The Birth of Modernism: How the Science of Aesthetics Created One of the Most Popular Periods of Art

Barbara Larson

Despite contemporary post-modernist decades the still relatively recent paintings of Whistler, Gauguin, Van Gogh, Picasso, and Ernst Ludwig Kirchner remain in the ascendant in popularity. We think of these artists as Modern, but just when and how did Modernism in art come about? What defines Modernism with its distorted or evocative figures and painterly, colorful, or multi-perspective deconstructed forms that tend to linger in the mind? There have been plenty of discussions about industrialization, the modern environment, and a developing taste for the instant. However, when we take a close look at those would-be defining criteria we are confounded by the return to the classical we see in Albert Moore, much of late nineteenth century Symbolism, several periods by Picasso, or mid-twentieth century Surrealist André Masson's *Gradiva*. Even Monet's celebrated love of the here and now and new urban structures falls into question when we see that his period of interest in industrial subjects such as train stations is relatively brief and expected figures in modern dress are cast aside for landscape and frequent prolonged studies of cathedrals and ancient rock formations. Yet Monet is Modern. Abstract paintings such as those by Kandinsky with their symphonic titles and semi-hidden references to apocalyptic scenarios or Rothko's meditative clouds of deep colors with tragic overtones remain compelling because they are not about specific moments such as historical incidents from 1910 to 1930 (in the former) or 1950 to 1970 (in the latter).

What defines Modernism as a whole is not modernity as a lived condition (though this can be a subject from time to time) or the instantaneous, but a commitment to the experiential–the neurological, physiological process of taking in a subject and being activated by it, both by artist and by viewer. Even the classical subjects, given art historical explanations about contemporaneous conservative politics or interwoven references to mind (Freud, Jung) and mythos, are compelling because of an unexpected play with form, color, texture, perspectival shifts, or location of

B. Larson (✉)
Department of Art, University of West Florida, 11000 University Pkwy, Pensacola, FL 32514, USA
e-mail: blarson@uwf.edu

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subjects. These formalist concerns are rooted in aesthetics, which narrowly entails a study of beauty, but more broadly refers to sensory response to form and color.

How and when did the experiential turn in art happen and, therefore, what brought about Modernism? The answer is both simple and complex. The simple answer and the one we will explore is 1860. The more complex answer lies in the period before this, when scientific investigations began to challenge ideas on how we see and experience the world and questions were raised about whether or not art should be a mirror of what we thought was the world we knew (realism), or strike ideal fictions (past heroic deeds, for example), or sweep the passive viewer along on an emotive journey of turbulent seas and wistful views over a vast, pantheistic nature (Romanticism). Modernism as it came about around 1860 replaced the passive if empathetic viewer with an actively engaged and individualized person of experience who held a veritable dialogue with the work of art. The transformation is both subtle and profound. Romanticism is surely concerned with the experiential (J. M. W. Turner, after all, strapped himself to the mast of a ship in a storm in order to convey believable sublime drama in painting), but a difference in Modernism lies in its refusal to close the loop of anticipated viewer response. Romanticism, carrying the viewer along beneath the wing of the artist, often points out what one should see and feel from a dramatic perspective; it assumes, Modernism usually does not. Mid-century Realism holds up a mirror of detailed surfaces or the specifics of social disarray; Modernism does not. Modernism opens up the picture plane as a site of the indeterminate. And the resonance and appeal Modernism continues to have for its audiences today largely lies in the way it continues to galvanize the individual spectator. What occurred to precipitate Modernism with its experimental forms and play with color or line was a transformation in the way the relationship between body and mind was reconfigured—a transformation that would reverberate in art for one hundred years.

