Beauty in Architecture
No, not a luxury; only a necessity

Semir Zeki
Professor of Neuroesthetics,
University College London

Beauty, like consciousness, is difficult to define. But, like consciousness, it has two characteristics that most, if not all, are agreed on - that all humans are capable of experiencing it and that it is a highly subjective experience. The latter is especially interesting and even has a proverb, traced to Roman days, that seemingly gives it substance: "*De gustibus et coloribus non est disputandum*" [in matters of taste and colour there can be no dispute]. It is a handy little proverb that on the one hand serves to stifle all discussion about matters of taste and on the other acts as a protective shield to all those who, knowingly or unknowingly, sacrifice beauty for other ends. It is also one that does not withstand critical scrutiny.

Subjective and Objective

In fact, subjective and objective have meaning only with regard to an external observer, who will find that, when people of different cultural and ethnic backgrounds are asked, for example, to judge whether an object is hot or cold, there will be very nearly universal agreement among them, thus making of the experience of heat an apparently objective one. When however the same multitudes are asked to judge the beauty of a painting or that of a building, wide variations will be found, thus leading the external observer to conclude, ineluctably, that the experience of beauty is subjective. But this classification is only true with respect to the external observer. To the experiencing individual all experiences are objective and enabled by the organization and functioning of their brains. To a great extent, that organization is similar in all humans. This critical fact is commonly un-acknowledged because, especially in matters of taste, the emphasis has been more on differences. But the similarity in the essentials of brain organization between individuals of different races and cultural backgrounds raises the fundamental question of the extent to which an individual can assume that his or her experience is similar or identical to that of others, of *whether an external observer can ever detect any uniformity in matters of taste and beauty*.

A uniformity in matters of taste?

The question was nicely, if obliquely, framed for scientific experimentation by the English art critic Clive Bell (1914), although scientific experimentation was the last thing Bell had in mind. In his book, *Art*, Bell (who was equating art with beauty) wrote that "…there is a particular kind of emotion provoked by works of visual art…the aesthetic emotion" and that this same kind of emotion is evoked by "every kind of visual art" (including architecture) because "all works of art [must have] some

common quality"; the discovery of that "common quality" will lead us, Bell believed, to solve "…what I take to be the central problem of aesthetics".

In fact such a common quality, or rather characteristic, has been discovered, though only in a neurobiological context. Briefly summarised, the experience of beauty, regardless of whether its source is sensory, whether derived from joy or sorrow, whether moral or highly cognitive (mathematical), correlates with heightened neural activity in a specific part of the emotional brain, field A1 of the medial orbito-frontal cortex (A1mOFC), an activity that is proportional to the declared intensity of the aesthetic experience(Kawabata & Zeki, 2004)(Ishizu & Zeki, 2011)(Zeki *et al.*, 2014)(Ishizu & Zeki, 2017)[1](see Figure 1); hence the experience of beauty can actually be quantified. This may be the common factor that Bell sought in vain, the answer that he imagined would solve the "central problem of aesthetics". If so, it only provides an answer in the context of neurobiology. But the answer carries important associations because activity in the same part of the brain also correlates with the experience of pleasure, reward, decision-making and the experience of desire (Schultz, 2000)(Gottfried, et al. 2003)(Wallis, 2007)(Kawabata & Zeki, 2008) This association provides a common neural framework for all four related experiences and acts as a pointer to the experience of beauty as a factor in decision-making.

[1] This is not to say that stimuli perceived as beautiful but having different sources activate A1mOFC alone; different sensory stimuli activate different brain areas but A1 mOFC is the common area, activity in which correlates with the experience of beauty regardless of source.

