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NEUROHISTORY AND THE ARTS
Was Kandinsky a Synesthete?

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> Now I call the proper object of each sense that which does not fall within the ambit of another sense, and about which there can be no mistake, as sight is of color, and hearing of sound, and taste of savor, while touch has several different objects. Each particular sense can discern these proper objects without deception; thus sight errs, not as to colors, nor hearing as to sound; though it might err about what is colored or where it is, or about what is giving forth a sound. This, then, is what is meant by the proper objects of particular senses.
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> Aristotle, De anima, II, 5 (418a, 12–20)

Sensory association between color and music are found in many cultures. One of the earliest is the Pythagorean quest to assign a particular color to each musical note, about the 6th century BCE. In more recent times, the list of those who were involved with the synesthetic experience includes Charles Baudelaire, Arthur Rimbaud, Alexander Scriabin, Vassily Kandinsky, Vladimir Nabokov, Sergei Eisenstein, David Hockney and Richard Feynman. These attributions are based on some of the intriguing comments we find in their writings or remarks they have made about their own work. In his *What Do You Care What Other People Think*? Feynman (1988, p. 59) claimed, ''When I see equations, I see the letters in colors.'' To composer Alexander Scriabin the key of F# major appeared violet in color (Myers, 1914). Writer Vladimir Nabokov noted in his autobiography *Speak, Memory* (Nabokov, 1947, p. 21), ''[t]he long ''aaa'' of the English alphabet has for me the tint of weathered wood, but a French ''a'' evokes polished ebony.''

The specific condition we term synesthesia occurs when an individual receives a stimulus in one sense modality and experiences a sensation in another. This cross-modal condition has long been seen as neurologically abnormal, because it is at odds with the idea that we have five distinct senses, as codified by Aristotle. It is also at variance with the *Law of Specific Nerve Energies* formulated by Johannes Müller (1826), following the earlier insights of Charles Bell (1811). The law implies that each sense modality has its characteristic sensory quality, regardless of the physical means by which the peripheral nerve was stimulated. Thus, signals traveling up the optic nerve are always experienced as visual activation, whether stimulated by optical, tactile, sonic or electrical activation of the photoreceptors. Müller's concept is deeply embedded in the analysis of brain function, and seems to negate the possibility of cross-modal activation in the cortex. How could the nerve energy be specific if it activated more than one sense modality? On the other hand, the physical energy that activates the nerve has a synesthetic quality, in that we can feel as well as hear a strong sound vibration. There seems to be implicit agreement that this kind of cross-modal activation of the peripheral nerve does not qualify as synesthesia.

Vassily Kandinsky (1866–1944) is perhaps the best-known synesthete, no doubt because his paintings have a dynamic, musical feel to them and his writings often speak about relationships

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between music and art. We also know of Kandinsky's interest in ''colored hearing,'' the most common form of synesthesia, and that he was intent on developing means for the individual to expand cross-modal sensitivity. While his focus is elaborately explained in his writing, it is perhaps due to his efforts to explain his goals quasi-scientifically that scientists have often considered the techniques he speaks about metaphorical. Yet evidence from his painting practice, from comments offered by some who knew his personal history, and from his collaborative projects suggests that he was a true sensory synesthete. For example, Nina Kandinsky, his wife, wrote that he passionately loved colors from early childhood and claimed to distinguish a particular smell and musical sound for each color, a common synesthetic trait (Kandinsky, 1947, p. 9). A cellist and a violinist since childhood, Kandinsky also had a well-developed sense of music and much experience with it. Moreover, while there is a metaphoric quality in his written statements, his words nonetheless clearly convey that his experiences are of concrete, cross-modal sensations experienced directly. Jean Arp, one of Kandinsky's contemporaries, explained that ''Kandinsky's image and poetry have become concrete'' (Arp, 1944, p. 227) and, in his 1944 essay ''Concrete Art,'' Arp cited Kandinsky as the first example of a concrete artist (Arp, 1944, p. 140).

Equally intriguing are the two events that defined Vassily Kandinsky as a painter, for both relate to his synesthesia and reveal how he strove to enhance his capabilities. He explains in ''Reminiscences/Three Pictures'' that ''two events stamped my whole life and shook me to the depths of my being'' (Kandinsky, 1913, p. 363). The first was when viewing an exhibition of French Impressionists in Moscow in 1896, where a Monet *Haystack* painting led him to the realization that a picture can hold a viewer's attention even if the subject cannot be immediately recognized. The second critical event was a performance of Richard Wagner's *Lohengrin* in Moscow, also in 1896. His later description of the impact of this event emphasizes the vivid sensory quality of the experience evoked by the music:

> The violins, the deep tones of the basses, and especially the wind instruments at that time embodied for me all the power of that prenocturnal hour. I saw all my colors in my mind; they stood before my eyes. Wild, almost crazy lines were sketched in front of me. (Kandinsky, 1913, p. 364)

This sensory unification of color and music stimulated Kandinsky systematically to develop painted compositions in which one does not perceive a static representation. Rather the concrete painted forms evoke a dynamic expression, captivated by a visceral language that entices colors to sway to unheard music (see Figure 1). The viewer immediately senses that each point seen is moving toward the evocation of its counterpoint, just as each series of lines appears to correlate with a sonic form. Kandinsky's writings support the viewer's reaction, often stating his longing to provide painting with the independence from nature that he felt in music. He frequently spoke of how an understanding of art and music can expand the value of using associative techniques aimed at enhancing sensory exchange. The idea that he developed his innate capabilities is supported indirectly by our knowledge of how he worked as well as the circumstantial evidence contained in his writings (Kandinsky, 1912, 1913, 1947, 1984; Lindsay & Vergo, 1982).