Before 1860 the mind was often inextricably linked with the notion of a soul and thus, essentially considered separate from the body, its vessel. The eye as the window to the soul could take in the visuals of the world and resulting thoughts could be relatively undisturbed by the living, breathing body. But by 1860 psychology, which had previously been a metaphysical, philosophical discipline was coming into its own as a true science and the duality of mind and body was replaced by an increased awareness of the body's physiological processes upon which the mind was now seen to depend. In earlier decades of the nineteenth century there had been significant interest in physiology along with the materiality of the brain, but a vitalist conception of living matter as ultimately mysterious, compatible with spiritual notions, lingered. Significant work on the brain as the material conveyer of thought was promoted by François Magendie, Franz Joseph Gall, Charles Bell, and Claude Bernard. These scientists were fascinated by the electrical response within nerves, but neurons (nerve cells) within the brain were not yet well understood. Historically, it had been the brain, not the heart, that was thought of as the home of the soul and gray matter retained much of its mystery. The relationship of aesthetics to the soul does not entirely disappear from Modernism (Kandinsky), but it was not until the middle of the nineteenth century that the science of neurology reached the kind of maturity

that allowed aesthetics to be recast as a sub-discipline of psychology. Modernism responded to a modern science of aesthetics, the result of psychophysiology.

The psychological turn in aesthetics borrowed ideas from even earlier eras—it had roots in seventeenth and eighteenth century sensationalism. The sensationalists such as John Locke had believed that thought was essentially formed by experience provided by the senses (such as touch) and then combined with memories formed throughout one's lifetime that were bound with these sensations, especially those that produced pleasure and pain. The twin poles of pleasure and pain at the root of human response remained a viable interpretive device for modern psychophysiologists and aestheticists as we shall see. Such was the case with empiricist Alexander Bain, often credited as the founder of the science of psychology (and editor of the first journal of psychology, *Mind*); Bain was also interested in the role of aesthetics in art. The importance of aesthetics to response was underscored from another arena of science—evolutionary theory, wherein Darwin (also influenced by Bain) became increasingly drawn to the important role he believed aesthetics played in the history of species in the 1860s.

In his influential writings of the 1850s, Bain demonstrated an interest in neurological research where the fine arts were concerned. He was mainly concerned with the more traditional interpretation of aesthetics—the definition of what is beautiful. Harmony and proportion produced pleasurable sensations, as did artistic variety. Forms with straight lines necessitated attention to proportion and symmetry to produce pleasure, while curving shapes led to immediate pleasurable sensations associated with ease and abandon based on the freedom from restraint experienced by the muscles of the eye (which trace an arc and experiences the joyous effect of release). Forms cause waves of emotion in the viewer, affecting muscles and nerves. But the more forms one sees the more complex the chain of neurological responses that results in the complete aesthetic response. The basis then of aesthetics was tied to physiology and not to ideas; the implication of the physical movement of the body to the mind and its experience of aesthetics was part of his perspective. Frederic Leighton and Albert Moore's sinuous, languorous paintings of Greek girls of the 1860s and 1870s despite their antique content demonstrate the principle of pleasure-producing elliptical contours. The British artists Leighton and Moore belonged to the first truly Modern movement, appropriately named Aestheticism.

In addition to discussing the physiology behind the experience of the beautiful, Bain also contributed to Aestheticism through foregrounding the importance of specific impressions, remembered through novelty or surprise. He wrote, "The brain is more sharply stimulated…by reason of novelty of the impression…Different things that strike us…are the very foundation of our intellectual development" (Bain 1865, 571–72). Notably, Walter Pater, the best known of the literary critics of Aestheticism wrote about the importance of the impression from the perspective of Bain. He called upon artists to adhere to a strong impression in their quest for beauty and "burn" with a "hard, gem-like flame" (Pater 1868, 311). He reiterated the importance of the subjective and of psychology in the context of a world that impresses itself upon the artist in his 1873 book *The Renaissance.* His writings, given Pater's central

importance as a critic within Aestheticism, are examples of the familiarity with the ideas of Bain among the artists associated with the movement.

