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*Examining Semir Zeki's
'Neural Concept Formation and Art:
Dante, Michelangelo, Wagner'*

In his paper, 'Neural Concept Formation and Art: Dante, Michelangelo, Wagner' Semir Zeki writes 'we can trace the origins of art to a fundamental characteristic of the brain, namely its capacity to form concepts' (Zeki, 2002, p. 53). He proposes that 'this capacity is itself the by-product of an essential characteristic of the brain. That characteristic is abstraction, and is imposed upon the brain by one of its chief functions, namely the acquisition of knowledge.' (*ibid.*, p. 53). Then, centring his argument around 'the ideal of love', he claims that Dante, Michelangelo and Wagner 'had created in their brains', he further asserts that 'none of the three found that ideal in real life, and each was impelled in a different way to create works of art in response to that gap' (*ibid.*, pp. 53–4).

After reading through the piece several times I find the speculative hypothesis weak on data and scientifically unconvincing. This is not just a result of Zeki's ill-conceived definition of art. His theoretical view also puts aside the degree to which developing and appreciating artworks involves a number of complex operations. Indeed, perhaps the most noteworthy aspect of Zeki's theory is the degree to which it undermines his own premise that a real theory of art and aesthetics must be neurologically based. Instead, after asserting that his approach is dictated by a truth that he believes to be axiomatic — 'that all human activity is dictated by the organization and laws of the brain: that therefore, there can be no real theory of art and aesthetics unless neurologically based' (Zeki, 2002, p. 54), he presents a tautological and psychologically-based argument best summed up by the phrase 'and then a miracle occurs'.

How the 'Miracle' Occurs?

Overall, the most significant problem in the paper arises as a result of Zeki's approach to how this 'miracle' occurs. In a section aptly titled 'Abstraction in the Visual Brain', Zeki briefly summarizes research he claims demonstrates

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abstraction in the visual brain. His discussion of abstraction and the visual brain is then abstractly extended to discuss opera and literary work. His explanation for the sweep of the argument — that the kind of detail we would need for the argument to hold together can be found in his earlier work — ignores two key points. First, his earlier work is similarly focused on vision. In addition, as I have explained elsewhere (Ione, 2000; 2001), and as others have reiterated (Levy, 2000; McMahon, 2000; Nash, 2000; Shortess, 2000), his earlier work, too, is speculative and removed from the nuts and bolts of art practice and art appreciation. In summary, the theory is both ill-formed in and of itself and does not apply to art practice and appreciation.

The conclusions he draws from his conjectures highlight two other major limitations that are ingrained in his theory. One is, as he writes: 'How the brain abstracts is only partially known, for simpler constructs only.' (Zeki, 2002, p. 59) It seems, with so little known, one should draw sweeping conclusions with more care. The second limitation results from his decision to speak about art in terms of ideals and universals. Coupling his view of ideals and universals with his view of abstraction he gives us the impression we should assume the subsystems of the brain are homologous (in the sense of employing similar principles) when we discuss neural concept formation and art.¹ I would argue that painting with a visually-biased brush blurs neural distinctions that researchers know occur when processing language, visual art and music. It would have been helpful to clarify why he favours a homologous view, if he does, and to include some discussion that related his visually-biased argument regarding abstraction to known processing distinctions among visual art, music and literary works.

While it may well be, as he infers, that abstraction and knowledge-acquisition are homologous insofar as visual art, music and language are concerned, we need to know with more specificity how his view integrates empirical studies that have demonstrated modularity — including his own scientific research. Again, had he discussed some of the work now available on the literary and musical brain, the reader would be better equipped to understand how he comes to draw his conclusions. We know that words and music are primarily processed in different parts of the brain — although the entire brain is used in this processing. It is also well known that subtle language distinctions are evident in brain processing when we compare spoken words to those written or heard. These kinds of distinctions have been repeatedly recorded in basic studies. He does not say how particular cortical areas and binding should be explored in regard to the neural concept formation. Without some indication of precisely how the binding mechanism under discussion operates, his theory has neither a clear nor a firm neurological foundation. In short, as the theory now stands, it is unclear what Zeki is saying and why he ignored the many published studies that would have allowed him to offer a more robust exposition. A top-down, homologous theory that does not address known

[1] Overall, even general studies of brain research cover basic differences among language, auditory and visual processing (see Carter, 1999; Greenfield, 1997; Posner and Raichle, 1997). These sources also include recommendations for further reading. One of the most interesting comparative studies compares the portrait painter Humphrey Ocean with non-artists performing the same task (see Miall and Tchalenko, 2001; Solso, 1999; 2001).

distinctions and how different areas of the brain contribute to a mental abstraction, when our data show discernable differences, is at best vast mystification.

