

What brain scientists contribute to a broader perspective of appreciating Visual Art, Poetry and Music – Perhaps

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It was in 1979 when I made a proposal to the Werner-Reimers-Foundation in Germany to initiate a study group on “Biological Aspects of Aesthetics”; the idea was to get a better understanding of the neural basis of aesthetic appreciations. The result of this interdisciplinary and international study group resulted 1988 in the book “Beauty and the Brain” published by Rentschler and colleagues; here apparently the first time the term “neuroaesthetics” was used. In 1997 both the painter Jörg Immendorff and I were elected to the EASA, and we both gave talks at that occasion, my challenge being to reflect as a neuroscientist the artwork of Immendorff. Now 25 years later and some 40 years after the first steps in this unknown intellectual territory, I presented some examples from the visual arts, poetry and music. The examples show that knowledge from the neurosciences and psychology can perhaps provide an additional angle looking towards the arts, certainly not replacing such perspectives as developed in the humanities, but the other way around also using the arts as a source for stimuli in experiments to study neural mechanisms.

One example is the black square of Kazimir Malevich which indicates what is represented in the retina of the human eye, i.e. just edges and surfaces; there are no lines; these are abstractions as in Euclidian geometry. The Chinese scientist Lin Chen in his research on visual perception has shown that the extraction of topological invariants like surfaces, edges or holes are the first steps in neural processing to create a visual image. Thus, one might argue that an artist anticipated intuitively a scientific theory. Other links between perceptual phenomena in vision and artwork can be seen in the “op art” when for instance Victor Vasarely used the “Hering Illusion” in his image “Supernova” to induce unexpected perceptual phenomena. The genius of the artist is to create more in perception than is represented physically. But artists can also create the impossible. Examples come from Jackson Pollock with his drip-paintings which are impossible to be copied (only by photography); this gives us knowledge about visual perception to always have represented in the mind something in its identity; visual noise is not “something”. Impossible figures also come from images of Pieter Brueghel the elder or M.C.Escher which are geometrically possible but physically not. An important discovery in Western art was the “central perspective” going back to Alberti and Leonardo. This perspective is very different from the “floating view” in Eastern landscape pictures. Interestingly, both perspectives are perceptually wrong: In the floating view different views are superimposed which in one moment is impossible; however, they can create strong belongingness and embeddedness of the viewer in nature. The central perspective suffers for instance from the problem that size constancy for near objects is neglected; it is geometrically correct, but perceptually inadequate. The different perspectives, from the East and the West, do not speak against the creativity of artwork; they represent different cultural specifics based on anthropological universals. We all share the same neural mechanisms. This is in particular also observed in poetry and music. Poems in their aesthetic appreciation are characterized by a “time window” of some three seconds. Similarly, musical motifs in the tradition from Haydn to Mahler show a temporal preference of some three seconds. This universal time window as an operating range (not as a physical constant) can be observed in many cognitive functions like speech, communication, movement control, memory functions, visual processing, or anticipating. To see it in poetry, music and also visual art is just a reflection of a fundamental mechanism of the human brain.

References: Rentschler, I., Herzberger, B., and Epstein, D. (eds) (1988). *Beauty and the Brain. Biological Aspects of Aesthetics*. Basel: Birkhäuser Verlag; Pöppel, E. (2018): *East of West, West of East: a matter of global and local identity*. Cognitive Processing; Zeki, S., Bao, Y., Pöppel, E. (2020). *Neuroaesthetics: The art, science, and brain triptych*. PsyCh Journal 9 (2020): 427–428.