Aestheticism as an art movement emerged around 1860 and included figures like James McNeill Whistler, Moore, Dante Gabriel Rossetti, and Leighton. Subjects ranged from the classical to the contemporary (Whistler's well known scenes of the Thames River). Aestheticism distanced itself from traditions wherein content was considered the most important aspect of art such as narrative, literary paintings or high-minded references to the heroic or other moral messages or impossibly detailed landscapes. Aesthetes prided themselves on their credo, "Art for Art's Sake." Whether the subject was classical or contemporary, they created compelling works of art based on holistic corporeal response to form and color. The approach varied. Rossetti's Aesthetic paintings feature sensual, often contemporary female heads in luscious oil paint created with glazing and layering techniques, while Moore's languorous statuesque classical females in diaphanous, classicizing gowns make use of muted, harmonious tones and Whistler's Aesthetic works of the Thames sometimes appear laden in a liquidly fog so thick the viewer can readily imagine its dampness on the skin.

Aesthetic response was being contemplated by Darwin and his evolutionist followers as well at this time. Darwin felt aesthetic response accounted for a surprising number of factors in evolution of species from the value of camouflage in avoiding the tendency of the eye to focus on attractants, bright colors in flowers that attracted birds or insects, part of the web of life, and most notably perhaps in the context of this essay, to sexual selection (wherein animals, including humans, choose the most attractive mate). As was so often the case with the Aesthetic artists Darwin contemplated the sensual and pleasurable appeal of beauty; he had read his Bain. As Gowan Dawson has noted, critics of Darwin and of Aestheticism linked them, found them immoral, and complained about their "fleshy" agenda (Dawson 2007).

Darwin's main focus was on species survival, and the avoidance of pain was another pole of experience that became bound with aesthetic theory for the evolutionist. He had read Edmund Burke's *A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful* (1757) when he was a student and returned to it again after the Beagle voyage as he contemplated species transformation. (Larson 2013). Burke's ideas developed as part of the "culture of sensibility" in the eighteenth century, when a science of the senses was being formulated and applied to many areas of society, from manners to aesthetics. According to Burke, the sublime created "unnatural tension in the nerves." Darwin identified with Burke's ideas on a rapacious nature, the central drive of self-preservation, and the mind-body relationship in emotional expressions. Obscurity, a sense of danger, and imposing forms created a sense of fear (the sublime). Burke had also held much appeal for artists of earlier decades of the nineteenth century, particularly in regard to landscape aesthetics, but Darwin was especially drawn to Burke's discussion of the physiology and psychology of danger.

In considering sexual selection in the animal world Darwin grew increasingly interested in investigating the concept of beauty in the 1860s. There is an echo perhaps of Aestheticism's credo "art for art's sake" (that is, art's lack of moralizing necessity)

when he wrote of the sometimes capricious taste for form and color by female creatures in considering mating partners in his 1869 edition of *Origin of Species*, ten years after its original publication. He happily noted, "I willingly admit that a great number of male animals have been rendered beautiful for beauty's sake" (Darwin 1869, 247). At this time one of the creatures that was associated with Darwin's ideas on aesthetics and sexual selection in the public mind was the peacock (with its magnificent train of feathers), which also made its way into Aesthetic decorative devices of the period. Perhaps the most famous example is Whistler's peacock room, a decorative interior for a wealthy industrialist featuring large painted golden peacocks, but peacock feathers as a motif could be found from fans to stylized decorations for elegant interiors within the movement.

In the 1860s, artists and scientists were sometimes involved in the same cultural circles and artists had ready access to scientific ideas through interdisciplinary journals or the current openness between the philosopher-scientists of the time and artists. An example would be the philosopher/amateur physiologist George Lewes whose life partner was the novelist George Elliot. Lewes had many artist friends along with scientists such as Darwin, about whom he wrote four lengthy articles in the 1860s for his own journal the *Fortnightly Review*. Artists and poets also published in this journal such as Rossetti.

By 1860 in art and science the time was ripe to consider aesthetic attraction to formal elements over detail or the unfolding of a scenario (in art, this would be foregrounding a historical narrative or other event) for a number of reasons, one of which was the cumulative evidence of innate imperfection of the eye as discussed by scientists including the most famous optical physiologist of the day, Hermann von Helmholtz (1856–67). Helmholtz believed the eye to be so faulty (Darwin humorously quoted Helmholtz that had the German scientist been presented with any instrument as poorly constructed as the eye he would have returned it; Darwin 1874, 441) that it was constantly dependent upon information supplied by the mind (psychology) to make sense of the world. Helmholtz also applied his experiments on neurological response to the importance of the impression in art: In "On the Relationship of Optics to Painting" he considered color and light from "the physiological study of the manner in which the perception of our senses originate, how impressions from without pass into our nerves, and how the consideration of the latter is thereby altered" (Helmholtz 1995, 279).