Zeki's failure to critically engage with data is disappointing. His decision to look only at the visual brain is inexplicable because the kinds of studies that would help clarify his position are far-reaching. For example, while work on the musical brain is not as abundant as work devoted to vision, a growing number of researchers are exploring the musical brain and studies of knowledge-acquisition in this area are growing.² Studies by Robert Zatorre, a neurologist and a musician, would have been an excellent touchstone since Zatorre pioneered investigations into the neurobiology of music about two decades ago. Isabelle Peretz, also a neurologist and a musician, studies *amusia* (tone deafness) in her lab at the University of Montreal. Her research has provided evidence of the distinctive nature of the pathways involved in perceiving music. Andrea Halpern, a singer and cognitive psychologist, uses PET imaging to observe the brains of subjects as they imagine specific melodies (Halpern and Zatorre, 1999). Another excellent resource is Christo Pantev's work. While at the University of Münster in Germany he and his colleagues showed that a much larger area of the auditory cortex was activated in musicians on hearing a piano tone compared with a non-musician (see Pantev *et al.*, 1998; 2001). He is now using magnetoencephalography to track neural development in young musicians taught by the Suzuki method. This work is *directly* related to knowledge acquisition.

Equally unsettling is that Zeki excludes key neurological studies and, instead, peppers his argument with philosophical notations that reference historical views of art and aesthetics. It is striking to see how he places his argument in terms defined by Plato, Kant, Schopenhauer and other philosophers rather than neurological research that directly relates art and the brain. It is also ironic to see this approach in light of the number of contemporary philosophers who view recent scientific research as a tool that will aid us in distinguishing philosophical arguments from actual brain operations. Given Zeki's dependence on philosophical sources, rather than empirical data, it is not surprising to find his conclusions are largely unrelated to current research in this area. What his inclusion of historical philosophers does, however, is lend support to a monolithic view of art, favoured historically, that aligns art with universals. Adopting this historical foundation allows him to easily frame his views in terms of 'universals' and ideals, rather than explaining particular operations. Unfortunately, the sweeping assertions that result do not rest on scientific analysis, although they do allow him to treat the work of Dante, Michelangelo and Wagner as if the distinct differences among them are inconsequential.

Finally, and of great concern, is the way Zeki evaluates the data he does present when he turns to the three artists named in the article's title. The neural concept formation argument is essentially segregated from the psychological interpretation he

[2] 'Music, maestro, please!' offers a good overview of this research (Abbott, 2002). In addition, each of the scientists discussed in the text contributed to *The Biological Foundations of Music*, published by the New York Academy of Science. Their articles include bibliographies that allow topics to be pursued with more specificity (see Zatorre and Peretz, 2001).

offers to explain how an unrequited love was given form in the art of Dante, Michelangelo and Wagner. The specific cases are studied in the next section.

Neural Concept Formation and Dante, Michelangelo, Wagner

Art that falsifies Zeki's analysis is not hard to find and is best considered in light of Zeki's psychological analysis of the three artists highlighted in his paper. For example, he begins the Dante section by explaining that his 'concern here is with Dante's relationship to Beatrice, the 'lady' who inspired all his work' (Zeki, 2002, p. 62). He concludes: 'Dante's work was inspired by a brain concept that could, he knew, never be realized in life' (*ibid.*, p. 65). What I find most extraordinary in Zeki's discussion of Dante and the *Divine Comedy* is his approach. His focus on the romantic passion that inspired the *Divine Comedy* is built around Dante's relationship with Beatrice. Then his argument is supported by an analysis of whether the views of Aristotle prevailed in Dante's mind despite the Platonic flavour of the *Divine Comedy*. Given Zeki's impulse to focus on Dante's relationship, and to view it in terms of philosophical ideas, it is useful to ask if this is neurological and whether his examination of Dante is verified by others who have looked at this work.

