

Human proportions in architecture

[Design](#), [Architecture](#)



'After having considered the right arrangement of the human body, the ancients proportioned all their work, particularly the temples, in accordance with it'. To what extent does the human body influence architectural forms and writing from antiquity to 1600? The study of the human body has spanned centuries, from the mathematicians of antiquity to the humanist scholars of the High Renaissance, and parallels between the bodily proportions and architecture have played their part in some of the most celebrated architectural feats.

Writers and architects throughout this period never eased in exploring the various ways in which the 'arrangement of the human body could be applied to architecture, from associations with the Golden Section, to the Roman perfect numbers, and the creation of the square and the circle as 'ideal' forms derived from the Vitruvian man. Yet, whilst all these issues were significant to the architects and writers of this period, many other factors were just as important in determining the architecture produced.

It is important to take into account not only alternative systems of proportion other than those derived from the human body, but also the historical and social context in which buildings were being designed. Furthermore, whilst writers and architects were influenced by the use of the human body in previous works, they were often equally influenced by the mere 'authorities' of the past, and whilst human proportions may have been passed on through the centuries, the meaning behind its involvement was frequently lost, so that it was not a conscious reference to the human body, but a keeping with tradition.

The theory which exists as the basis of this discussion is notion established by Aristotle, who scribed the relationship between the human body and the rest of reality: " the body carries in it a representation of all the most glorious and perfect works of God as being an epitome or compendium of the whole creation" I . This idea of man as a microcosm in the grand macrocosm of the Universe is one which led to the belief that in creating architecture for the worship of God, it was only those proportions created by God himself, namely those of man, which could ever be worthy.

Yet, over the course of the next millennium, a whole host of different interpretations of the human DOD were made, so that it was not a single set of ideas which became applied to architecture. To begin in antiquity, the most basic way in which the human body influenced architecture was in the creation of the classical orders. Most simply, it is understood that the form of the first Doric order derives from the warriors of King Doors in Greece, and thus displays " the proportions strength and beauty of the body of a man".

Though the intricacies of the Doric order, namely the triptychs and mottoes, are believed to originate from timber construction of the primitive hut which was then copied in stone, the masculine, war-like associations of the order were very influential throughout antiquity, during the Middle Ages and into the Renaissance. Examples of the Doric order include the Temple of Hyphenates, Athens, mid 5th century BC, built in dedication for the blacksmith of the Gods and forger of armor, as well as Brakeman's Temperate 1502-19, for SST. Peter, 1 by G.

Odds and R. Tavern, y and Building : Essays on the Changing Relation of Body and Architecture, (Cambridge, London : MIT, 2002). P. 35 the hero and martyr. The Corinthian and Ionic orders display as much human influence in their architectural forms and associations, respectively having derived from the Ionian and Corinthian peoples. Based on the more civilized Ionian women, the Ionic order expressed feminine values of a matronly figure, with the curls of hair, folds of drapery and sandals represented in the volutes, fluting and base of the column.

Similarly, the Corinthian order is thought to have derived from the basketwork of a Corinthian maiden, and so portrays the slender, refined qualities of a young girl, surrounded by acanthus leaves for the capital. In his architectural reties of 1537-43, Sebastian Series states that " temples to male saints whose lives were less robust than delicate, or to females saints who led matronly lives should be Ionic.

Temples to the Virgin Mary, virgins, nuns, should be Corinthian". Thus, it is apparent how the various forms of the human body can be influence not only the physical forms of the building, but also their values and associations. Historically, it is important to note that architecture based in mathematics, meaning that to the ancients, the practice of architecture was not differentiated from that of thematic theory.

This is therefore a strong argument in favor of how bodily proportions influenced classical architecture, reiterated by Vitreous who claimed that " without symmetry and proportion there can be no principles in design, that is, if there is no precise relation between the members, as in the case of the

well-shaped man" 2. Furthermore, it was the mathematician, Pythagoras (582-507 SC), who suggested that the Golden Section was based on human proportions, and therefore proving its importance in the dimensions of classical buildings.

The most celebrated example of this system of proportion is the Parthenon, built on the Athenian Acropolis, Greece in the 5th century BC. Although several elements, including the dimensions of the facade, the spacing of the columns and the interior rectangular space can be seen to agree with the Golden ratio, very few scholars still believe that the Parthenon was originally intended to comply with the theory discovered by Euclid sometime after it was built. Therefore, in terms of their utilization of the Golden Section, it does not appear that the architecture of the ancient Greeks was strongly influenced by the human body.

