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COMMENTARY

Behavioral Functions of Aesthetics: Science and Art, Reason, and Emotion

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Abstract
In his landmark article for this journal, Francis Mechner (2017) presents a novel analysis of the confluence of unique combinations of variables accounting for aesthetic experiences, a phenomenon he calls synergetics. He proposes that artists, musicians, and writers use novel devices to capitalize on those effects. In my response to Mechner's fascinating article, I question the generality of such synergetic experiences to a wide array of audience members. I also question whether the evolutionary basis for aesthetic creativity accounts for the ubiquity of aesthetic activity, as Mechner suggests. I do share `Mechner's emphasis on the importance of culturally nesting aesthetic contributions. But I suggest understanding aesthetic activities across cultures and subcultures requires additional mechanisms serving important bridging functions. I explore dispositional analysis, drawing on both Wittgenstein's aesthetic language games and derived stimulus relationships. The behavioral functions of aesthetic experiences are those playing roles in cultural contingencies: motivational events, antecedent stimulus events, and consequences of aesthetic activities. Two kinds of aesthetic responses are discussed: 1) aesthetic creative responses by artists, writers or musicians, and 2) responses of audience members to those creations. These resulting aesthetic stimuli may play critical roles in cultural metacontingencies.

Keywords Mechner · Aesthetics · Derived stimulus relationships · Metacontingencies · Culture · Functional behavioral analysis

Francis Mechner's "Behavioral and Biological Analysis of Aesthetics"

The opportunity to comment on Francis Mechner's "Behavioral and Biological Analysis of Aesthetics" (2017) is an honor and pleasure. Only someone steeped in the arts and humanities as well as a theoretically grounded scientific scholar such as Mechner could effectively cover the territory addressed in his exposition. My discussion concerns several domains of common interest as well as putting forward thoughts of my own. Mechner's examination of audience and cultural variables, the role of reinforcement mechanisms in aesthetic concepts, and respondent emotional conditioning provide especially fertile ground for discussion. I also wish to examine the intellectually appealing, but perhaps deceptively beguiling, topic of evolutionary aesthetics. With the reader's forbearance, I have embedded examination of these issues as well as several others within the framework of my thoughts about behavioral aesthetics.

The title is derived from "Two things are necessary: science and art, reason and emotion," by Claude Bernard, quoted in Bernard (1967).

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Two Aesthetic Traditions

Our shared aesthetic experiences created by music, poetry, stories, painting, and other activities characteristic of a culture provide the loom upon which culture is woven. These aesthetic forms exert their effects through their behavioral functions: they serve as antecedent motivating events, prompts to action, maintaining consequences and artistic behavior that connect them. As Mechner has aptly suggested, embedding such aesthetic events within the behavioral activities that make up our culture is a powerful behavioral tool for binding a culture together. He discussed cultural variables as priming factors that increase the effectiveness of aesthetic materials. This article explores the behavioral functions of dispositional aesthetic materials and events and suggests ways in which those processes become essential components of cultural metacontingencies (Glenn, 1988; Todorov, 2013).

Mechner's discussion of mechanisms responsible for aesthetic experiences is supplemented here by my own attempt to reconcile our understanding of how aesthetic beauty has been treated across various cultures with inductive empirical traditions (Popper, 1959; Quine, 1969). In the present article, I attempt to integrate the role of intuitive, affectively creative visual arts, musical, and written materials with Quine's naturalistic epistemology (Quine, 1969) and Wittgenstein's early comments on aesthetics (Wittgenstein, 1966), as well as drawing upon behavior analysis (Skinner, 1938, 1957). Integrating these intellectual traditions may seem like striking discordant notes on the piano simultaneously. Perhaps as Wittgenstein has suggested, we may not only discover where the shoe pinches, philosophically speaking (Wittgenstein, 1961), but perhaps we may arrive at a way of overcoming that intellectual disharmony while doing so.

Physical Characteristics of Aesthetic Stimuli

As Mechner (2017) pointedly stated, there are no universal identifying physical properties of what is deemed aesthetic that extend from culture to culture. To expect that a list of such features exists in nature is akin to asking for the physical defining properties of the dynamic concept of reinforcers for operant behavior (Skinner, 1938, pp. 21, 38). The opportunity to listen to the Kronos Quartet, attend a watercolor painting master class, or to listen to Mary Oliver read her poetry can all serve as maintaining events for the behavior of interested individuals under the right circumstances. There is nothing physically in common across those events any more than there is among aesthetic events.

Cognitive neuroscientists have focused on the relations between features of artistic stimuli and their perceived properties and brain activation effects (Chatterjee, 2004; Skov & Vartanian, 2009). This technological approach, called neuroaesthetics, applies the tools of brain imaging to attempt to answer questions similar to those addressed by earlier physiologists (such as Fechner, 1876/1997) and later Gestalt psychologists (Spehar & Van Tonder, 2010), but without the neurophysiological appurtenances. Adopting these modern neuroimaging approaches has been driven by the persistent notion that identifying physical components of aesthetic stimuli (shape, hue, intensity, proximity, contrast, luminance, and other aspects of composition) and their correlated brain activation patterns will help us understand "what is art?" and "what is beautiful?" The behavioral process of seeing and perceiving art is not disclosed by measuring brain events, whether evoked potentials or changes in blood oxygenation, but it is instead revealed as a process by which shapes, colors, contrasts, and hues on a canvas are transformed into matters of social significance. These processes can only be understood by examining the behavioral functions seeing art serves for observers.