In approaching this work it is important to point out that Zeki's analysis of *The Divine Comedy* lacks neurological notation, so it is in no sense neurologically-based. Rather he presents a philosophical, psychologically constructed examination. Moreover, while critics are likely to mention Dante's relationship with Beatrice when they examine his philosophical ideas, artists have tended to engage with philosophical ideas and the construction of his work. What is indeed striking about the varied artistic responses is that unfulfilled love is unlikely to be what provided the motivation for the artistic response. Indeed, despite Zeki's emphasis on how Beatrice inspired Dante, the responses of others were not deemed less successful, although they were created without a similar romantic inspiration.

For example, Sandro Botticelli³ an early interpreter, generally produced images very much in accord with Dante himself on a philosophical level. William Blake, characteristically, did not illustrate Dante's story so much as he used it to critique Dante's views of religion and cosmology (Bindman, 2000). In addition, *TV Dante*, a recent play co-directed by Tim Phillips and Peter Greenaway offers a striking response, very much of our time. In this case, Phillips has said that as he worked with the text he came to realize how much Dante's layering of meaning and the richness of his allusions could be sustained in the fluid medium of television (Phillips, 2001). Finally, in a parody by Gary Graves (2002) we find Dante's own ideas of universality used to comment on how people turn to abstractions about universality to manipulate our understanding of all we cannot explain. In this play the actors show the audience that promoting particular ideas about universal principles often serves to ingrain certain ideas in our minds despite the fact that these so-called axiomatic truths are ideas, or ideals, and may have no relationship to how things actually are or the way things actually happen.

[3] Reproductions of the Botticelli interpretation were recently re-published (see Botticelli, 2000).

Again I reiterate that Zeki, too, has offered an artistic interpretation of Dante's work. He, too, engages with the philosophical notions, rather than presenting an analysis based on empirical scientific data. Although there is no indication that Zeki's theoretical response was inspired by a romantic relationship similar to Dante's with Beatrice, it is clear when reviewing Zeki's speculative argument that it is grounded in philosophical views, not scientific parameters.

Similarly there are too many unanswered questions and leaps of faith when he turns to Michelangelo. According to Zeki, 'what made Michelangelo leave so much of his work unfinished can be traced to the same source as that which made Dante create his art — the impossibility of realizing the ideals formed by the brain in the experience of particulars in real life' (Zeki, 2002, p. 65). Then, when introducing Michelangelo, Zeki explains that Michelangelo's unfinished work attests to art's great power, and that we can surmise that Michelangelo's unfinished pieces, being ambiguous, speak to us in neurological terms. He further explains, the 'ambiguous' work of great art speaks to us in a neurobiological sense, because when 'a work of art is "unfinished" it offers several solutions, all of equal validity. Reading this it was unclear to me what is neurological about his definition and how we should apply this neurobiological interpretation to 'unfinished' artwork by artists whose work and life clearly refute Zeki's assumptions.

An artist whose work raises questions about the credibility of Zeki's thesis regarding the conjunction of art, love and unfinished works of art is Rembrandt Harmenszoon van Rijn (1606–69).⁴ More specifically, we know that love was often expressed in Rembrandt's art and that he didn't find that unrequited love was necessary whether producing finished or unfinished work. Rembrandt's renditions of the women with whom he shared his life show this exceptionally well. Moreover, reviewing the catalogue for the recent exhibition *Rembrandt's Women* reveals a number of easily accessible examples of how love was portrayed both in his finished and unfinished work (Williams, 2001). *A Woman in Bed*, a particularly poignant painting, has the peculiar honour of being said to represent all three women in Rembrandt's life. While we don't know who the model was, we can easily see that Rembrandt has invited the viewer to share an intimate moment. Similarly, the face of another sensual work, *A Woman Bathing in a Stream*, depicts Hendrieckie, one of the women with whom Rembrandt shared his life. Looking closely we find the handling of the paint is unusually spontaneous and the picture appears unfinished in some parts. This is most evident in the shadow at the hem of the raised chemise, the right arm and the left shoulder. This painting's earthy sensitivity, its ability to capture a personal moment, and its unfinished areas all, in effect, demonstrate that Zeki's correlation of unrequited love and unfinished works of art is too glibly applied.

