS., Turin: Giulio Einaudi, 1984–1986, VOL. 3, pp.3–85 · FRINGS, *Mensch und Maß*, pp.19–23.

- 10 VITRUVIUS, *De architectura*, II.pref.
- 11 Ibid., IV.1, 6. On this see ONIANS, *Bearers of Meaning*.
- 12 “Aedium compositio constat ex symmetria, cuius rationem diligentissime architecti tenere debent. Ea autem paritur a proportione, quae graece αναλογία dicitur. Proportio est ratae partis membrorum in omni opere totoque commodulatio, ex qua ratio efficitur symmetriarum. Namque non potest aedi ulla sine symmetria atque proportione rationem habere compositionis, nisi uti [ad] hominis bene figurati membrorum habuerit exactam rationem.” VITRUVIUS, *De architectura libri decem*, translated and annotated by Curt FENSTERBUSCH, Darmstadt: Wissenschaftliche Buchgesellschaft, 1981, III.1 (p.136). On this see also ZÖLLNER, *Vitruvs Proportionsfigur*, passim · Vitruve, edited by Pierre GROS, pp.55–78 · Giacomo BERRA, “La storia dei canoni proporzionali del corpo umano e gli sviluppi in area Lombarda alla fine del Quattrocento”, in: *Raccolta Vinciana*, VOL. 25, 1993, pp.159–310 · FRINGS, *Mensch und Maß*, pp.19–56 · Burkhardt WESENBERG, “Vitruv und Leonardo in Salamis. Vitruvs Proportionsfigur und die metrologischen Reliefs”, in: *Jahrbuch des Deutschen Archäologischen Instituts*, VOL. 116, 2001 (published 2002), pp.357–380 · Indra Kagis McEWEN, *Vitruvius. Writing the Body of Architecture*, Cambridge, MA and London: The MIT Press, 2003.
- 13 VITRUVIUS, *De architectura*, III.1,3: “Item corporis centrum medium naturaliter est umbilicus. Namque si homo conlocatus fuerit supinus manibus et pedibus pansis circinique conlocatum centrum in umbilico eius, circumagendo rotundationem utrarumque manuum et pedum digiti linea tangentur. Non minus quemadmodum schema rotundationis in copore efficitur, item quadrata designatio in eo inuenietur. Nam si a pedibus imis ad summum caput mensum erit eaque mensura relata fuerit ad manus pansas, inuenietur eadem latitudo uti altitudo, quemadmodum areae, quae ad normam sunt quadratae.”
- 14 Rudolf WITTKOWER, *Architectural Principles in the Age of Humanism*, London: The Warburg Institute, University of London, 1949. On Rudolf Wittkower see *Klassiker der Kunstgeschichte*, edited by Ulrich PFISTERER, 2 VOLS., Munich 2008, VOL. 2, pp.107–123 (Alina PAYNE).
- 15 ZÖLLNER, *Vitruvs Proportionsfigur*. On this thesis, see also the reviews in the *Newsletter of the Society of Architectural Historians of Great Britain* (Winter 1988, by John ONIANS), the *Archiv für Kulturgeschichte* (VOL. 71, 1989, pp.511–513, by Günter BINDING), and in the *Journal of the Society of Architectural Historians* (VOL. 52, 1993, pp.359–360, by Carolyn KOLB, and my response, *ibid.*, VOL. 53, 1994, p.377).
- 16 On possible exceptions to this rule, see for example Suzanne Preston BLIER, “Houses Are Human. Architectural Self-images of Africa’s Tamberma”, in: *Journal of the Society of Architectural Historians*, VOL. 42, 1983, pp.371–382 · Jan PIEPER, “Häuser des Narziß. Architektur nach des Menschen Bild und Gleichnis | Houses of Narzissus. Architecture According to the Image of Man”, in: *Daïdalos*, no. 45, 1992, pp.30–47 · Günther FEUERSTEIN, *Biomorphic Architecture*, Stuttgart and London: Axel Menges, 2002, with 2 supplements published as *Zoon. Anthropomorphes Bauen. Architektur als Wesen*, Vienna: Grafisches Zentrum HTU, 2003 and 2004.
- 17 VITRUVIUS, *De architectura*, I.2, 4; III.1,1–9; II.3,3; III.1,7; VI.8,9 · On ancient metrology see Friedrich HULTSCH, *Griechische und römische Metrologie*, second edition, Berlin: Weidmannsche Buchhandlung, 1882, pp.30–74 · Eivind LORENZEN, *Technological Studies in Ancient Metrology*, Copenhagen: Nyt Nordisk Forlag, 1966 · Thomas THIEME, “Metrology and Planning in the Ba-