Yet, when returning to Vitruvius, another example of the human body influencing architectural forms and writing is introduced. In Book III of his Ten Books of Architecture he confronts us with the fact that man, when " placed flat on his back, with his hands and feet extended, and a pair of compasses centered at his navel, the fingers and toes of his two hands and feet will touch the circumference of a circle and described therefore. And just as the human body yields a circular outline, so too a square figure may be found from it. 3 The importance of this discovery to the scholars of antiquity, that man could fit into the two most perfect geometric units, was immense, as it was thought to reveal a fundamental truth about man and the world. In light of the earlier notion of the microcosm-macrocosm, it becomes clear why 2

Vitreous, Book III of his Ten Books of Architecture, quoted in R. Witter, Architectural Principles in the Age of Humanism, (London : Academy Editions, 1973) 3 Vitreous, The Ten Books on Architecture, Book III. Architects and theorists were keen to emulate the square and circular forms, as derived from the human body, within their work. Within ancient Rome there are few centralized buildings, but any such examples prove how ideas of centralization were not only discussed in architectural writings, but were actually put into practice. The Pantheon, Rome, rebuilt during the reign of Hadrian c. 125 AD, is a primary example of the celebration of the two purest geometric and anthropomorphic forms, with the plan consisting of a circle attached to a square.

The square entrance-hall, which opens onto the vast coffer dome of the interior, is one of the most technically brilliant feats of its day, as well as a huge influence to architects and writers of the true. One further example of central-planned buildings of antiquity is the Temple of Minerva Medica, of 4th century Rome between the via Albanian and the Aurelian Wall. Though it exists today as a mere ruin, its original decagon's structure and dome adhere to the geometrical recommendations of Vitreous and the ancient mathematicians, illustrating the influence of the body on architecture.

The issue of centralized structures was one that preoccupied the minds of architects and theorists through the centuries, but it was not until the Renaissance, and Alberti's *De Re Aedificatoria* when centrally planned churches became fully established. In his stipulations for the 'ideal church', Alberti declares that the circle is the shape most celebrated in nature, but

he also advocates 8 other geometric shapes derived from the circle including the square, hexagon and decagon, and rejects the form of the basilica because of its inadequacy in comparison to the temple. Michelangelo choir for AS Annunciate, Rome 1444, is considered to be the first centralized building of the Renaissance, based on a circle with attached semi-circular chapels. Liberties San Sebastian, Mantra of 1460, however, makes use of the Greek cross plan, with 3 arms protruding from a central cross-vaulted interior space. Yet, perhaps the figure to show the greatest interest in the physical manifestation of the central plan was Brucellosis.

His Old Sacristy for San Lorenz, commissioned by Giovanni di Bicci de' Medici, and completed in 1428, is considered "the first Renaissance space that could actually be entered" 5 . The plan consists of one exact square with 3 surrounding squares a third of the size, with the overall cube being surmounted by a hemispherical dome. Similarly, Brutishness's Santa Maria dogleg Angel, 1434, has a central plan based on an octagon surrounded by 8 chapels each with rounded ends like an apse.

AY these buildings, of which there are many more, make use of the central plan and thus illustrate the influence of the human body from which they were derived. Yet, it may not be the case that the architects adopted these shapes for that same reason, and it is therefore necessary to identify other factors which may have led to their adopting of centralization. To begin with, it is possible that characters like Brucellosis and Alberta, at the time of a thriving classical revival in Florence, were simply being influenced by the 4 R.

Witter, *Architectural Principles in the Age of Humanism*, (London : Academy Editions, 1973) p. 65 F. Hart, *History of Italian Renaissance Art: Painting: Sculpture: Architecture*. (London, 1987) prestige of centralized buildings and wanted their buildings to carry the same associations of a powerful Roman Republic. Aside from the obvious example of the Pantheon, as mentioned earlier, a further direct influence from Rome may have been the Santos Stefan Rotund which, in the sass, underwent major restoration work by Reselling under Pope Nicolas V, bringing it to the attention to the likes of Alberta, Brucellosis and Michelson. Another massive influence is the Church of the Holy Sepulcher in Jerusalem, where a circular wall encloses a ring of columns and is surmounted by a dome. Moreover, Just as pilgrimage buildings on the main routes to or within the Holy Land imitated elements of the sacred buildings of Jerusalem, small rotunda churches were built in Europe as satellites of more important churches being approached by pilgrims. It has therefore been suggested that Liberties San Sebastian may have been built as a " sacred station en route to Sans Andrea" 6, and thus emulates the centralized plan as a reference to the affiliations to the Holy Sepulcher, and does not relate to the Vitamins man. Other issues suggest that the use of centralization does not directly bare reference the human body, particularly when acknowledging the religious focus that many churches of the Renaissance still fostered, despite being built during the flourishing of humanism. Giuliani dad Sandals S. Maria dellCareer, Pratt 1485, has the plan of a Greek cross, with 4 arms joined to the crossing and a dome suspended over the Rossini.

Here, however, architectural intentions other than those of centralization appear to prevail, when considering the manner in which the dome doesn't touch the incommensurate of the arches, the pure white walls and geometrical simplicity of the building. Overall, Giuliani and Seasonal has created a church that is able to " evoke in the congregation a consciousness of the presence of God" 7, Just as Alberti stipulated that an ideal church should have a " purifying effect and produce the state of innocence which is pleasing to God" 8.

In addition to the issue of centralization, the human body is represented in architecture through the proportions and mathematical ratios applied to the building. Just as Plato thought that proportion was " the bond that holds things together" 9, Alberti commented in his treatise of 1450 that: " Just as the head, foot and indeed any member must correspond to each other and to all the rest of the body in an animal, so in a building, and especially in a temple, the parts of the whole body must be composed so 6 R.