Zeki's discussion of Wagner, his third artist, is more developed than his interpretations of Dante and Michelangelo. I was impressed to see he gave a bit more thought to how Wagner's process of composing the music translated to the listener's brain. I believe the Wagner section would have been stronger had he

[4] Examples of Rembrandt's can be seen at www.ibiblio.org/wm/paint/auth/rembrandt/

incorporated some of the exciting work being done on synesthesia into the discussion. Briefly, one of the outstanding features of Wagner's work is its reach, and another is that he approached his work with the intention of stimulating cross-modal experience. He believed that opera was the highest form of art because it combined visual, dramatic, vocal, musical, choreographic and textual elements into a single form. Juxtaposing contemporary scientific experiments that have deepened our understanding of cross-sensory connections with artistic experimentation would have allowed Zeki to examine Wagner's work from a number of rich perspectives. Had he looked at them he might have also recognized that a number of recent scientific studies have raised questions about the very philosophical and historical assumptions he relies on in his exposition of art. As Christopher W. Tyler and I have discussed (Ione and Tyler, in press), what is most impressive about contemporary research in this area is the way the idea of five distinct senses, as codified by Aristotle, has been re-examined and found to be too black and white. Although the details are too complex to re-state here, suffice to say that scientists are opening 'neurological' doors that will aid further study of sensory integration. This includes our ability to conceptualize how an artist like Wagner developed work capable of stimulating cross-modal sensory experiences within his audience, among other things.

Historical Perspective

Zeki's paper, in my opinion, is perhaps most fascinating in its unintentional demonstration of a number of implicit assumptions often assumed to be axiomatic truths when art and cognitive science are brought together. While historical ideas cannot be well-developed in this response essay, I do want to bring some of the historical biases adopted by Zeki to the fore.

The School of Athens by Raphael Sanzio (1483–1520) offers a means to quickly introduce some historical foundation.⁵ One of the four main fresco walls in the Stanza della Segnatura, this painting is often described as a complex allegory of secular philosophy and is said to illustrate the historical continuity of Platonic thought. Compositionally, the work depicts Plato and Aristotle surrounded by philosophers, past and present, in a splendid architectural setting. The space in which the figures congregate is said to be based on Bramante's design for the new St Peter's in Rome.

Zeki's argument brings this painting to mind because it is carved out of the tradition enshrined in the famous painting. He, too, glorifies the people and ideas represented and aligns those of the Italian Renaissance with the ideas of the ancient Greeks. Looking closely at the painting, we find Raphael used the 'stars' of the Italian art world to stand in for Greek figures. Michelangelo, one of the 'three Titanic figures in Western culture' that Zeki examines, is placed in the

[5] Images of the fresco can be found on the Vatican page, see http://www.vatican.va/museums/patrons/documents/vm_pat_doc_12101999_raphael_en.html. Information about the people represented is available at http://hypo.ge-dip.etat-ge.ch/www/athena/raphael/raf_ath4.html. Excellent images, identification of the figures and a brief history can also be found in James Beck's *Raphael: The Stanza della Segnatura, Rome* (1993).

foreground and depicts Heraclitus, sketching on a slab of marble. It is said that Leonardo was the model for the face of Plato, whom we see centrally located, holding a copy of his book, the *Timeaus*, while pointing upward to the spiritual dimension. Next to him we find his younger pupil Aristotle, holding a copy of his *Ethics*. Aristotle, as mentioned above, codified the belief that we are endowed with five distinct senses. Dante, too, is represented, to the left. Also on the left we find Pythagoras, who is often cited in discussions of synesthesia. As is well known, Pythagoras discovered that all natural musical intervals correspond to natural numbers. It is also said that he and his followers worked with a mathematical order of musical harmony by relating the length of strings to the successive octaves. It is this interest in relationships and correspondence that led them to explore the idea that colours and sounds could be related, following mathematical rules. Later, with the sensory codification Aristotle provided, comments related to synesthesia were cast as metaphorical and aligned with ideas about universals. These ideas were then related to art (and other experiences) that were defined as more spiritual than worldly, a view firmly reinforced in Zeki's text. Wagner, of course, was not depicted by Raphael because he was not yet born in 1511. Still, as Zeki notes, Wagner has much in common with Dante, Michelangelo and the philosophical tradition under discussion in his paper. As Zeki explains,

All [i.e. Dante, Michelangelo and Wagner] were men and each occupies a high position in Western civilization. The culture of all three was deeply rooted in the Western, Christian tradition and each one had been deeply influenced by ancient Greek civilization. (Zeki, 2002, pp. 61–2)

Looking at the Raphael painting with a more broadly-based historical perspective we find one of its outstanding features is the degree to which it represents a particular view of art Raphael shared with his peers, including Michelangelo who, as noted, is depicted in the *School of Athens*. Indeed Michelangelo sums up this view in his harsh criticism of Flemish art. According to Michelangelo,

Flemish painting . . . will appeal to women, especially the old and very young ones, and also monks and nuns, and lastly men of the world who are not capable of understanding true harmony . . . [these painters] render exactly and deceptively the outward appearance of things . . . Though the eye is agreeably impressed, these pictures have neither art nor reason; neither symmetry nor proportion; neither choice nor values nor grandeur. In short, this art is without power and without distinction . . .