Lewes was one of the influential cultural figures that read Helmholtz on optical physiology and became convinced that seeing was essentially psychological and part of individualized mental perception. Impressions stimulated sensations that might be localized or more generalized within the body. Sensations via sensory nerves then transmitted the message of the impression to the brain. He addressed these ideas in his "Prolegomena" of his book *The History of Philosophy* (1867, xvii–xcv).

The fallible eye, investigated by newly emerging psychologists, physiologists and evolutionary theorists, underscored the importance of a coordinated sensorium in viewer response. Aesthetic artists as we have seen jettisoned an interest in detail, narration, or moral messages as had been present with the Pre-Raphaelites or contemporaneous Victorian artists or academic painters; Aesthetic artists were interested

in color harmonies, texture, the curvaceous appeal of the body, and the relationship of forms that did not foreground specifics.

Physiological aesthetics began to attract considerable attention among scientists and newly minted art critics along with artists who took up new ideas on the mind and aesthetics. They found a resource in the many physiological laboratories proliferating in Europe, most notably in Germany. The early English physiological aesthetic theorist James Sully, for example, admired by artists and scientists, including Darwin, spent time studying in Helmholtz's laboratory. Sully responded to Bain, Darwin, and Helmholtz in his subsequent publications.

The evolutionary history of the organism was central in explicating physiological and psychological theories of response to the environment. While Darwin followed Bain, Locke, and Burke on the importance of pleasure and pain in aesthetics, he acknowledged the evolutionary history of these experiences. And from Darwin's perspective, first and foremost vision was part of a coordinated sensorial response in which sensibility was tied to self-preservation—averting harm on the one hand (pain) and positive excitation of the tissue on the other (pleasure). Based in the vital qualities of cell structures, in which both plants and animals share protoplasm, all organic beings responded to sensory stimuli in the environment in a holistic manner. The eye, though limited, developed as it had to the extent that survival and reproduction were ensured. Thus, in the animal world vision responded strongly to stimulants such as markings, coloration, or such secondary sexual characteristics as size of antlers or the overall impression of an animate form such as that which is far larger than the individual and potentially threatening. These stimulants varied among species and through time. And physiological processes evolved along with mental faculties.

Darwin supporter Herbert Spencer was one of the most influential of the psychologists on developing physiological aesthetics in the 1860s. Like Bain, he tied physiology to psychology in his influential *Principles of Psychology* of 1855. Spencer had already demonstrated in this text an interest in evolutionism before Darwin's landmark *On the Origin of Species* was published in 1859, though he had Lamarck's brand of teleological evolutionism in mind. From this position he maintained the idea that aesthetics, rooted in animal behavior, had an increasingly complex history through evolutionary time. He began to write about aesthetics in the 1850s, but is best known for his explanations concerning art from the second edition of *Principles of Psychology* (1872). Here he elaborated on human aesthetics as surplus energy once used for survival and play. Aesthetics as indulged upon in painting was, in its expenditure of energy, a form of adaptation to the present moment. In *Principles of Psychology*, he acknowledged that his original publication, steeped in "The Doctrine of Evolution," was ridiculed in the mid-1850s, but in the last ten years (presumably since Darwin's *Origin of Species* was published) he felt that evolutionary applications of physiology to the mind were now taken seriously; perhaps this is the reason that he now addressed art specifically. Spencer also found that pleasure and pain were fundamental to evolutionism; art (as the elimination of pent up energy no longer needed in survival) was a site of pleasure. Bain had been interested in the older concept of Associations or past memories where aesthetics were concerned; Spencer also added

Associations to his theories of art. The artist and viewer draw upon associations and the impression at first perceived is enhanced through individual experience: Bain for example had written, "The mind supplies from the past what the eye does not distinctly see at the time, so that the picture realized is not the bare optical impression of the moment, but a much fuller picture which that impression suffices to suggest" (Bain 1855, 246). Positive and negative memories are attached to aesthetic aspects of pleasure and pain. Spencer believed that art accompanied the evolutionary advance of culture; the more advanced the culture (both in terms of physical evolution and the advance of society) the more complex the art and the greater the pleasure it gave the viewer. In this way, evolutionism might be used to confirm elite sensibilities and refined taste in Victorian Britain.