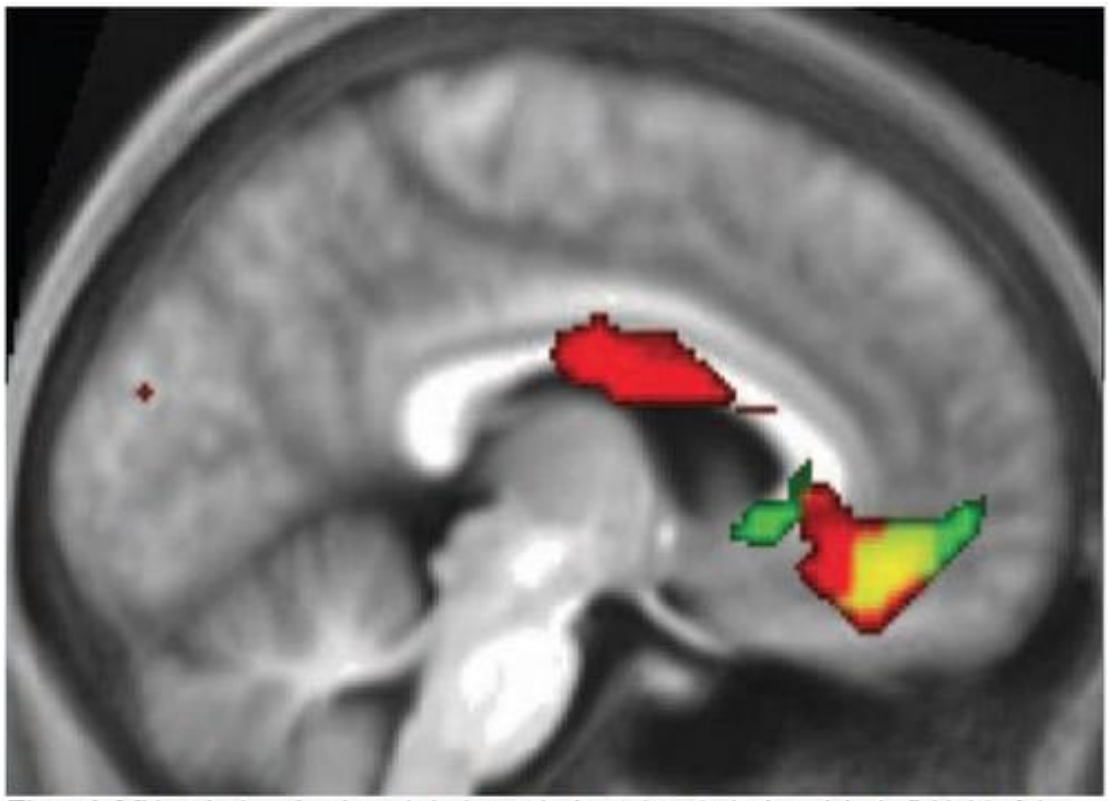

Figure 1: Mid-sagittal section through the human brain to show the brain activity in field A1 of the medial orbito-frontal cortex (A1mOFC) that correlates with the experience of musical (green) and visual (red) beauty. The yellow region corresponds to field A1 mOFC. The experience of beauty derived from other sources (including highly cognitive sources, such as mathematics) also correlates with activity in the same part of the emotional brain. From Ishizu, T and Zeki, S (2011). PLoS One. **6**, e21852 doi:10.1371/journal.pone.0021852.

Beauty as a guide to design

Mathematicians and physicists have emphasized the importance of beauty in guiding them to the truthfulness of their formulations and thus to apprehending truths about our Universe before they are demonstrated experimentally(Dirac, 1939). Can architects also be guided by beauty in their designs? After all, the architect is capable, like all others, of experiencing the "Aha" moment, when a design in progress is perceived to be beautiful. Beauty being an objective experience to the experiencing individual, it becomes almost impossible to cheat oneself in this regard, unless of course there are other considerations to which beauty becomes hostage - such as social or financial constraints or the projection of power in the design, as has been commonly demanded by powerful rulers. In his essay, Bell had warned that such extraneous influences, be they intellectual or otherwise, are the enemies of the "aesthetic emotion";, what matters is that "which is left behind when we have stripped a thing of all its associations, of all its significance as a means" (Bell, 1914).

Looking at the hideous architecture that defaces much of post-war central London or the suburbs of Paris (Figure 2), it is evident that there are indeed

considerations to which beauty is commonly sacrificed and which do a disservice to nourishing those parts of the brain whose activity correlates with pleasure, reward and, above all, beauty.