Evolutionary Functions of Aesthetic Stimuli

Mechner's theory (2017) provides a comprehensive analysis of the biological ontogeny of aesthetics, and how brain processes may be associated with aesthetic perception. He discusses the functions of artistic techniques or procedures writers, visual artists, and musicians use (which he calls "devices") to make them aesthetically effective. He has done a masterful job of reaching across disciplinary boundaries in formulating his theory of aesthetics. One of his fundamental premises is that aesthetic attractiveness and preference for art and artists confers genetic reproductive advantage (Mechner, 2017, p. 9), an assumption shared with brain scientists and evolutionary psychologists (Miller, 2000; Rolls, 2011). Mechner hypothesizes that aesthetic stimuli that are more effective as reinforcers also have greater survival value. The artists who produce those objects, are also indirectly conferred a reproductive advantage. This reasonable assumption may have exceptions, such as why an aesthetic preference for Jackson's Pollock's Abstract Expressionist drip paintings (Pollock, 1980) or John Cage's (1952) four and one-half minutes of silence titled "4'33," for the piano, would have reproductive value. Perhaps Mechner would concur with Miller (2000, who has argued that it is not the aesthetic product itself, but it is the artistic virtuosity with which it is produced that may be sexually selected, serving as an evolutionary fitness indicator. An unorthodox artist's unique technique, boldly dripping swirls of variously colored paint on a stretched canvas with confident panache may be akin to a peacock presenting his courtship tail feathers with lusty vibrancy. The swirls of paint may be what makes that artist sexually attractive to reproductive females.

Aesthetic Communities: Whose Rules?

David Hume (1825, p. 225) suggested that "[Beauty] exists merely in the mind which contemplates [things], and each mind perceives a different beauty; and every individual ought to acquiesce in his own sentiment, without pretending to regulate those of others." But, throughout history people have always been interested in arriving at judgments about aesthetics. When aesthetic assessments have been rendered regarding the arts, several distinct aesthetic communities have made such judgments. These communities often arrive at distinctively different conclusions regarding a given aesthetic offering. Over the centuries, that has not deterred some individuals from viewing themselves as aesthetics experts and arriving at what they believe are definitive conclusions not necessarily shared by others. Here is a list of four potential judges of aesthetic value:

1. Painters, musicians, or writers who are most expert are often assumed to be most qualified to set the rules for each field of the arts, and to define what is considered "good" or "bad" aesthetic material.
2. Since the Renaissance, however, scholarly experts, academic theoreticians, critics, musicologists, or museum curators were often seen as the most knowledgeable.
3. More recently, audience members who avidly attend concerts, visit art galleries, buy literature, and attend poetry readings and book signings, and are neither professional artists nor scholarly experts comprise an important aesthetic audience for rule setting.
4. Finally, the general public who seldom attend live theater or classical musical performances, visit art galleries or read new literature also have distinctive ideas regarding aesthetically appealing material, or perhaps, distasteful art or music. In Shakespeare's time, such audiences threw rotten eggs and jeered the actors and occasionally joined them onstage to express their disdain; today, they post snarky Tweets or Facebook posts. Their views may be strikingly at odds with the foregoing three groups.

When one speaks of "we" or "us" regarding the ways aesthetic materials are viewed, (accepted and enjoyed or perhaps vigorously rejected), it is necessary to indicate to which "we" we are referring. One often assumes the first two audience categories are the primary evaluative frames of reference as perhaps Mechner's analysis suggests. The behavioral functions of aesthetic materials may differ among the above four categories of audiences. For example, the cultural functions of the Bahian *Samba de Roda* may be very different for working class Bahians than Brazilian musical scholars. Each group has their own rules, usually unarticulated, regarding how aesthetic materials are evaluated and used within their communities. "Rule" here refers to Wittgenstein's meaning as he applied it in the realm of aesthetics. According to Hagberg, Wittgenstein argued that aesthetic rules are indicated by the artistic, written, and musical phenomena one chooses, not the analysis of features that characterize them. He stated that such rules in contexts of artistic creativity and aesthetic judgment, "may be extremely explicit and taught, or not formulated at all" (Wittgenstein, 1966, p. 7, quoted in Hagberg, 2014). Or "rule" in the present context may also refer to the contingencies or metacontingencies characterizing conditions for reinforcement (Todorov, 2013, pp. 67–68).

Dispositional Aesthetics and Private Events

We may remark, "I was deeply moved by the first movement of Gorecki's third symphony." We awkwardly explain that the "I" who was having the experience is my inner self, which isn't all that edifying. It suggests perhaps that is a small inner person, our "Self" who is having the aesthetic artistic experiences, and somehow reporting to the observable outer self, what our experience was.

Conscious Self

Since Plato and Aristotle, humans have been trying to localize the inner self that is doing the aestheticizing. In 1947, Skinner presented his first systematic lectures on verbal behavior to a summer class at Columbia University, dutifully recorded by Ralph Hefferline. Skinner (Hefferline & Skinner, 1947/2009) remarked,

> Consciousness of self is a social phenomenon. Your behavior becomes important for yourself only insofar as it is important to others. Curiously enough the solitary man would have no vocabulary about himself in this sense, although he would react to cramps, pains, etc. He would have no way of being aware of himself as a self as a person.

In other words, we are taught by parents and others that we have selves inside us that do the experiencing. It is not that there is a small version of us inside our brain enjoying the music or artwork. That is, that the name we have been taught to apply to these tendencies to respond is "our self." I suggested several years ago that "[s]elf-awareness is a specific type of autoclitic discriminative behavior and inferential generalization to similar performances exhibited by other people" (Thompson, 2008, p. 11).

Private Events and Dispositions

The concept of aesthetics has historically connected the external reality of paint applied to wet, heavy cold pressed watercolor paper, with the resulting visual impressions, cognitive reactions, emotions, and perhaps critical judgments about those externally witnessed creations. As Mechner points out, aesthetic reactions to pieces of art or music are often emotional and sometimes cognitively grounded, but may be difficult to describe verbally. Gilbert Ryle (1949, p. 39) reminded us that "[a] s the human body is a complex organised unit, so the human mind must be another complex organised unit, though one made of a different sort of stuff and with a different sort of structure."