After 1860 a number of artists including landscape painters moved away from detailed painting towards optical impressions of the world in Great Britain and in France. The kind of exacting perfection found in academic art or even that of experimental artists like the Pre-Raphaelites or compiling of social information among the French Realists and Victorians was not in line with new science of aesthetics from which true Modernism dates.

The English position on psychophysiology with a focus on Spencer and Bain was introduced into France by psychologist Théodule-Armand Ribot, sometimes called the founder of French experimental psychology. He represented a key transitional personality in reconsidering a still pervasive trend towards Cartesian dualism (of body and mind) in France. Ribot published *La Psychologie anglaise* in 1870 and translated Spencer's *Principles of Psychology* into French. He was also an early French supporter of Darwin. The influence of psychology on vision was also the subject of important writings by historian Hippolyte Taine, who became Professor of Art and Aesthetics at the Ecole des Beaux-Arts in Paris in 1864.

The concept of the impression had begun to circulate in France in the 1860s. In 1860, that grand lexicographer philosopher Emile Littré (author of the *Dictionnaire de la langue française*) wrote an essay on perception and the impression, and in 1863 the poet and art critic and galvanizer of modernism Baudelaire used the phrase "impressions upon the mind" in praising an artist of modern life (Baudelaire, 2: 155).

Psychophysiology developed as a field of study in France, inclusive of the work of Ribot, Alfred Binet, Charles Féré, Charles Richet, and Charles Henry. While experiments in aesthetics and psychophysiology would bear their greatest fruit in the art of France in the last two decades of the century, Impressionists were pursuing corporeal effects of light and weather as early as the 1860s and 1870s. The Impressionist Monet dispensed with detail and began to apply paint in a way that suggested in its tactile and fluid aspects a holistic response to the environment. Impressionist artists sometimes painted side by side, coming up with different results (colors, expression of lighting, focus or lack thereof on one or another object) demonstrating not that they painted what anyone would see, but rather how individual psychology in combination with optical physiology "sees," with open-ended results for the viewer to bring his or her perspective. An example can be found in Renoir and Monet's side by side paintings of the floating restaurant and its surround *La Grenouillère* of 1869. In these paintings Renoir's preference for pastels and focus on the life of people and animals (the ladies

in gauzy gowns and dogs lazing about or stepping precariously and unseen into a boat) seems to be on show while his companion Monet telescopes outwards to the sparkling water while trees, bathers, and elegant figures are comprised of daubs and strokes of less blended color.

By the 1860s the idea that subjects of art were not precise objects to be clearly described, but rather were part of an optical field of responsiveness had gained traction among Modernists. Wave theory of electromagnetic fields, color and light, suggested that these forces were vibrating energies interweaving within the atmosphere or ether. Edmond Bequerel's extensive *La Lumière, ses causes et effets* (1867–68) which investigated wave and particle theories of light operating within the ether is one example of literature available to artists on this subject. The idea of a thick, but transparent and all pervasive field (ether) that transported the multiple and competing waves of energy was a popular concept throughout the nineteenth century and is perhaps the source of Monet's much referenced "envelope" that existed between himself and the motif portrayed.