Michelangelo then goes on to say,

It is practically only the work done in Italy that we can call true painting, and that is why we call good painting Italian.⁶

Like Professor Zeki, Michelangelo brings some well-defined ideas about what constitutes art to his discussion. While the distinctions applied to Northern and Southern Western art of the sixteenth century that Michelangelo's comments allude to are beyond the scope of this piece, it is worth mentioning that Michelangelo's view encapsulates certain valuations that came to define good art and later

[6] Views reported by Portuguese artist Francesco de Holanda, and often cited in the literature to show how the Italian view has been given preference in art history and theory (see Klein & Zerner, 1989).

aesthetic theories in the West. I've introduced these sixteenth-century debates to note that it was the Italian point of view that became foundational to later studies and the philosophical texts. Particular philosophical and religious predispositions were inscribed in this view, and these predispositions influenced how our contemporary art and science dialogue took form.

Art was increasingly defined in terms similar to the Italian view, and its terms are very much embedded in the philosophical theories that equated art with universal Truth. The very theories Zeki incorporates into his discussion. Art was also seen as a modality in the service of philosophy and spiritual pursuits. Cognitive Science — and I believe consciousness studies as well — have largely adapted this framework to their studies of art, despite the fresh empirical data that has been brought to the study of the mind. This adaptation has taken form implicitly, as a part of how cognitive science continues to define its methodology. Generally the question 'what is cognitive science' is answered in a way that characterizes it as an extension of the theories of mind we date back to antiquity, and Plato's *Dialogues* are usually referenced as the key starting point. Plato, of course, brought contradictory views on art to the table.

Perhaps of greater importance when reviewing Zeki's paper is that he tells us he is not a Platonist, and nonetheless presents an argument reminiscent of Platonic ideas rather than a neurological exposition. In light of the way Plato is both cited and rejected by Zeki, it is unfortunate Zeki never considers where his views fit in relation to the particular questions that have always plagued Plato's legacy, and the way many of Plato's views were implicitly absorbed into philosophical theories of art. Nor does Zeki show any concern about the degree to which Plato has influenced Western philosophy and theories of mind. Instead Zeki simply recognizes Plato's 'authority'. While it is perhaps not relevant to note that, despite his own artistry, Plato bans the artists from his *Republic*, Plato's views of the brain, as expressed in the *Timeaus*, are important in light of Zeki's critique. As is well known, the *Timeaus* was particularly successful in spreading Plato's teleology and his rejection of sensation and observation in favour of reason. Of greater importance when applying cognitive science research to art today is that while Plato's ideas about the brain have been re-examined over time, the approach he outlined is still employed to ask and answer questions about the mind, sensory experience, perception and the relationship between empirical knowledge and what is often designated 'true knowledge'. One might say that the way in which methodological derivations have been re-configured underscores Plato's influence on how theorists discuss art in relation to theories of the mind today. Yet, as is frequently noted, art practice and appreciation cannot be encapsulated with a theory.

Conclusion

This response to Semir Zeki's 'Neural Concept Formation and Art: Dante, Michelangelo, Wagner' barely begins to touch upon the complex issues interwoven with the theory Professor Zeki presents. As I have sketched above, and discussed elsewhere (Ione, 2000; 2001), Zeki defines art in a way that deletes

much of what artists do and the complexity of how humans relate to art. His commitment to particular axiomatic assumptions about art also limits his analysis. When this limited purview is the framework adopted in studies of art its constricted vision in effect emphasizes the art historian E.H. Gombrich's view that the wellspring of art lies in the multifarious contributions of individual artists. While cognitive studies can enhance our understanding of art, sweeping speculations cast as science have the potential to detract from efforts to understand and appreciate art. Theoretical conjectures, moreover, have the potential to complicate the equation. With this in mind, I would urge Semir Zeki to develop his theory further and, as he does so, to fully examine groundbreaking neurological studies that produce data related to the exciting ways artists actively develop and cast the various art forms he examines.⁷

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