silica of Johannes Stoudios”, in: *Le Dessin d'architecture dans les sociétés antiques. Actes du colloque de Strasbourg 26–27 January 1984*, Leiden: E. J. Brill, 1985, pp.291–308 · Eric FERNIE, “Historical Metrology and Architectural History”, in: *Art History*, VOL. 1, 1978, pp.383–399 · ZÖLLNER, *Vitruvs Proportionsfigur*, pp.23–43 · VITRUVUS, *L'architecture*, ed. GROS, VOL. 3, pp.55–78 · WESENBERG, *Vitruv und Leonardo*.

18 WESENBERG, *Vitruv und Leonardo*.

19 ZÖLLNER, *Anthropomorphismus* · Frank ZÖLLNER, “Vitruvs Proportionsfigur. Eine Metapher für Maß und Geometrie”, in: *Entwerfen. Architekturausbildung in Europa von Vitruv bis Mitte des 20. Jahrhunderts*, edited by Ralph JOHANNES, Hamburg: Junius, 2009, pp.145–161.

20 VITRUVIUS, *De architectura*, I.2, 4 and III.1, 5–8.

21 Ernst NEUFERT, *Bauentwurfslehre. Grundlagen, Normen, Vorschriften über Anlage, Bau, Gestaltung, Raumbedarf, Raumbeziehungen, Maße für Gebäude, Räume, Einrichtungen, Geräte; mit dem Menschen als Maß und Ziel. Handbuch für den Baufachmann, Bauherrn, Lehrenden und Lernenden*, weitergeführt von Peter NEUFERT und der PLANUNGS-AG NEUFERT MITTMANN GRAF, 33rd, completely revised and redesigned edition, Braunschweig and Wiesbaden: Friedr. Vieweg & Sohn, 1992. The 39th German edition was published in 2009 on behalf of the newly founded Neufert-Stiftung · Quoted after: Ernst and Peter NEUFERT, *Architects' Data*, 3rd edition, edited by Bousmaha BAICHE and Nicholas WALLIMAN, Oxford: Blackwell Science, 2000, p.1 · On Neufert and his *Bauentwurfslehre* see Gernot WECKERLIN, “Die Angst des Architekten vor dem leeren Blatt. Architekturhandbücher als Medien im künstlerischen Prozess”, in: *Imaginäre Architekturen. Raum und Stadt als Vorstellung*, edited by Annette GEIGER, Stefanie HENNECKE, and Christin KEMPE, Berlin: Dietrich Reimer, 2006, pp.102–119, esp. p.111 (on the numerous editions of the *Bauentwurfslehre*).

22 NEUFERT, *Bauentwurfslehre*, 1992, p.24: „Noch heute haben wir einen besseren Begriff von der Größe einer Sache, wenn wir erfahren: sie war soviel Mann hoch, soviel Ellen lang, um soviel Fuß breiter oder soviel Köpfe größer. Das sind Begriffe, die uns angeboren sind, deren Größe uns sozusagen im Blute liegt. Das Metermaß hat dem allen aber ein Ende gemacht.“

23 See for example the source material in Victor MORTET, *Recueil de textes relatifs à l'histoire de l'architecture et à la condition des architectes en France en Moyen Age*, 2 VOLS., Paris: Alphonse Picard et fils, 1911–1929, VOL. 1, pp.157–161 and VOL. 2, pp.183–188 · Hans LIEBESCHÜTZ, *Das allegorische Weltbild der heiligen Hildegard von Bingen*, Leipzig and Berlin: B.G. Teubner, 1930, pp.31–34 · Günter BANDMANN, *Mittelalterliche Architektur als Bedeutungsträger*, Berlin: Gebr. Mann, 1951, p.65 · See also Bruno REUDENBACH, “In mensuram humani corporis. Zur Herkunft der Auslegung und Illustration von Vitruv III.1 im 15. und 16. Jahrhundert”, in: *Text und Bild. Aspekte des Zusammenwirkens zweier Künste in Mittelalter und früher Neuzeit*, edited by Christel MEIER and Uwe RUBERG, Wiesbaden: Ludwig Reichert, 1980, pp.651–688, 675–676 · FRINGS, *Mensch und Maß*, pp.57–62.