Precious little remains in published discussions by the Impressionists that demonstrate the influence of aesthetics from the perspective of current science, but art critic Jules Laforgue, who wrote enthusiastically about the Impressionists during their lifetimes, claimed the style follows the new science of aesthetics. In an essay entitled "The Physiological Origin of Impressionism," referred to by art historian Richard Brettell as "the single most important piece of theoretical writing on the subject of rapid painting in Third Republic France" (Brettell 2000, 49 n. 29), Laforgue wrote that Impressionist forms were obtained "not by contour but solely by means of vibrations and contrasts of color" (Laforgue 1903). He wrote about the eye from an evolutionary perspective, and praised the Impressionists visual acuity: "The natural eye succeeds in seeing reality within the living atmosphere of forms, differentiated, refracted, reflected by beings and objects in constant variation." Laforgue took to task old-fashioned aesthetics of "Objective Beauty" and the "Subjective Taste of Absolute Man." Instead, "now we have a more exact idea of life within and outside of ourselves." There is an echo of Bain's theories of novelty or surprise followed by the need for the strained nerves of the eye to seek rest when he writes, "Note the three main stages of the physical state of the artist's [Impressionist's] eye before a landscape: the increasing acuity of optical sensitivity under the stimulus of a novel view, the summit of acuity, followed by a decrease in sensitivity due to fatigue of the nerves." While the artwork was absolutely unique to the artist, so it is to the viewer: "Each viewer brings to the work an individual sensitivity made up of an infinity of unique moments of sensitivity…. My instrument is perpetually changing and there is none identical to mine." Like the Aesthetic artists, Impressionists dispensed with any kind of moralizing or specific, historical scenario. And like many of the Aesthetic artists they fixed on a motif that struck them, referred to by art historian Richard Thomson as "emotive naturalism" (2010, 33). Monet seemed to confirm the uniqueness of his choices and responses: "I always work better in solitude and according to my own impressions" (1884, 2: 232).

While artist and viewer both play roles where the impression is concerned, there was an attempt to situate the Modern artist as a special type of person. The idea that

the artist was a neurologically superior being was held by materialist scientists like Herbert Spencer, Ribot, Pierre Janet, and Taine. But when it came to Modernists this sensitivity could be read in one of two ways: for Laforgue, for example "The Impressionist eye is in short the most advanced eye in human evolution, the one that has succeeded in grasping and rendering the most complicated of nuances known" (Laforgue 1903). Gauguin claimed for artists of his generation a great intellectual capacity that provided "the vehicle of the most delicate and the most invisible emotions in the brain." However, the critic Albert Aurier, a great supporter of Gauguin, saw his friend Van Gogh in a different light. He was "a distinctly characterized hyper-aesthetic perceiving with abnormal, perhaps even painful intensities the imperceptible and secret characters of lines and forms, but even more so the colors, the lights, the nuances invisible to healthy pupils, the magical irritations of shadows" (Aurier 1890). Using the language of psychophysiology, Max Nordau famously saw all Modernists as having a neurologically degenerate system, wherein evolution becomes degraded. But even this could work both ways. Having read Aurier's article on his supposed abnormality and aware of the recent revival of the "mad genius" theory of artists with frazzled nervous systems, the epileptic Van Gogh acknowledged, "The emotions that grip me in front of nature can cause me to lose consciousness…" but applied neurotic tendencies to other Modernists as well, "If we want to face the real truth about our constitution we must acknowledge that we belong to the number from those who suffer from a neurosis that has its roots in the past" (cited in Sheon, 175). Even Impressionists like Monet or Renoir could be discussed as having aberrant vision. Critic Félix Fénéon and writer Joris-Karl Huysmans accused them of "seeing blue" (creating paintings with a bluish cast) due to the force of extreme excitement which supposedly caused momentary color-blindness (Ward, 128).

Just how much the early Modernists themselves knew about the new science of aesthetics is found less in direct statements than through examining their work and looking at their conversation with others. When a young artist came to imbibe the brilliance of the reclusive Cezanne, a former Impressionist living in the south of France, Cezanne advised him "sensation above all else" (Denis 1957–59, v. 2, 29). Cezanne's Impressionist mentor Pissarro left behind commentary describing "the sensation" as that which the artist both sees and feels. Of his time painting with Cezanne he said, "Each one kept the only thing that counts. His own sensation" (Pissarro 1950, 391). In his later style, Cezanne developed deliberate and insistent brushstrokes that communicate touch, movement relative to the motif, and sight, along with the emotive appeal of even the simplest of objects. His subjects were invariably still lifes, landscapes, or the occasional portrait. Cezanne's cohesive approach to painting galvanized followers as disparate as Matisse and Picasso, who counted him as a precursor. Picasso was affected by Cezanne's breakdown of traditional perspective in the direction of a world experienced through prolonged and unprocessed vision, but he also noted Cezanne's emotionalism before the motif (Zervos, 36). The Symbolist Maurice Denis who liked to paint religious scenes, including angels, was an admirer and a visitor. In his famous painting *Homage to Cezanne* created during Cezanne's lifetime, contemporary late nineteenth century Symbolist artists, who rarely painted the here and now, are never-the-less crowded admiringly around one of Cezanne's paintings of