Thus, translating our thoughts and feelings into language of the empirical world remains an elusive undertaking. Skinner offered his own explanation of this problem. "Private events then remain inferences to the experimenter or philosopher, but they are just as directly observed by the person in whose skin they exist as an environmental stimulus" (Skinner, 1969, quoted by Catania, 2004, p. 7). This is reminiscent of Quine's (1969) Refutation Theory (a form of eliminative

materialism) in which he suggests that "[The mind of another person is] a curiously comfortable case of induction" (p. 125). In his classic 1945 article, Skinner went on to explain, "It is impossible to establish rigorous vocabularies of private stimuli for public use because differential reinforcement cannot be made contingent upon the property of privacy" (p. 274).

Wittgenstein and Aesthetics

Aesthetic Language Games

In some of Wittgenstein's (1953) early work, he discussed how the concept of language game applies to aesthetics. He remarked that artists come to know *rules* as fundamental parts of their artistic learning and that such rule learning enables the artist to apply that concept to novel cases. He emphasized that such rules are not necessarily taught verbally. He suggests that in many instances, actions come first, and the rules later, or perhaps the rules are only stated to the extent that they confirm the already developed skilled artistic performance. Wittgenstein proposes that aesthetic rules are often not cognitive, but learned affectively within the context of incidental events of a culture. "To describe a set of rules fully means really to describe the culture of a period" (Wittgenstein, 1966, p. 8, n3). If our aesthetic engagements and uses of aesthetic terms and concepts are context sensitive, so are our aesthetic behaviors and functional vocabularies as well. Likewise, Susan Sontag remarked that "[a] ll aesthetic judgment is really cultural evaluation" (Sontag, 2009, p. 103).

Herein, I use aesthetic concepts functionally, that is, in what way they function within an analysis of behavior. We need not define a word in terms of the physical properties of the stimuli (tones, colors, or the associated perceptual words, or the locations and sequences of brain activation associated with engaging with that aesthetic stimulus). Given the inconstancy in those physical and psychological attributes across cultures and social groups: *What behavioral functions does an aesthetic object widely varying in features, or an aesthetic event, serve?*

Aesthetic Rules or Contingencies

In subsequent sections, organized by the behavioral functions, the application of that convention or rule to a community will be described as an exemplar, which may or may not apply to other communities. Functions of aesthetic rules can be quite variable for subcommunities. For example, a given aesthetic rule may apply to artists and museum professionals and critics, but not to museum visitors or the general public. When Marcel Duchamp's *Fountain*, a men's urinal, was first exhibited at the Grand Central Palace in New York in 1917 under the artist's pseudonym "R. Mutt," it evoked an outcry of offence and sharply negative reactions from many viewers, especially the public, spirited arts followers, and arts critics. But by 2004, many artists and critics praised it as an important piece of conceptual art (BBC News, 2004).

Other rules may apply to most members of larger communities. We may be accustomed to thinking of artistic conventions as vague, intangible ways of thinking about art, music, and literature. Cultural practices, including the creation of, and embedding of the arts within their communities, are called *social institutions* and have corresponding rules (Wittgenstein, 1966). Many of these rules are unwritten or unspoken, though members of a given community may react to them as if they were a matter of community policy, such as exclusion of homoerotic photographic images in a major art museum exhibit. A rule in aesthetics seldom means an artist will be arrested and imprisoned for violating an aesthetic rule, but if the public deems an artwork offensive, sometimes it may react as though the artist should be incarcerated, or worse. Often rules in the visual arts are unspecified verbally, though we nonetheless expect they will be followed. Philosopher David Bloor (1977) wrote that normative rules within various communities, ".. . come (informally) from the consensus generated by a number of interacting rule followers, and it is maintained by collective monitoring, controlling and sanctioning their individual tendencies. Consensus makes norms objective.. ." (p. 17). Most of the time, such agreements are unstated unless someone fails to observe the rule and propose exhibiting a painting or including a piece of music that fails in some noticeable way to have properties in conformity with community expectations.

Behavioral Functions of Aesthetic Stimuli

Though aesthetic materials are typically identified with their emotive and humanizing properties, they also serve the same functions as other behavioral variables within an analysis of behavior. They are most often culturally determined motivational stimuli and events embedded in socially derived relationships. Their effectiveness depends in part on other stimuli with which they have conditional discriminative relationships (Bortoloti & de Rose, 2009. They create antecedent motivational states emulating establishing operations (Michael, 1982), serve as classically conditioned stimuli, discriminative stimuli, and emotional maintaining events (Mechner, 2017, sec. 14 "Francis Mechner's "Behavioral and Biological Analysis of Aesthetics"".). They are distinguished by the possible duration of their effects. Some have immediate but not enduring effects, such as aboriginal sand paintings that are erased by the storyteller once they have been observed and the story has been told (Killion, Killion, Miller, Rowan, & Wigman, 1999), or live performances (jazz and classical music, dance, and theater). These evanescent features are

distinguishing characteristics of performance art. Other aesthetic stimuli have enduring properties to be witnessed perhaps into the distant future, such as sculpture, frescos, stained glass, and architecture. Yet other aesthetic materials are enjoyed both in the immediate present as well as the less extended future, such as paintings, films, etchings and lithographs, printed literature and books.

Establishing Operations

Aesthetic materials can set the stage for subsequent behavior to be reinforced. Dretske (1993) described these effects as "structuring causes" to be distinguished from "triggering causes," which I discuss shortly. The opening of a new gallery or a foundation offering grants to artists may make creating new art more likely. A city government may welcome submissions for visual, musical, or performance art for an annual event, such as an arts festival. These establishing operations do not directly evoke any specific artistic activity, but increase the likelihood that some artistic responses will occur and be reinforced.

Art Forms themselves can Play the Role of Establishing Operations One of the most famous artistic establishing operations in United States history occurred in 1913 in New York City with the famous Armory Show. This was the opportunity for European avant-garde artists to present their work to a large new audience, including many other highly experienced artists. The Armory Show was the most important exhibit in American art history. It introduced Bellows, Cassatt, Braque, Degas, Goya, Ingres, Kandinsky, van Gogh, Monet, Munch, Picasso, Renoir, Rodin, Whistler, and dozens of others to an American audience. The art world was greatly influenced, not only by European artists who exhibited there but, in addition, by American artists and the audiences who streamed in by the thousands.