24 See MORTET, *Recueil*, VOL. 1, pp.159–160 note 3. The argumentation of these and the following remarks follows in large part ZÖLLNER, *Vitruvs Proportionsfigur*, pp.44–76.

25 Francesco DI GIORGIO MARTINI, *Trattati di architettura ingegneria e arte militare*, edited by Corrado MALTESE, 2 VOLS., Milan: Il Polifilo, 1967, VOL. 1, p.20. See Lawrence LOWIC, “The Meaning and Significance of the Human Analogy in Francesco di Giorgio's Trattato”, in: *Journal of*

*the Society of Architectural Historians*, VOL. 42, 1983, pp. 360–370 · ZÖLLNER, *Vitruvs Proportionsfigur*, pp. 72–76 · REUDENBACH, “Gemeinschaft als Körper und Gebäude”, pp. 171–176 · Francesco Paolo FIORE and Manfredo TAFURI, *Francesco di Giorgio architetto*, Milan: Electa, 1993, no. XX.4, pp. 363–365 · FRINGS, *Mensch und Maß*, pp. 199–287.

26 Lorenzo GHIBERTI, *Denkwürdigkeiten (I Commentarii)*, edited by Julius von SCHLOSSER, 2 VOLS., Berlin: Julius Bard, 1912, VOL. I, pp. 227–231, esp. p. 228 · Klaus BERGDOLT, *Der dritte Kommentar Lorenzo Ghibertis*, Berlin: VCH, 1988, pp. 550–554, 562–568, and XXXI–XXXII, LXI, LXVII, LXXVI–LXXVII, XCI–XCIV.

27 Antonio AVERLINO detto IL FILARETE, *Trattato di architettura*, edited by Anna Maria FINOLI and Liliana GRASSI, 2 VOLS., Milan: Il Polifilo, 1972, VOL. I, pp. 20, 21, and 18 (fols. 3v–4r and 6r) · FRINGS, *Mensch und Maß*, pp. 153–198.

28 *The Literary Works of Leonardo da Vinci*, edited by Jean Paul RICHTER, 2 VOLS., third edition, London: Phaidon, 1970 (first edition: London: Sampson Low, Marston, Searle & Rivington, 1883), VOL. 2, § 1347A (i.e. Codex Atlanticus, fol. 270r [new count 730r]).

29 Richard SCHOFIELD, “Amadeo, Bramante and Leonardo and the ‘tiburio’ of Milan Cathedral”, in: *Achademia Leonardi Vinci. Journal of Leonardo Studies*, VOL. 2, 1989, pp. 68–100.

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31 *Ibid.*, fols. 91v–92r. See also Carol Herselle KRINSKY, *Cesare Cesariano and the Como Vitruvius Edition of 1521*, Ph.D. Thesis, New York University, 1965 (Ann Arbor: University Microfilms, 1965), pp. 297–300 · Paolo VERZONE, “Cesare Cesariano”, in: *Arte Lombarda*, VOL. 16, 1971, pp. 203–210.

32 CESARIANO, *Vitruvio*, fols. 48v and 143.

33 Leon Battista ALBERTI, *De re aedificatoria*, Florence: Nicolaus Laurentius Alamanus, 1485, used in the edition of Max THEUER, Wien and Leipzig: Heller, 1912, 9.5–6 (musical harmony) and 7.5 (anthropomorphism). See also Peter Hugh SCHOFIELD, *The Theory of Proportion in Architecture*, Cambridge: Cambridge University Press, 1958, p. 57 · *Leon Battista Alberti*, edited by Joseph RYKWERT and Anne ENGEL, Milan: Electa, 1994, pp. 292–299 (Paul von NAREDI-RAINER) and pp. 300–315 (Robert TAVERNOR).