Tavern, *On Alberti and the Art of Building* (New Haven, London : Yale University Press, 1973), p. 144 7 Editions, 1973) p. 19 8 9 Ibid. P. 6 R.

Paddock, *Proportion : Science, Philosophy, Architecture* (London : E & F N Spon, 1982) p. 182 that they correspond to one another" 10. This idea manifests itself in the way that buildings incorporate an overall system of proportion, but more specifically, the inclusion of the " perfect' numbers, as defined by the ancients, resulting from the tradition in which architectural measurements were made using parts of the body (foot, digit, cubit and inch).

It was a combination of the discovery that a man's foot is one sixth of his height, with the knowledge of the 10 digits of the human body, which deed to the numbers 6, 10, and 16 being hailed as superior to all others, and those which would allow the perfection of the human body to be mirrored in architectural expressions. Liberties fade for Santa Maria Novella, completed in 1470, displays not only the unified proportions outlined by his treatise, but the ratios of perfect numbers.

The whole fade is based on the unit of a square, but crucially, the central rose window stands at a height of 36 units above the entry platform, within a fade 60 units high. This ratio of 36: 60 is significant because it relates directly to the emissions of the 'ideal man' who is 60 inches tall, with a navel 36 inches off the ground. Other references to this particular ratio based on 'perfect' numbers as determined by the ancients include Brutishness's oratory of Santa Maria dogleg Angel, and San Sebastian, with a ratio of 6: 10 for the main elements of the building such as the door, apses, portico vault and dome.

It is therefore apparent that there was a strong influence of the " perfect" numbers (relating to the human body) in the Renaissance, but, as witnessed with regards to centralization, this issue does not appear significant in the Middle Ages. Only a few examples exist, one of which is Milan Cathedral in Lombardy, Northern Italy, which was begun in 1386 under the archbishop Antonio dad Assault, and displays proportions based on the 'perfect' numbers in the width of its nave which is divided into 6 units of 16 brachia.

The use of the perfect numbers as ratios for elements of buildings appeared extensive in the Renaissance, and widespread throughout architectural theories. It is also possible, however, to identify several other systems of proportion which were equally as influential on the architecture of these years. Whilst Pythagoras identified the Golden Section and the "perfect numbers", he also discovered how musical harmonies could be determined by measured lengths of string, and therefore how the corresponding mathematical ratios could be applied to architectural proportions.

In *De Re Edification*, Alberti appears to be strongly influenced by these discoveries, asserting the notion of beauty in music being paralleled in architecture, and recommending ratios based on intervals greater than an octave. Francesco di Giorgio, in his *Trattato di architettura*, 1482, does not write explicitly on the theory of proportion in architecture, but still comments on music ratios when making recommendations for the *S. Francesco Della Vigna*, Venice, completed in 1534.

Here he explains how the ratio of width to height of the nave should be based on the musical harmony of a 4th (ratio 3: 4), and makes suggestions for the width of the chapels and transepts on similar terms. He gives no explanation for his choice of particular ratios, only stressing the view stated by Alberti that a system of proportion should be related to the whole building, and that churches should reveal the "perfection of the divine Ewing itself" 1 1.

In addition to musical ratios, another system of proportion that stands in competition with that based on the human body (namely 'perfect' numbers)

is the notion of sacred geometry. This system particularly arises during the Renaissance, and is identifiable again with the example of Brutishness's Old Sacristy for San Lorenz, where the 3 arched windows are said to allude to the trinity, the four walls of the cube denote the evangelists, and the 12 ribs of the dome stand as a symbol for the apostles.

One final and major way in which the human body influenced architecture is that of the orders. Having established counter-arguments regarding the physical properties of buildings, it is necessary to incorporate social issues into the debate. Although the ancient texts explained the importance of using human proportion in buildings, and the various ways in which they manifest themselves, this does not mean that subsequent theorists and architects were equally as influenced by these theories.

Instead, when identifying the similarities between treatises on architecture, it may be that writers were influenced by the authority of previous writers, and not specifically the content of their writing. Furthermore, when comparing, for example, Alberti and Francesco di Giorgio, writing respectively in 1450 and 1482, it is crucial to note differences in their personalities, activities and educational background which will have influenced their work.

This point of social and historical context is clarified by Alberti himself who said that: " the greatest Joy in the art of building is to have a good sense of what is appropriate" 12, whilst Filtrate's work of 1465, " can be seen as an explicit historical document, albeit of arduous interpretation" 13. The varied and extensive influence of the human body on architectural forms and rating

have been discussed with reference to the classical orders, geometric shapes, proportions, ratios and measuring systems.

However, whilst all these influences are apparent, it is necessary to question the extent to which these ideas, originally founded in the human body, were used deliberately, or whether the architectural forms in which they manifested themselves were imitated for their own sake. Likewise, it is also possible to identify other influences and issues concerning the context and individuality of the artist which suggest the human body was rarely of the greatest influence.