On a smaller scale, a single piece of visual art, musical performance, or perhaps a provocative theatrical performance, may make it more likely that an audience member may speak out in agreement or protest, actions that may be reinforced. A group of visual artists, musicians and writers gathered at the Café Voltaire to present their ideas and grievances to whatever audiences showed up. They were often whimsical creations of the Zurich Dada artists themselves. Antiwar poems were recited simultaneously in French, German, and English to a constant drumbeat background (Shipe, 1983).

Architecture Role as an Establishing Operation Other motivationally effective aesthetic objects include architectural settings, such as cathedrals, temples or mosques, or pieces of sculpture, such as the Lincoln Memorial statue in Washington, DC. Entering great cathedrals such as St. Peter's Basilica in Rome inspire awe and a feeling of subordination in the holy setting. Part of the architectural intent is to encourage visitors to feel deferential and willing to submit to the guidance from the Church's Holy Father and his priests and to grasp the Christian Bible's admonitions and mysteries. These aesthetic functions prepare parishioners to be receptive to the priest's homilies, biblical interpretations, and the words and lessons of the hymns. Scale can also exert negative effects such as the huge lobby of the East Wing of the National Gallery of Art in Washington, DC, which depreciates its Lilliputian visitors, diminishing their significance, not a welcoming effect. Lack of human scale in the museum's entrance area is an architectural mistake.

Antecedent Stimulus Control

Dretske (1993) used the term "triggering causes" for events immediately prior to an outcome that is caused by them, to be distinguished from "structuring causes," which do not directly evoke them, but that set the stage for them and make them more probable.

Classically Conditioned Aesthetic Events As de Rose (2015) and Mechner (2017) have pointed out, classically conditioned variables play an important role in some aesthetic events. Some works are designed to elicit emotional responses, usually to classically conditioned stimuli that in the past had been paired with powerful events eliciting emotional experiences, such as the death of a child, violent war experiences, or falling in love. Skinner (1969) suggested that part of the responses to emotionally arousing classically conditioned stimuli, may include perceptual "conditioned seeing," the tendency to "see familiar objects more readily and easily than unfamiliar objects" and stimuli previously paired with an emotionally eliciting unconditioned stimulus (Skinner, 1953, p. 267). The unconditioned stimulus pairing with the current aesthetic stimulus may have occurred long ago, but the conditioned stimuli retain their powerful respondent eliciting properties, associated with feelings of sadness, sexual arousal, or joy. Kathe Kolwitz's bronze *Lament* (Fig. 1) is a particularly effective example based on her experiences in World War II, especially a mother lamenting the death of her children.

Discriminative Stimulus Functions of Aesthetic Stimuli Some aesthetic stimuli have been so ingrained as parts of social customs that no verbal or other accompaniment is necessary to set the occasion for immediate responding, such as a band or orchestra playing "God Save the Queen," to an English audience, or in a slightly more upbeat tempo of the same notes, "My Country, 'Tis of Thee," to an American audience, such as at a graduation ceremony or football game.

Calls to prayer by a muezzin, such as the Azan (Adhan) are used to announce to Muslims it is time to pray. They serve as discriminative stimuli in the technical operant sense. The

Fig. 1 K. Kolwitz., *Lament* (1938–40), born Kaliningrad, Russia; relief, bronze, bronze foundry H. Noack, Berlin

Azan is reciting a prayer, not singing, but in some locations the recitation can be melodically beautiful, such as the prayer of the Turkish muezzin Hafiz Mustafa Özcan (n.d.), and recordings are sold or offered free. Having been taught to follow these rituals since childhood (and perhaps been punished for failing to do so), and certainly socially reinforced for complying with those procedures, they become autonomously maintained by the network of emergent relations associated with such stimuli in a Muslim's everyday life.

The Aesthetic Response

The term "aesthetic response" can mean at least two very different things. As most commonly used, as in Mechner's article (2017), the aesthetic response refers to *the subjective reactions of individual observers or listeners, to an aesthetic presentation, such as a musical selection, a painting, or poetry selection*. Mechner's analysis of the aesthetic response spotlights the audience of the aesthetic material, not the person who creates aesthetic material. Mechner tells us that operant phenomena are involved in three aspects of the aesthetic experience. First, the potential audience member seeks out the aesthetic material and is reinforced by hearing the music, seeing the artwork, or reading the textual material. Next, the audience member experiences a private, covert event of some kind, including an emotional reaction, which has interoceptive discriminative and reinforcing stimulus properties, to which they may exhibit an overt exclamation of pleasure. Third, there may also be a listener or other audience member who reacts to the exclamation of pleasure.

Mechner borrows his key term "synergetic" (as in "synthetic brews") from Hermann Haken (2013), who originated synergetics, the science of interactions whose effects are different in kind from those of the individual interacting elements. A similar term, "synergism," is used in pharmacology when effects of two drugs are greater than the additive sum of the two. However, in Mechner's meaning of synergetic effects the results are not only greater but are *qualitatively* different from the sum of their parts. Mechner explores not the experience of the aesthetic creator, but instead, the person who has the aesthetic experience.

Yet, many audiences who attend art galleries, listen to music, attend a motion picture screening, or read a novel are not fortunate enough to have synergetic experiences of the types Mechner describes. Nonetheless, typical gallery visitors or concert audiences do find the aesthetic materials to which they are exposed sufficiently satisfying to repeat their visits. However, few of these visitors have such emotional epiphanies elicited by simultaneous confluence of highly unexpected variables. Yet, they return again and again to enjoy aesthetic experiences. At times, concerts are disappointing, or the book we are reading lacks sufficient interest to sustain their attention. We put the book down midway through, finding it uninspiring. The overall reinforcing effects of aesthetic materials cannot depend upon such unusual combinations of events (i.e., surprises), or audiences would probably stop returning. As important as such synergetic effects undoubtedly are for some audience members, they may not be the primary reason broad audiences enjoy the arts. Perhaps musicians, writers, choreographers, or others who are themselves actively engaged in the aesthetics world may be more likely to experience the confluence of priming factors to which Mechner refers, and find the artwork or music highly reinforcing. There must be other factors operating to keep the rest of us coming back.