***Figure 2**: A building in the grounds of the Hôpital Salpetrière, Paris. An example of a building that serves a useful function but that is also crushingly soul-destroying, indifferent to providing a hospitable and welcoming habitat to the weary and anxious patient, and indifferent to using beauty where it may be needed and effective. Photo: S Zeki*

Translated into architectural creations, this implies that there is, or ought to be, some common guiding element, that is pancultural and that dictates the experience of architectural beauty, some kind of *sensus communis* which would enable the architect to suppose that what s/he regards as beautiful would have universal assent, or nearly so, among humans. How can this be if beauty is entirely subjective, as is universally assumed? The answer is that, even to an outside observer, the experience of beauty is not quite as subjective as most assume. This is especially so of the experience of biological beauty, one of the two categories into which all experiences (including that of beauty) can be subdivided, the other being the artifactual (Zeki, 2009)(Zeki, 2016). The biological category extends from colour which (as the Roman proverb above shows) is often considered to be a subjective experience, to the experience of human faces and bodies, to landscapes in the natural world and to mathematical beauty; the artefactual category includes man-made artifacts such as machines, cars, aeroplanes and of course buildings. In general, one may say that biological experiences are interfaced through inherited brain concepts which, to a large extent, are uniform across humans and cultures and thus lead to similar experiences while artifactual ones are interfaced through acquired brain

concepts and are therefore not only dependent upon culture and learning but also change even within the lifetime of a single individual, and thus lead to more varied experiences (Zeki, 2009).

In fact, there is very little, indeed trivial, variation between individuals belonging to different ethnic and cultural groupings when experiencing colour(Zeki et al., 2018), which constitutes one of the most extreme examples of experiences based on inherited biological concepts. Chromatic signals are interfaced through inherited brain programs that generate colours in the brain in almost identical ways in all humans. The experience of *colour categories* (as opposed to shades or hues of colour) is therefore very objective, even to an outside observer, not subjective as the Roman proverb implies (Zeki et al., 2018). This is also true, though to a lesser extent, for the experience of mathematical beauty (Zeki et al., 2018), which I classify in the biological category because it must obey the logical deductive rules of the brain, rules that are common to all humans, irrespective of cultural and ethnic differences (Zeki et al., 2018)

Inherited brain concepts as determinants of beauty

Mathematical relations may also hold at least a partial key to the experience of facial and corporeal beauty, where what we may loosely call mathematical principles – of symmetry, balance, and precise relationships of parts to one another – have to be respected for a face to be experienced as beautiful. In his *Kanon,* the Greek sculptor Polykelitos, and others since, proclaimed that the perfect human body (such as *Doryphoros*) can be constructed according to strict mathematical criteria. Such basic characteristics underlying human beauty seem to be pancultural because, I believe, there may be an inherited brain template that dictates the minimum requirements that are necessary for characterising – or experiencing – a face or body as beautiful. Indeed, when Francis Bacon declared that his aim in painting was to give a "visual shock", he did so precisely by mutilating and deforming those characteristics of a face or a body – the proportions, symmetries and relations; he rarely if ever defaced or mutilated objects such as chairs or tables or cars, which belong to the category of artifactual experiences(Zeki & Ishizu, 2013).

The categorization of architectural beauty

This raises the question of what category architectural beauty belongs to and the extent to which the architect can reasonably assume that what s/he considers to be a beautiful design will have universal assent, in the sense that others will also experience that architectural design as beautiful. Our outside observer would, I imagine, find it difficult to obtain unanimity among people of different races and cultures in designating buildings as beautiful and thus be led to suppose that architectural beauty is truly subjective. In the schema of experiences that I have proposed, architectural beauty falls into the artifactual category because there is no inherited brain concept of a building, let alone a beautiful building. But the picture is more nuanced than that strict subdivision would suggest. When we design artefacts such as buildings, we have already looked at nature and it would be surprising if something of that biological experience did not seep into our artifactual designs. Indeed, the Roman architect

Vitruvius (for whom beauty or *Venustas* constituted one of the three Vitruvian Triads of architecture) emphasized that beauty in architecture has its source in the contemplation of the natural world, including the human body. This might stretch the principle of *pareidolia*, because here one begins to treat the architect as unconsciously instilling into an architectural design properties derived from more biological percepts such as those of faces or bodies or landscapes[2]. It is indeed common to find many architectural designs that are inspired by, and resemble human bodies or body parts. (Figure 3).

[2] As a quick search of the internet will show, many architectural designs resemble, and are inspired by human faces and human bodies or body parts.