34 Andrea PALLADIO, *I Quattro libri dell'architettura*, Venice: Dominico de' Franceschi, 1570, pp. 6 (1.1, anthropomorphism). On the problem of the proportional system in Palladio see WITTKOWER, *Architectural Principles*, pp. 110–124 · Deborah HOWARD and Malcolm LONGAIR, “Harmonic Proportion and Palladio's *Quattro Libri*”, in: *Journal of the Society of Architectural Historians*, VOL. 41, 1982, pp. 116–143 · Branko MITROVIĆ, “Palladio's Theory of Proportions and the Second Book of the *Quattro Libri dell'Architettura*”, in: *Journal of the Society of Architectural Historians*, VOL. 49, 1990, pp. 279–292.

35 See Antonio FOSCARI and Manfredo TAFURI, *L'armonia e i conflitti. La chiesa di San Francesco della Vigna nella Venezia del '500*, Turin: Giulio Einaudi, 1983, pp. 208–209.

36 Daniele BARBARO, *I dieci libri dell'architettura di M. Vitruvio. Tradotti & commentati [...]*, Venice: Francesco de' Franceschi & Giouanni Chrieger, 1567 (reprint, edited by Manfredo TAFURI and Manuela MORRESI, Milan: Il Polifilo, 1987), pp. 96–108 · See Diego Horacio FEINSTEIN, *Der Harmoniebegriff in der Kunstliteratur und Musiktheorie der italienischen Renaissance*, Ph.D. Thesis, Universität Freiburg, 1977, pp. 135–143 · ZÖLLNER, *Vitruvs Proportionsfigur*, pp. 155–169 · On



Daniele Barbaro see also Manfredo TAFURI, *Venezia e il Rinascimento*, Turin: Giulio Einaudi, 1985, pp.179–198.

37 HOWARD and LONGAIR, “Harmonic Proportion and Palladio’s *Quattro Libri*”.

38 WITKOWER, *Architectural Principles*, pp.110–124.

39 Claude PERRAULT, *Les dix livres d’architecture de Vitruve*, second, revised edition, Paris: Jean Baptiste Coignard, 1684 · See Wolfgang HERRMANN, *The Theory of Claude Perrault*, London: A.Zwemmer, 1973 · Antoine PICON, *Claude Perrault, 1613–1688, ou la curiosité d’un classique*, Paris: Picard, 1988, pp.115–135 · Henry MILLON, “The French Academy of Architecture. Foundation and Program”, in: *The French Academy. Classicism and its Antagonists*, edited by June HARGROVE, Newark: University of Delaware Press | London and Cranbury, New Jersey: Associated University Presses, 1990, pp.68–77.

40 PERRAULT, *Les dix livres d’architecture de Vitruve*, pp.104–105; see also *ibid.*, p.11 · On Perrault and his theory see also SCHOFIELD, *Theory of Proportion in Architecture*, pp.27–73 · Walter KAMBARTEL, *Symmetrie und Schönheit. Über mögliche Voraussetzungen neueren Kunstbewußtseins in der Architekturtheorie Claude Perraults*, Munich: Wilhelm Fink, 1972 · Alberto PÉREZ-GÓMEZ, *Architecture and the Crisis of Modern Science*, Cambridge, MA and London: The MIT Press, 1983, pp.32–39.

41 PÉREZ-GÓMEZ, *Architecture and the Crisis of Modern Science*, pp.39–47 · Hanno Walter KRUFFT, *Geschichte der Architekturtheorie. Von der Antike bis zur Gegenwart*, 4th edition, Munich: C.H.Beck, 1995, pp.148–150.

42 On this see SCHOFIELD, *Theory of Proportion in Architecture*, pp.76–80.

43 *L’architettura di M. Vitruvio Pollione*, translated with comment by Berardo GALIANI, Naples: Stamperia Simoniana, 1758, p.94 and plate 4 · Pietro CATANEO, *I quattro primi libri di architettura*, Venice: Aldus [Manutius], 1554, fol.35, and *idem, L’architettura di Pietro Cataneo*, Venice: Aldus [Manutius], 1567, pp.75–76.

44 See for example Joseph GWILT, *An Encyclopædia of Architecture. Historical, Theoretical and Practical*, a new edition, revised, with alterations and considerable additions by Wyatt PAPWORTH, London: Longmans, Green, and Co., 1867; reprint 1982 (New York: Bonanza Books), pp.796 and 802 · KRUFFT, *Geschichte der Architekturtheorie*, p.328.