The opportunity to respond actively to provide access to highly desirable (Premackian, high probability) aesthetically related behavior that otherwise would not be at one's disposal, is an important maintaining consequence for audience members. In an early animal study exploring this concept, Thompson (1969) demonstrated respondent, fixed-action patterns, and operant components of complex response sequences led to, and were maintained by, the opportunity to display high probability species-specific behavior. Killeen (2014) has discussed the role of opportunity to respond in maintaining behavior, incorporating respondent, adjunctive, and operant mechanisms. There are many ways for audiences to be actively involved in aesthetic activities within their surroundings, ranging from participating in book clubs, membership in an historic preservation group, serving on a selection committee for an art exhibit—all providing regular contact with aesthetic materials. For many audience members, attending a performance by a professional theatrical series or participating in a semi-professional musical ensemble may be among their top priorities.

The opportunity to respond is effective as a maintaining consequence because many audience members are disposed to participate in such activities, much as others are disposed to participate in outdoor activities, such as hiking, canoeing, or

collecting natural specimens (fossils, rocks, nature photographs). Although there is considerable controversy within the philosophical literature regarding the causal status of the term "disposition" (Armstrong, Martin, & Place, 1996, depending upon exactly how it is defined, disposition as used here can be a proxy for a tendency to exhibit a characteristic behavior, such as participating in aesthetic activities.

In the next section, I touch on the mechanisms that maintain the behavior of the creators of aesthetic materials, as opposed to audience members, a different type of "aesthetic response." Aesthetic responses can also refer to the behavior of creatively producing aesthetic materials, such as making an etching, singing a song, or performing a traditional dance. In both cases, aesthetic creations have an emotional element that both the creator and the witness experience. Although there may be cognitively engaging elements of artistic aesthetics, those are often secondary to the emotional impact.

Artists' Maintaining Consequences

What does the person who produces aesthetic material gain from doing so? What do they achieve by reading a poem aloud they have just written, shooting a selection of artistic photography, or composing a piece of music at a piano? Established artists working in several genres were asked that question by a University of California-Berkeley arts magazine editor (Smith & Marsh, 2008). The first respondent, Judy Dater, had been making photographs for more than 40 years and is considered one of America's foremost photographers. She was the recipient of a Guggenheim Award and many other accolades. She said:

> I like expressing emotions—to have others feel what it is I'm feeling when I'm photographing people. Empathy is essential to portraiture. I've done landscapes, and I think they can be very poetic and emotional, but it's different from the directness of photographing a person. I think photographing people is, for me, the best way to show somebody something about themselves—either the person I photograph or the person looking—that maybe they didn't already know.

The most common answer from working artists to the question, "What do I get from creating art?" An answer, presumably a subjective description of a maintaining consequence for creating art, is "to express my feelings and thoughts I have no other means of expressing." We can only retrospectively surmise that Botticelli's *Birth of Venus* expressed his reverence; Renoir's *Dance in the Country* expressed his feelings of love; and Goya's *Third of May 1808* painting of the murder of a member of the Spanish Resistance commemorated their bravery and expressed his repugnance and sorrow. The opportunity to express powerful feelings seems to be a maintaining consequence.

With the beginning of the Dada movement, these powerfully expressive functions of art were called into question. Dada led to conceptual and pop art. These latter artists contended it was no longer necessary for art to be emotionally engaging or to express a semantically meaningful idea (Naumann, 1999). Rejection of semantic expression and emotional impact in the arts reached its culmination with Abstract Expressionism, which focused exclusively on formal elements of composition, (shape, color, contrast, movement, composition, and texture), which included color field painters (Mark Rothko), gestural painters (Pollock), and action painting (de Kooning). But today, most art that reaches a broad audience involves emotionally engaging elements.

Audience Maintaining Consequences

Unlike Mechner's (2017) discussion of the properties of the aesthetic material, here I examine the functions aesthetic elements serve in our daily lives. At times, aesthetic experiences arising from the arts share similarities with other evanescent emotional and cognitive experiences, such as religious ecstasy (James, 1902), chemical-induced hallucinogenic and mental states (psychedelic chemicals, e.g., Barrett & Griffiths, 2017), and emotional experiences naturally occurring in our daily lives, like despair upon losing a loved one. It is obvious that such powerfully elusive and privately experienced phenomena are not unimportant, but they are beyond scientific investigation—the focus of my current exploration. My concerns here are:

1. The circumstances under which humans create aesthetic materials that produce such effects; and
2. What purposes aesthetic materials and events serve?

There would be little aesthetic material without audiences to react to them. Although it may be true that some artists create their aesthetic objects and perform music largely for themselves, at least in part, nearly all aesthetic creators do so to have their material seen and heard by others. This raises the question: Under what conditions is an aesthetic object or an event a reinforcing consequence for an audience member's or observer's behavior, rather than for the creator of art? A child completes her drawing and rushes to thrust it before her mother, awaiting her mother's approval. The mother is the intended audience whose approval is the reinforcer for the child. As we grow older, the reinforcing link between the aesthetic creator and the audience becomes less direct and reinforcement increasingly unpredictable. Although the maintaining consequence for the creative artist may be more obvious, what is the maintaining consequence for the observer?

Music seems to be a major part of who we are. One of the first things we often discuss with new acquaintances (with

whom we may later become friends) is our musical preferences. We enjoy exchanging our favorite songs and composers and performers. Perhaps that piece we have remembered all these years was Charlie Parker's *April in Paris* or Beethoven's Choral Symphony, or perhaps we fondly recall *Sleeper's Awake* played by Christopher Parkening. Our music always remains a part of who each of us is throughout our lifetimes. Upon hearing no more than a few notes of that special piece of music we may begin humming the melody, or "hear" it mentally (Skinner, 1969, commenting upon conditioned hearing). We are transported into that musical moment.