a bowl of apples. This suggests that they recognized the importance of the older artist's awareness of subjective response and its reorganization through the formal means of line and color, whether one painted what might exist in the world or not, a direction that interested them greatly. A few years later, after Cezanne's death, Denis acknowledged Cezanne's constant references to "petite sensations" and that this had begun with the aesthetics of his youth (bringing us back to the 1860s).

That the new scientific aesthetics with its roots in the 1860s is of great consequence for artists of the imagination (Symbolists) as well is also suggested by theorist-artist Denis's insistence that the group of painters he was specifically associated with, the Nabis, found their inspiration in sensation and materiality. He claimed the artists drew upon scientific philosophy (neurology and sensation), not mere ideas. He wrote of the Nabis, "The movement [Nabi] represented a strictly scientific approach to art.... If the Nabis were brought to distort, to compose, and finally to invent surprising formulas, it is because they wanted to subordinate themselves to the laws of harmony that govern the relationship between colors, the arrangement of lines, and to imbue the relationship of their sensations with more sincerity" (Denis 1896, 36–7).

In particular Denis cited the importance of the research of psychophysiologist Charles Henry on aesthetics to the Nabis. Henry's experiments were based on the principles of pleasure and pain as reconfigured by the influential physiologist Charles-Édouard Brown-Séquard. Brown-Séquard used the term "dynamogeny" (pleasure) in reference to stimulants that create nervous irritation and a powerful response whereas "inhibition" (pain) is a response to that which is enervating and makes nervous power disappear. In addition, dynamogenous or inhibitory responses, for example to color or sound, seemed to correspond to wavelength theory of invisible fields of energy. Wave lengths of light, color, and within electromagnetic fields were thought to vibrate not only through the air (ether), but within the nerves as well. Denis's one-time mentor, Gauguin, said of his own painting: "Color like music is a vibration and like music attains what is most general and consequently what is vaguest in nature—its interior force" (Gauguin 1899, 227).

Originally a librarian with an interest in aesthetics and psychology, Henry engaged in serious scientific study including on electromagnetism and eventually became director of the Laboratory of the Physiology of Sensations. He had developed friendships with artists and was interested in fixing the effects of line and color through experiments on the nervous system. For example, he and fellow aesthetician and scientist Charles Féré conducted color experiments not just on the eyes, but the whole body through an instrument held by hand called a "dynamometer." Red and orange caused a heightened response in the neuromuscular system, whereas blue and violet were inhibitory. These kinds of experiments were thought to bring scientific insights to both artist and viewer. Neo-Impressionists like Georges Seurat were determined to bring greater control to the world of sensations and turned to Henry for direction. The Neo-Impressionist Signac even helped Henry illustrate his lectures. The respect for psychophysiology was such that some former Impressionists like Camille Pissarro joined the Neo-Impressionists in creating a style that made Henry's principles fundamental.

While this essay focuses on the beginnings of Modernism largely in the 1860s, it is worth noting that psychophysiology was considered such fertile ground for artists that three important directions in the immediate aftermath of our period should be noted: its application to art and politics, its use in considering occult energies that certain artists wished to capture in their paintings, and its value for abstraction. Neo-Impressionists, unlike the Impressionists, were directly engaged in politics and felt that Henry's findings, which suggested that responses to color, line, and sound were universal, could be applied to paintings to suggest a harmonious, even utopian future for all of humanity. Henry also had an interest in politics and felt the artwork could transmit communal messages. To this end he suggested as further reading to artists the writings of his follower Jean-Marie Guyau, notably *L'Art au point de vue sociologique* (1887). Guyau believed that the aesthetic phenomena of painting could expand from one person to another like a "vibrating, magnetized wire." He opened his book with these words: "The transmission of nervous vibrations and related mental states is constant among all living beings, but especially those that are grouped in societies or families" (Guyau 2001, 16).