45 J.N.L. [Jean-Nicolas-Louis] DURAND, *Précis de leçons d’architecture données à l’Ecole Royale Polytechnique*, Paris: chez l’auteur, à l’École Royale Polytechnique, 1817–1819, pp.8–14 and p.5 (first edition: *Précis des leçons d’architecture données à l’Ecole polytechnique*, 2 VOLS., Paris: chez l’auteur, à l’École Polytechnique, an X [1802] and an XIII [1805]).

46 Eugène Emmanuel VIOLLET-LE-DUC, *Dictionnaire raisonné de l’architecture française du XI<sup>e</sup> au XVII<sup>e</sup> siècle*, 10 VOLS., Paris: Librairies-Imprimeries Réunies, 1854–1868, VOL.7, p.534 · Auguste CHOISY, *Histoire de l’architecture*, 2 VOLS., Paris: Gauthier-Villars, 1899, VOL.2, p.764, after KRUFFT, *Geschichte der Architekturtheorie*, pp.323 and 328.

47 SCHOFIELD, *Theory of Proportion in Architecture*, pp.76–80 · Heinz BIENEFELD, “Bedeutung und Verlust des Schönen in der Kunst. Proportion und Material als Wesensmerkmale der Architektur”, in: *Das Münster*, VOL.46, 1993, pp.115–118.

48 See for example Edward CRESY, “Principles of Proportion”, in: GWILT, *An Encyclopædia of Architecture*, p.766.

- 49 LE CORBUSIER, *Der Modulor*, VOL. 1: *Darstellung eines in Architektur und Technik allgemein anwendbaren harmonischen Maßes im menschlichen Maßstab*, 5th edition (reprint of second edition 1956), Stuttgart: Deutsche Verlagsanstalt, 1985, pp.115–117 (first German edition: Stuttgart: Cotta, 1953; original French edition: *Le Modulor. Essai sur une mesure harmonique à l'échelle humaine applicable universellement à l'architecture et à la mécanique*, Boulogne-sur-Seine: Éditions de l'Architecture d'Aujourd'hui, 1950) · See Stanislaus VON MOOS, *Le Corbusier. Elemente einer Synthese*, Frauenfeld and Stuttgart: Huber, 1968, pp.398–406 · KRUFF, *Geschichte der Architekturtheorie*, pp.328 and 463–464 · LE CORBUSIER, *Une Encyclopédie*, Paris: Centre Georges Pompidou, 1987, pp.259–261 · On the first variations, see also LE CORBUSIER, *Sketchbooks*, 4 VOLS., New York: Architectural History Foundation | Cambridge, MA and London: The MIT Press, 1981–1982, VOL. 2: 1950–1954, 1981, passim · On the reception see Eva-Marie NEUMANN, “Architectural Proportion in Britain 1945–1957”, in: *Architectural History*, VOL. 36, 1996, pp.197–221.
- 50 On the genesis of the Modulor, see the essay by Christoph SCHNOOR in this volume.
- 51 Eckhard LEUSCHNER, “Wie die Faschisten sich Leonardo unter den Nagel rissen. Eine architekturgeschichtliche Station auf dem Weg des ‘Vitruvianischen Menschen’ zum populären Bild”, in: *Beständig im Wandel. Innovationen — Verwandlungen — Konkretisierungen. Festschrift für Karl Möseneder zum 60. Geburtstag*, edited by Christian HECHT, Berlin: Matthes & Seitz, 2009, pp.425–440, esp. pp.431–433.
- 52 LE CORBUSIER, *Le Modulor*.
- 53 LE CORBUSIER, *Der Modulor*, pp.36 and 176.
- 54 *Ibid.*, pp.36–68.
- 55 *Ibid.*, p.56.
- 56 On this see Niklas MAAK, *Der Architekt am Strand. Le Corbusier und das Geheimnis der Seeschnecke*, Munich: Carl Hanser, 2010, p.127.
- 57 LE CORBUSIER, *Der Modulor*, pp.19, 20, 223, and 33.
- 58 Ernst BLOCH, *Das Prinzip Hoffnung*, 3 VOLS., Frankfurt am Main: Suhrkamp, 1974 (first edition: 1959), VOL. 2, pp.858–863, esp. p.861 with a critique of Le Corbusier.
- 59 MAAK, *Der Architekt am Strand*, p.127.
- 60 On Neufert in general and on his *Bauentwurfslehre* see Anka GHISE-BEER, *Das Werk des Architekten Peter Neufert. Ein Beitrag zu Entwicklungstendenzen in der Architektur der ersten Nachkriegsjahrzehnte*, Ph.D. Thesis, Universität Wuppertal, 2000, pp.17–21. See also the literature quoted below in notes 66 and 70–72.
- 61 Ernst NEUFERT, *Bauentwurfslehre. Grundlagen, Normen und Vorschriften. Handbuch für den Baufachmann, Bauherrn, Lehrenden und Lernenden*, Munich: Bauwelt-Verlag, 1936, p.6; *idem*, *Bauentwurfslehre*, 1992, pp.24–25. On the history of the editions see *ibid.*, p.IV. Not until the 30th edition from 1979 was the *Bauentwurfslehre* “significantly” revised and “significantly” expanded (still by Ernst himself), as was the 33rd edition from 1992.
- 62 Ernst NEUFERT, “Der Mensch als Maß und Ziel”, in: *Monatshefte für Baukunst und Städtebau* (Bauweltverlag Berlin), VOL. 19, no. 5, 1935, appendix: “Bauwelt-Tafeln” with the subtitle “Neufert Entwurfslehre” and with the proportional figure as a signet on each plate (these plates were added to the *Monatshefte für Baukunst und Städtebau*, which appeared until 1942, up to the 23rd issue in 1939). The title *Bauentwurfslehre* used from 1936 onward appears for the first time in an announce-