We may be patrons or followers of an artist or of certain types of aesthetic materials. We attend concerts, visit museums, collect and listen to recordings, attend movies and theatrical performances, belong to a book group, or learn to be docent at the art museum. These activities all involve actively responding to aesthetic materials, and having experiences that serve as reinforcing events. Discussing your ideas about a book with other book group members, or explaining to novice museum-goers the difference between Impressionist and Renaissance art, involves opportunity to respond, important reinforcers for most adults involved in aesthetics.

As observers, architectural aesthetic materials often seem cold and indifferent. But stained glass[1] can be a captivating architectural element, seldom more effective than it was in the hands of German artist Ludwig Schaffrath (see Fig. 2).

Among the most striking of his designs were huge walls of parallel lines of swirling and intersecting rows of colored textured glass, combining and diverging unpredictably. Schaffrath's designs created paradoxes for a seemingly rigid, fragile material, for in his hands the designs became almost magically fluid. Ludwig Schaffrath's designs have a remarkable visual cadence much as music has metrical properties, synchrony and asynchrony, and creates harmonies and occasionally startling visual effects, much like listening to Bach's First Brandenburg Concerto with the opening theme played by the entire ensemble, then returning in part in different keys throughout the movement, allowing the themes to emerge unexpectedly into the solo parts in the rondo (Thompson, 1986).

A companion stained-glass window by a contemporary artist, Michael Pilla, holds a special place in a hospital chapel (see Fig. 3). The artist commented,

> A hospital chapel is a place where people wrestle with challenging events and outcomes. Art in that setting that is abstract but not overly defining, and at the same time human is an important part of making it accessible. It is not enough to be beautiful, it must invite an active audience response.

[1] This section based on Thompson (2011).

Fig. 2 Ludwig Schaffrath (1973), born Alsdorf, Germany. Stained glass window wall constructed of antique mouth-blown glass, *Schwimbad Übach Pallenberg*, Germany

Derived Cultural Functions of Aesthetics

I believe that every culture discovers its own ways of creating such aesthetic effects through music, visual arts, and the written and spoken word. Aesthetic materials are embedded within daily lives of ordinary members of the public, either through formal aesthetic mechanisms (museums, orchestras, attending readings) or informally through daily cultural customs, meeting friends for lunch, taking children to school, or attending religious services. Aesthetic materials are noteworthy for being taken for granted as essential parts of our daily lives. They have always been a central vehicle involved in weaving our cultures together. How that occurs is the subject of this section.

Derived Stimulus Classes and Values

An art object, or event such as a musical performance, is not a disembodied autonomous entity. Its meaning is established through repeated pairing of similar aesthetic stimuli with other cultural ideas, words, or concepts. Mechner (2017) noted that aesthetic materials such as words that characterize the way various listeners and viewers see themselves help confirm

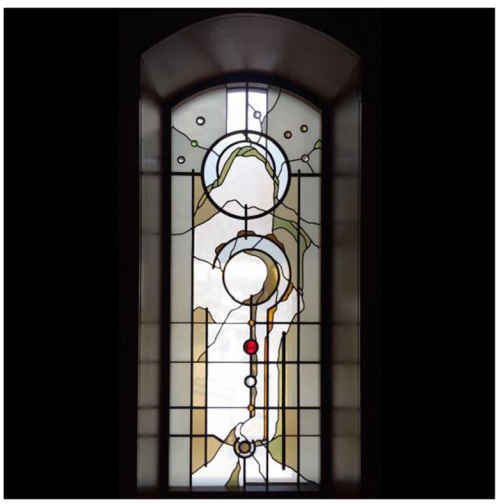

Fig. 3 Michael Pilla, Stained glass chapel window, antique mouth-blown glass. April 8, 2018 at the St. Joseph's Hospital in St. Paul, Minnesota

their identity. The meanings of the aesthetic stimuli and their conditionally associated concepts are determined by those derived relationships. The oil paintings of peasants by Millet, *The Gleaners* (1857; Fig. 4), or Rembrandt's portrayal of *Return of the Prodigal Son* (1661–1669; Fig. 5), cause words to come to mind that may capture how we wish to think of ourselves.

Personal qualities emerge in response to these powerful images—compassionate, caring, humble, sacrificing, benevolent, merciful—and do so more effectively than almost any other means. They help us define who we wish to be.

An important series of relevant studies help us begin to understand how aesthetic stimuli function behaviorally. Bortoloti and de Rose (2009, 2011) established relations between a meaningful stimulus (a facial expression of emotion) with other, arbitrary ones (see Fig. 6).

They modified the semantic differential procedure to measure transfer of meaning to the arbitrary stimuli. The Osgood Semantic Differential (Osgood, Suci, & Tannenbaum, 1957) measures the degree of meaning of different kinds of stimuli. The target stimulus was presented above a set of Likert scales, to which viewers responded by rating the presented stimulus, for example, as happy or sad. Using this method, Bortoloti and de Rose showed that the meaning of facial emotional expressions transferred to the arbitrary nonsense stimuli as if equivalent to them. They also showed that how much an abstract symbol was judged related to one of the facial expressions, as measured by "nodal distance" (Bortoloti & de Rose, 2011). Nodal distance refers to the number of steps a meaningful stimulus may be removed from several less-related stimuli (even unrelated abstract stimuli).

The abstract symbols used Bortoloti and de Rose's (2009) study might instead have been more culturally relevant stimuli, suggesting that the mere conditional pairing of nearly any stimulus with another stronger meaningful stimulus can establish a previously irrelevant stimulus as part of the same class or group. In other words, the irrelevant stimuli could just as well have been artistic images or musical phrases.