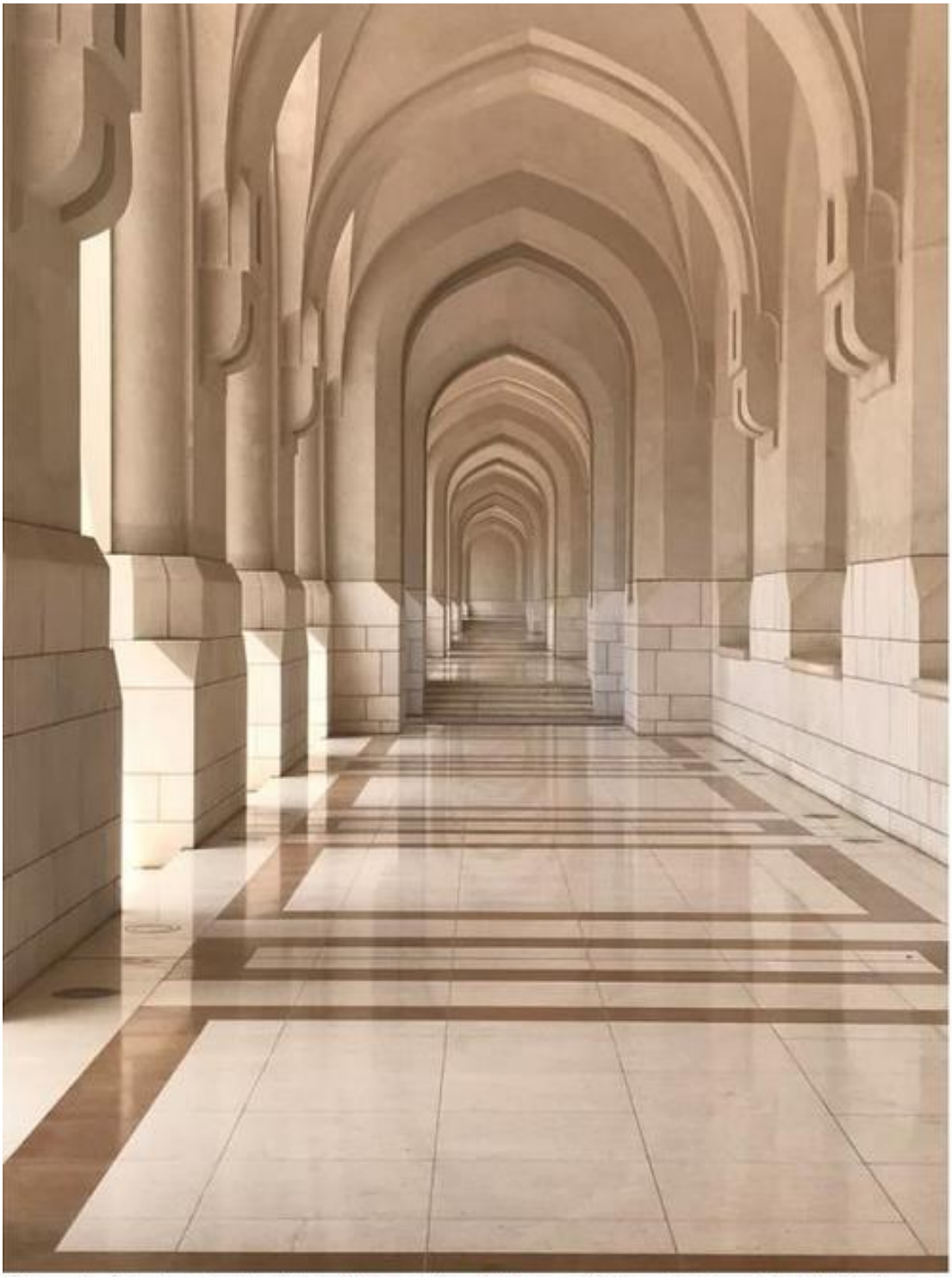

***Figure 3**: A hallway in the Sultan Qaboos Grand Mosque of Muscat, designed by MS Makiyah. It would be hard to believe that, consciously or unconsciously, the design does not obey mathematical principles of symmetry, harmony and proportion that are part of the cognitive apparatus of all brains. Photo: S. Zeki*

It is therefore reasonable to suppose that there is a heavy dose of biological beauty, dependent upon inherited brain concepts, that regulates architectural design, provided it is not subject to other requirements, as detailed above. I therefore imagine, though I cannot be sure, that, if forced to do the

experiment, our outside observer would find that, even though the unanimity is not nearly as great as those found in colour categorization, there is greater unanimity in classifying buildings as beautiful than is commonly supposed; hence that, even in the domain of architecture, beauty is not quite as subjective as may seem at first (Figure 3). Although there are many considerations that go into architectural design, what universality architectural beauty may possess probably lies in satisfying inherited brain concepts of proportion, harmony and geometric relationships that are more formally expressed in mathematical terms.