ment at the end of the journal, *ibid.*, VOL. 20, no. 6, 1936: "Neufert. Bauentwurfslehre. Handbuch für den Baufachmann, Bauherrn, Lehrenden und Lernenden. 267 Tafeln mit 3600 Zeichnungen".

63 Ernst MOESSEL, *Die Proportion in Antike und Mittelalter*, Munich: C. H. Beck, 1926; *idem*, *Urformen des Raumes als Grundlagen der Formgestaltung*, Munich: C. H. Beck, 1931.

64 On this see Konrad HECHT, *Maß und Zahl in der gotischen Baukunst*, 3 parts in a single volume, Hildesheim and New York: Georg Olms, 1979.

65 NEUFERT, *Bauentwurfslehre*, 1936, p. 39: „Nach den eingehenden und sehr genauen (rechnerischen) Untersuchungen von Ernst Moessel lassen sich weitaus die meisten klassischen Bauten nach dem Goldenen Schnitt bestimmen. Das Fünfeck oder Pentagramm (Drudenfuß) hat natürliche Beziehungen zum Goldenen Schnitt. Seine besonderen Maßverhältnisse fanden aber weniger Verwendung.“

66 On Ernst Neufert and Le Corbusier see Thilo HILPERT, "Menschenzeichen. Ernst Neufert und Le Corbusier", in: *Ernst Neufert. Normierte Baukultur im 20. Jahrhundert*, edited by Walter PRIGGE, Frankfurt and New York: Campus, 1999, pp. 131–143.

67 See the section on "Maßverhältnisse" in: NEUFERT, *Bauentwurfslehre*, 1992, pp. 34–37: "Grundlagen" (pp. 34–35), "Anwendung" (p. 36), and "Anwendung Modular" (p. 37).

68 Ernst NEUFERT, *Bauordnungslehre. Handbuch für rationelles Bauen nach geregelter Maß*, third edition, Wiesbaden and Berlin: Bauverlag, 1965, p. 36: Le Corbusier's "beautiful man", the "police constable", "always" measures six foot.

69 Ernst NEUFERT, *Bauordnungslehre*, edited by the Generalbauinspektor für die Reichshauptstadt Reichsminister Albert SPEER, Berlin, Amsterdam, Prague, and Vienna: Volk und Reich Verlag, 1943, pp. 44 and 46: „Durch diese über Millionen Jahre immer wieder aus dem eigenen Schönheitsempfinden heraus geleitete Zuchtwahl bildet sich der Mensch selbst zu dem in ihm wohnenden Schönheitsideal heran [...]. Darüber hinaus scheint diese Proportionsreihe im Sinne griechischen Denkens das vom Menschen und seinem Empfinden unabhängige, allgemeine Sprossungsgesetz der Natur überhaupt darzustellen.“ · NEUFERT, *Bauordnungslehre*, 1965, p. 41. This section was changed in the new edition from 1965; however, the quoted remarks and the racist vocabulary (natural selection, law of germination) remain the same in both editions.