Fig. 4 *The Gleaners* (1857) by Jean-François Millet. Completed 1857, 83.8 cm × 111.8 cm (33 in × 44 in), currently hung in the Musée d'Orsay, Paris

Fig. 5 Rembrandt van Rijn, *The Return of the Prodigal Son*, c. 1661–1669.262 cm × 205 cm. Hermitage Museum, Saint Petersburg, Russia

Derived Stimulus Classes and Memes

Mechner (2017) suggests that memes provide a mechanism for cultural cohesion, and that aesthetics contributes to creating memes that may contribute to the cultural meanings of stimuli. When Richard Dawkins first suggested the idea of a meme in *The Selfish Gene* (1976), the term seemed metaphorical. It isn't clear that he thought memes were empirically socially equivalent to genes. Genes and memes differ fundamentally in their properties. As the term "meme" is popularly used, it refers to a concept that can be rapidly established within days and weeks within a culture by means of massively saturated exposure via electronic and social media, and through repetition by members of a

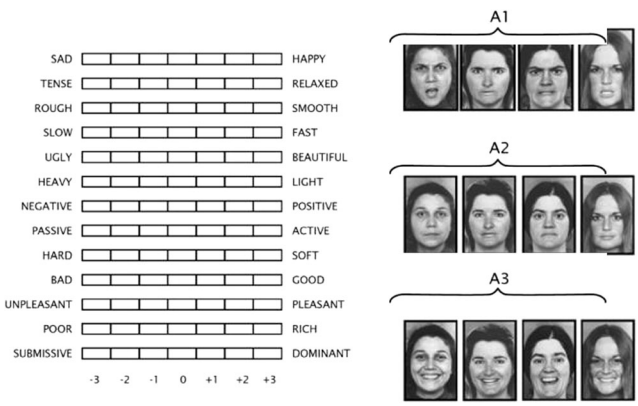

Fig. 6 Sample facial expressions and semantic differential scales used in this study (Bortoloti & de Rose, 2009)

community. Memes are fickle and may disappear almost as quickly as they are created. Memes may be analogous, but not homologous counterparts of persisting genetic mechanisms that account for durable behavioral changes. Differential responding to common features of complex artistic, written, or musical materials that are connected via a type of stimulus equivalent nodal nexus, may begin to suggest a mechanism, as per preceding discussion (Bortoloti & de Rose, 2009). But calling it a meme does not explain *how* that happens.

Derived Stimulus Classes and Metacontingencies

Drawing on Harris's (1964) and Skinner's ideas, Glenn (1988) suggested a highly creative account of the way interlocking social contingencies involving small groups of individuals, such as within families, could contribute to creating permanent social structures (see Fig. 7), even allowing for changes in the roles of individuals within those small groups. If a parent dies or leaves through divorce, another family member assumes important aspects of that role in a social network.

Less clear within Glenn's analysis is how larger cultural influences affect such social behavioral units. Todorov (2010, 2013) and Glenn and Malott (2004) have contributed to our understanding of how metacontingencies influence the behavior of groups. However, left ambiguous are the questions of how the influence of metacontingencies extend to broader culture, or conversely, how the aesthetics of the broader culture affects such metacontingency-based groups. Derived relationships involving aesthetic materials are one category of stimulus control with corresponding complex response classes that serve this purpose. Understanding the behavioral functions of these materials within a culture may begin to elucidate these mechanisms.

The Cultural Importance of Derived Aesthetic Relations

Value of a Derived Relationship The value of a poem for a reader depends upon the number and pattern of relationships that the words and phrases within the poem have for the reader. Aesthetic value also depends upon familiarity with the meter and rhyming scheme of words in the poem, including repetition, as Mechner (2017) points out. Those are emergent relations acquired similarly to the way stimulus equivalence relationships are learned to other novel stimuli.

In Kafka's novel, *The Metamorphosis* (1946), the principal character, Gregor Samsa, seemed improbable as someone with whom I might identify. He was a traveling salesman in early twentieth-century Austria who awoke one morning to find himself transformed in his bed into a gigantic insect-like creature—a cockroach, perhaps. The plight of the hapless character, turned into a flailing bug through no fault of his own, completely powerless in the hands of others, bears resemblance to the powerlessness we each experience in various subservient capacities in life as children, students, or employees. The derived semantic relations among the characteristics of the ill-fated insect, and other linkages of familiar features of Gregor's life story to those of many other readers makes Gregor's story part of each of our own stories. Many of us shared Gregor's feeling of thrashing impotence.

The Value of a Derived Relationship as a Part of Daily Life As a teenager listening to Barnie Bigard's wailing clarinet solo in Ellington's "Across the Track Blues," followed by the muted coronet lament in the second chorus, I experienced feelings of loneliness and despair that I assumed many African Americans must have felt growing up on the other side of the tracks in the American South, where the song originated. Despite living in the segregated working-class white Midwest,

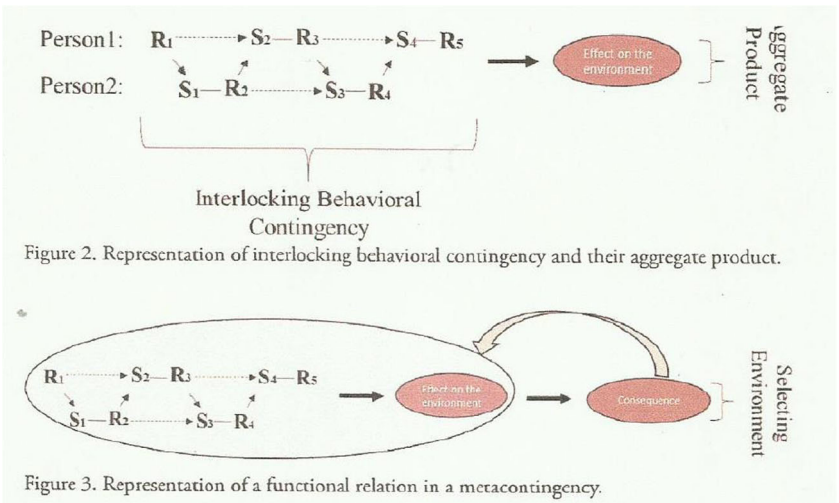

Fig. 7 Sample hypothetical interlocking contingencies, the basis for the formation of complex metacontingencies. Glenn and Malott (2004), Fig. 3

I felt kinship with black Americans. I thought that perhaps in some small measure I understood their plight, because of my own shared feelings. As an adolescent, that prototypic African American music became one of the first pieces of music I adopted as "my own" as I was coming of age. This feeling of affiliation occurred spontaneously when hearing Ellington's classic. My first hearing of "Across the Track Blues" was within the context of conflict over racism in America in the 1950s. Such aesthetic experiences occur spontaneously by such derived nonverbal pairings of our own feelings with words, visual images, songs, photos, and poems.