Although we are unable to test him, we do know that when he lived, there was a great interest in synesthesia. This interest, at the beginning of the 20th century, was perhaps enhanced by the publicity that Kandinsky and his colleagues gave it. Finally, we know that Kandinsky penciled notes in his books that spoke of exercises one could do to enhance synesthesia. He also desired to bring the essence of cross-modal experience to a wider audience, asserting, ''that one can feel the multi-sensory consonances and dissonances in simultaneously performed color movements, musical movements and dance movements'' (van Campen, 1997). One well known collaborative work on this theme was Kandinsky's musical play ''The Yellow Clang''. Conceived with the composer Hartmann and the dancer Sacharoff,

this production may well have been a springboard of the modern dance movement, from Isadora Duncan to Serge Diaghilev.

Ironically, although it continues to be hotly debated whether Kandinsky was actually a synesthete, the foundational issues became somewhat moot with the advent of LSD (the hallucinogenic drug *lysergic acid diethylamide*) in the 1960s. Multimodal synesthesia is experienced by most who take LSD, revealing that it is a latent facility that takes only the specific effects of the miniscule dose of this drug to release (see Marks, 1978). In Kandinsky's case, it may be that *Lohengrin* and his long acquaintance with music came together to provide an equivalent releaser. Such releasers imply a kind of neural plasticity in which the latent synesthesia can be triggered and, presumably, developed by appropriate forms of stimulation.

Finally, a number of scientists (*e.g.* see Marks, 1978; Cytowic, 1989; Simon Baron-Cohen & Harrison, 1997; Ramachandran & Hubbard, 2000, 2001) have recently been involved in exploring the neural mechanisms of synesthesia. As a result of this work, neurologists are removing this sensation from the taint of charged terms such as abnormal or aberrant. Surveying the research that now challenges Aristotelian notions of five distinct senses we find studies of letter confusions that have shown that the colors seen by synesthetes can be so vivid that they interfere with the identification of colored numbers (Mattingley et al., 2001; Ramachandran & Hubbard, 2001). Other studies show that their colors may be used to penetrate the crowding effect of arrays of nearby shapes, letters and numbers (Ramachandran & Hubbard, 2001; Wagar et al., 2002). The synesthetic color provides a marker identifying particular numbers or objects that are invisible to people without this special perception, who are unable to distinguish discrete numbers within the masking array. In addition, researchers such as Mills, Boteler, and Oliver (1999) are designing tests to determine that synesthete reports are accurate over time.

With the current explosion of techniques to explore the brain, synesthesia, like other formerly misunderstood behaviors, is opening doors that allow us to re-evaluate art, neural wiring, and sensory relationships. No doubt as more cross-modal research is completed, the cross-disciplinary

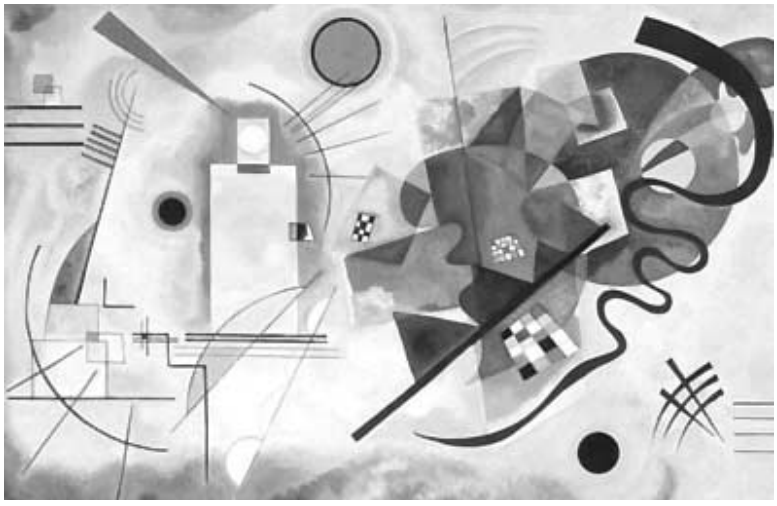

Fig. 1. Kandinsky's Yellow-Red-Blue (1925) is from his period of totally non-representational works, but this particular painting seems evocative of the concept of a person experiencing vivid 'synesthetic' imagery. Oil on canvas, Musée National d'Art Moderne, Centre Georges Pompidou. Reprinted with permission: Réunion des Musées Nationaux/Art Resource, NY. © 2003 Artists Rights Society (ARS), New York/ADAGP, Paris.

interplay of ideas and techniques will further enhance neurological history and our understanding of art.

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