70 Walter PRIGGE, "Zwischen bauhaus und BAUHAUS", in: *Ernst Neufert*, ed. PRIGGE, pp. 7–13, here p. 12 · On this see in general also LEUSCHNER, "Wie die Faschisten sich Leonardo unter den Nagel rissen".

71 Ernst NEUFERT, "Das Oktameter-System", in: *Der Soziale Wohnungsbau in Deutschland*, VOL. 1, 1941, pp. 453–465 · Gerd KUHN, "Die Spur der Steine. Über die Normierung des Ziegelsteins, das Oktametersystem und den Maßstab Mensch", in: *Ernst Neufert*, ed. PRIGGE, pp. 335–357. On the brick measurement see also NEUFERT, *Bauentwurfslehre*, 1992, pp. 53–55.

72 Ernst NEUFERT, "Bauordnung als Ganzheit", in: *Die Bauindustrie*, VOL. 9, 1941, pp. 1377–1386 · *Wohn- und Tagesunterkünfte für Bauarbeiter nach den Richtlinien der Deutschen Arbeitsfront*. Vorwort von Reichshauptamtsleiter Albert Speer (*Schriftenreihe des "Amtes für Schönheit der Arbeit"*, VOL. 10), Berlin: Verlag der deutschen Arbeitsfront, 1940 · Wolfgang VOIGT, "Triumph der Gleichform und des Zusammenpassens. Ernst Neufert und die Normierung in der Architektur", in: *Bauhaus-Moderne im Nationalsozialismus. Zwischen Anbiederung und Verfolgung*, edited by Winfried NERDINGER, Munich: Prestel, 1993, pp. 179–193.

73 Albert SPEER, "Vorwort", in: NEUFERT, *Bauordnungslehre*, 1943, p.3: „der totale Krieg zwingt zur Konzentration aller Kräfte auch im Bauwesen. Weitgehende Vereinheitlichung zur Einsparung technischer Kräfte und zum Aufbau rationeller Serienfertigung ist die Voraussetzung zu einer Leistungssteigerung, die zur Bewältigung unserer grossen Bauaufgaben erforderlich ist [...]“.

74 *Ibid.*, p.11: „der Schwerpunkt liegt auf der Herausarbeitung entsprechender, rationeller Baukonstruktionen auf den gefundenen Maßbeziehungen, wie sie der totale Krieg erfordert.“ · See also Ernst NEUFERT, "Die Pläne zum Kriegseinheitstyp", in: *Der Wohnungsbau in Deutschland*, VOL. 3, 1943, pp.233–240, here p.233: „Der totale Krieg fordert gebieterisch die Beschränkung unserer Lebensbedürfnisse auf das unbedingt Notwendige.“

75 Iring FETSCHER, *Joseph Goebbels im Berliner Sportpalast 1943: "Wollt ihr den totalen Krieg?"*, Hamburg: Europäische Verlagsanstalt, 1998, pp.63–98, here p.95: „Wollt ihr den totalen Krieg? Wollt ihr ihn, wenn nötig, totaler und radikaler, als wir ihn uns heute überhaupt erst vorstellen können?“ — On the preparations for "total war" from 1937 on, see also Joachim C.FEST, *Hitler*, 2 VOLS., Frankfurt am Main, Berlin, and Wien: Ullstein, 1978, VOL.2: *Der Führer*, pp.739 and 924 (first edition as *Hitler. Eine Biographie*, 1 VOL., Berlin: Propyläen, 1973).

76 Ernst NEUFERT, "Systematische Baunormung im Aufbruch", in: *Der deutsche Baumeister*, VOL. 4, 1942, no.12, pp.9–12, here p.11: „für die Bewältigung der gewaltigen Aufgaben im Osten“. — *Der Deutsche Baumeister* was a National Socialist journal.