As curious as "transmission of nervous states" may seem as the method to social harmony, Guyau here hints at another avenue in which the new aesthetics could be applied, occult energies, such as thought or brain waves. In occult applications of psychophysiology artists were interested in transferring their thought through color and line or expressing "emanations" or moods from human subjects. Even some physiologists believed that the body could be a site of psychic materializations. The very notion of oozing ectoplasm, captured in spiritist photography, was interpreted as excess nerve stimulation leaking out of body orifices.

Later nineteenth and early twentieth century "sensitive" artists continued the legacy of having a unique ability to capture what was invisible to the ordinary eye, now venturing into occult phenomena. The Symbolist Redon, a science enthusiast, began to paint fields of luminous color surrounding portrait heads as if referencing their auras, a popular concept during this period. Expressing his interest in these ideas he said upon leaving an electrifying piano concert he attended, the pianist had "a kind of fluidium hanging around him." Important early twentieth century modernist František Kupka was also a practicing medium. He believed his painting might be able to directly transfer thought to the viewer as if through telepathic waves. Linda Henderson has demonstrated that even among Futurists, celebrated for their love of technology, the present, and the future, its leading figure Boccioni believed he was an "ultrasensitive" who could perceive energies others could not, including emanations or states of mind (Henderson, 133). One of his best known series is entitled *States of Mind*.

The psychological power of line and color and their embeddedness in nature played an important role in the emergence of abstraction in art as well. Kupka, the first to exhibit an abstract painting, is an example of one of the earliest abstract artists who was influenced by new experiments in sensory perception. John Hatch has noted Kupka's indebtedness to psychophysicist Ernst Mach, who taught at the University of Vienna and Prague in the 1860s (Hatch). Mach's interest in sensations was such that he rejected the theory of atoms in favor of the unique importance of the role

of sensory data in understanding the world. He did support wave theory of energy. Mach had been influenced by his predecessor Gustav Fechner whose 1860 *Elements of Psychophysics* addressed the threshold of stimulation necessary to the senses for human awareness. Mach posited that information about the world is constantly dependent upon understanding the relationship of the senses as data is gathered, then synthesized. He positioned this within a framework of continual evolution. His interest in the sensory resulted in the book *Contribution to the Analysis of Sensations*. Kupka believed in the fundamental importance of the senses in responding to the invisible forces in nature, which is never an objective entity, but always changing. The multiple impressions one experiences need to be carefully disentangled before synthesizing them in a painting. Sensory systems are embedded within nature's own pulsating energies whether invisible waves of energy or visible waves such as water; therefore, abstract forms in art should be used to convey that reality. In turn, the painting should trigger sensory responses in the viewer. Kupka wrote, "As a sensitive being open to all impressions, the artist experiences within himself the whole movement of the universe" (Kupka, 207). For Kupka, waves of energy and resulting vibratory effects on the neurological system might be translated into abstract loops or curves of color or planes of color that also suggested the up and down motion of waves. Echoing Mach on the relationship of sensations, he wrote, "The radiation of the vital energy found in nature…always manifests itself in terms of relationships of vibrations" (Kupka, 141). The wave forms that Kupka felt are most in sync with human impressions are reminiscent of Bain.

The new science of aesthetics that considered the relationship of body to mind and the role of individual temperaments provided experimental information for Modern artists. It gave them direction in moving beyond any desire to depict impossibly detailed scenes or irrelevant idealized scenarios. It also validated formal means of expression through the expressive use of line and color or the physical application of paint. The scientific discussions and experiments concerning aesthetics coming out of the 1860s laid the groundwork for the emergence of Modernism in art.

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