Conclusion:

For Edmund Burke, "Beauty is, for the greater part, some quality in bodies acting mechanically upon the human mind by the intervention of the senses"(Burke, 1757). Notice that two thirds of that definition is based on the brain, if "mind" is accepted as being the result of brain activity. The "quality" in bodies is itself also sometimes heavily dependent upon properties for which the brain has inherited templates, that define the minimum requirements that must be satisfied if an object or design is to be experienced as beautiful. In our daily activity, we search and seek to satisfy that quality; in simpler terms, we seek the beautiful to nourish the emotional brain since, from a neurobiological point of view, all areas of the brain must be continually nourished in a way that corresponds to their specific functions. The experience of pleasure, reward and desire, are central to activity of the emotional brain, and specifically of field A1 of mOFC. When one considers that decision-making is also linked to activity there, one reaches the inevitable conclusion that beauty must be a guiding characteristic in all designs that aim to enhance human experience. Hence, whatever other demands go into architectural design, beauty must be a central element. Its experience adds to the health of its individuals amd hence to society's well being/ It is not a luxury but an essential ingredient in nourishing the emotional brain.

References

Bell, C. (1914) *Art*. Chatto & Windus, London.

Burke, E. (1757) *A Philosophical Enquiry Into the Origins of Our Ideas of the Sublime and Beautiful*. R and J Dodlsey, London.

Dirac, P. (1939) The relation between mathematics and physics. *Proc. Roy. Soc. Edinburgh*, **59**, 122-129.

Gottfried, J. A. O'Doherty, J & Dolan, R. (2003) Encoding Predictive Reward Value in Human Amygdala and Orbitofrontal Cortex. *Science (80-.).*, **301**, 1104–1107 http://www.sciencemag.org/cgi/doi/10.112.

Ishizu, T. & Zeki, S. (2011) Toward a brain-based theory of beauty. *PLoS One*, **6**, e21852 doi:10.1371/journal.pone.0021852.

Ishizu, T. & Zeki, S. (2017) The experience of beauty derived from sorrow. *Hum. Brain Mapp.*, **38**, 4185–4200.

Kawabata, H. & Zeki, S. (2004) Neural Correlates of Beauty. *J. Neurophysiol.*, **91**, 1699–1705.

Kawabata, H. & Zeki, S. (2008) The neural correlates of desire. *PLoS One*, **3**, e3027.
Schultz, W. (2000) Multiple reward signals in the brain,. *Nat. Rev. Neurosci.*, **1**, 199–207.
Wallis, J. (2007) Orbitofrontal cortex and its contribution to decision-making. *Annu. Rev. Neurosci*, **30**, 31–56.
Zeki, S, Javier, A and Mylonas, D. (2018) The Biological Basis of the Experience of Constant Colour Categories. *bioRxiv*, **488379**.
Zeki, S. Chén, O.Y. and Romaya, J.P. (2018) The Biological Basis of Mathematical Beauty. *Front. Hum. Neurosci.,*.
Zeki, S.& C.O. (2016) The Bayesian-Laplacian Brain. *bioRxiv*,.
Zeki, S. (2009) *Splendors and Miseries of the Brain: Love, Creativity and the Quest for Human Happiness*. Wiley-Blackwell, Oxford.
Zeki, S. & Ishizu, T. (2013) The "Visual Shock" of Francis Bacon: an essay in neuroesthetics. *Front. Hum. Neurosci.*, **7 https://**, 850.
Zeki, S., Romaya, J.P., Benincasa, D.M.T., & Atiyah, M.F. (2014) The experience of mathematical beauty and its neural correlates. *Front. Hum. Neurosci.*, **8**, 68, https://doi.org/10.3389/fnhum.2014.00068.