77 *Ibid.*, p.12. On Fascism's relation to antique culture see Klaus WOLBERT, *Die Nackten und die Toten des "Dritten Reiches"*, Gießen: Anabas, 1982, p.66 and passim · See also Daniel ZAIDAN, *Bildende Künste im Dritten Reich. Eine kritische Auseinandersetzung mit einem vernachlässigten Kapitel deutscher Kunstgeschichte*, Hamburg: Diplomica, 2008, which (p.55) rightly speaks of an imagined "parallel ethos between National Socialism and antiquity". See for example also Friedrich PAULSEN, "Ostgermanischer Holzbau", in: *Monatshefte für Baukunst und Städtebau*, VOL. 20, 1936, pp.365–368, here p.368: "The Greek temple and eastern Indo-Germanic timber construction are based on the same racial laws of formation." [„Der griechische Tempel und der indogermanische Holzbau des Ostens unterliegen ein und denselben rassistischen Bildungsgesetzen.“] (It was in this journal in 1935 that Neufert first published his "Bauentwurfslehre", see above).

78 NEUFERT, *Bauordnungslehre*, 1943, p.31: „bei vielen kultischen Handlungen, vor allem bei Juden überall“.

79 On this see additional articles in the journal *Der deutsche Baumeister* from 1942. Besides technical articles and National Socialist themes (see for example Adolf Hitler's motto for the 10th issue) the journal as a whole contains numerous comments on the "Osteinsatz"; see esp. Erich BÖCKLER, "Der Osten als Bauaufgabe" in VOL. 4, 1942, no.5, pp.1–8.

80 *Der "Generalplan Ost". Hauptlinien der nationalsozialistischen Vernichtungspolitik*, edited by Mechthild RÖSSLER and Sabine SCHLEIERMÄCHER, Berlin: Akademie-Verlag, 1993 · Bruno WASSER, *Himmlers Raumplanung im Osten. Der Generalplan Ost in Polen 1940–1944*, Basel, Berlin, and Boston: Birkhäuser, 1993 · Isabel HEINEMANN, "Rasse, Siedlung, deutsches Blut". *Das Rassen- und Siedlungshauptamt der SS und die rassenpolitische Neuordnung Europas*, Göttingen: Wallstein, 2003, pp.359–381.

81 With this term I refer to the so-called "Wehrmachtausstellung" ("Vernichtungskrieg. Verbrechen der Wehrmacht 1941–1944" [1st exhibition 1995–1999, 2nd revised exhibition 2001–2004])

of the Hamburg Institut für Sozialforschung; on this see the overview by Wiebke GRÖSCHLER, *Der Wandel eines Täterbilds. Von der ersten zur zweiten "Wehrmachtsausstellung"*, Cologne: PapyRossa, 2008.

82 On this see FEST, *Hitler*, pp.933–939.

83 Thomas JOCHER and Sigrid LOCH, *Raumpilot. Grundlagen*, edited by the WÜSTENROT STIFTUNG, Stuttgart and Zürich: Karl Krämer, 2010, pp.11–30. I am grateful to Roland Bondzio for the information.

## IMAGES

Cesare CESARIANO, *Di Lucio Vitruvio Pollione de Architectura Libri Dece traducti de latino in Vulgare [...]*, Como: Gotardus de Ponte, 1521, fol. 49r: FIG. 1 and fol. 50r: FIG. 2 · Frank Zöllner: FIG. 3 · Pietro CATANEO, *L'architettura di Pietro Cataneo*, Venice: Aldus [Manutius], 1567, p.76: FIG. 4 · *Le Modulor*, Boulogne-sur-Seine: Éditions de l'Architecture d'Aujourd'hui, 1950: FIG. 5 and FIG. 6 (© FLC / VG Bild-Kunst, Bonn 2014; FIG. 6 with reconstruction by Frank Zöllner) · Ernst NEUFERT, *Bauentwurfslehre. Grundlagen, Normen und Vorschriften. Handbuch für den Baufachmann, Bauherrn, Lehrenden und Lernenden*, Munich: Bauwelt-Verlag, 1936: FIG. 7 · Ernst NEUFERT, *Bauordnungslehre*, edited by the Generalbauinspektor für die Reichshauptstadt Reichsminister Albert SPEER, Berlin, Amsterdam, Prague, and Vienna: Volk und Reich Verlag, 1943: FIG. 8 · Thomas JOCHER and Sigrid LOCH, *Raumpilot. Grundlagen*, edited by the WÜSTENROT STIFTUNG, Stuttgart and Zürich: Karl Krämer, 2010: FIG. 9 and FIG. 10