The importance of aesthetics in our lives is related to the types and range of derived relations that aesthetic items have with important social institutions, events, and other things around us. Paintings and poetry with symbolic relations to our personal lives and our families are more likely to be important. We feel supportive of objects of sculpture (e.g., Martin Luther King, Jr., Washington, DC), orchestral music (e.g., Copland's "Our Town"), and theatrical performances (e.g., Lin-Manuel Miranda's "Hamilton") that seem to readily integrate symbolically into our life. To the degree they are nodally linked to emotionally important aspects of our own lives in ways that are culturally familiar, such as intimate relationships (e.g., Emily Dickenson's ″Wild Nights":

> Wild Nights—Wild Nights!
> Were I with thee
> Wild Nights should be
> Our luxury!
> (Dickinson, 1891/1960, p. 114)

or family (e.g., Mary Cassatt's *Mother and Child*), or sense of community or lack thereof (e.g., *Nighthawks* by Edward Hopper), or racism (e.g., August Wilson's *Fences*), the more powerfully they will be endorsed as being culturally important, and the greater they resist change when others insist they are irrelevant or lack value: "Some people build fences to keep people out. .. and other people build fences to keep people in" (Wilson, 1986, p. 61).

If aesthetic materials had established derived symbolic relational contact with personal, family, community, and other important cultural aesthetic nodes in derived relational trees, they will be embraced and incorporated into people's lives. We will implicitly see them as belonging to us, or at least appropriate to our communities. Aesthetic practitioners who create impenetrable barriers by creating artistic materials and events with no apparent nodal linkages to anything in audience's experience will tend to exclude their aesthetic materials from contact with the rest of the community.

Derived Stimulus Properties for Including and Excluding Group Members

The more someone insists they are uninterested in art, have a "tin ear," don't understand poetry, and dislike "artsy" programming on television and radio, the more certain you can be that they have definite preferences in aesthetics, including music, the visual and performing arts, such as in television programming. Perhaps the man "with the tin ear" can recite "I pledge allegiance, to the United States of America," can sing "God bless America. .." from start to finish and recite "The Lord's Prayer." He has a print of an old Norman Rockwell painting in the bedroom, loves country music, and, if old enough, used to watch Grand Old Opry on television. When he is driving to the next town, he listens to country music on his truck radio. Although he claims otherwise, he can carry a tune and enjoys singing hymns at church on Sundays. It's not that this gentleman dislikes aesthetic materials, activities, and ideas, it's just that he rejects aesthetics different from his own preferences. His aesthetics defines the outlines of his world for him, well beyond these aesthetic materials.

The classic empirical study by Bourdieu (1984), *Distinction*, demonstrated the relation between socioeconomic status and cultural taste. His data showed that education, which promotes social mobility beyond economic means, is most likely to determine what constitutes taste within society. Those with low overall capital are unable to access a higher volume of cultural capital because they lack the necessary means to do so. Bourdieu concluded that working-class people expect objects to fulfil a function (p. 41), "manual workers almost invariably reject photography for photography's sake (e.g., the photo of pebbles) as useless, perverse or bourgeois: 'A waste of film,' 'They must have film to throw away.. ..." Those free from economic necessities are able to operate separated from everyday life. As a result, stimuli associated with practical aspects of everyday life are valued by working class, especially rural people, whereas those with symbolic intellectual cultural functions are not. The network of things, and immaterial tastes (e.g., music) that are uniquely associated with higher socioeconomic tastes are rejected by those of lower socioeconomic tastes.

Aesthetic preferences identify who we are and our group memberships, social, cultural, educational, and vocational. Our group determines how we should respond, and what behavior we should exhibit to be reinforced. The opportunity for group responses to aesthetic stimuli is essential to derived relationships, such as in choral singing, pledges of allegiance, political marches, and associated signs and paraphernalia. Group-determined preferences (and aversions) must be incorporated within our analysis of the role of aesthetic stimuli as fundamental determinants of human behavior. Yet, I believe they offer a significant challenge to our understanding within the field of behavior analysis.

Summary

There may be as many ways such aesthetic creations are valued as there are cultures to value them. Our task is to consider the ways in which diverse aesthetic materials function within cultures. Armstrong (2001), Martin (1994), Pepper (1965), and others have argued that aesthetic materials serve as putative causal dispositions whose effects are dependent on observers for their expression. We may think of them as exerting "potential" effects by analogy from physics. Aesthetic rules, and the conditionally derived relations among aesthetic stimuli, words, and concepts associated with those stimuli, and their associated behaviors define their roles in culture. Not only are there beautiful or exquisite works of art, these works may also be associated with many other concepts that are essential to the way we think of ourselves, including personal traits, social and culturally defined roles, and qualities such as being trustworthy, compassionate, and honorable. These rules and relationships have been called "derived symbolic relationships" (Bortoloti & de Rose, 2009; Todorov, 2013; Glenn, 1988) or "relational frames" (Hayes, Barnes-Holmes, & Roche, 2001).

Mechner (2017) emphasizes the central role of evolutionarily programmed synergetic brews, the confluence of multiple establishing and triggering events making artistic creativity possible. Culture (Mechner, 2017, sec. 6.5 "Dispositional Aesthetics and Private Events") is among the elements listed. The essence of the creative process, Mechner suggests, is to be found in the host of devices creative artists have evolved with which to express their creative aesthetic sensibilities. Culture defines the parameters of art and aesthetics, which determine which of these devices will fit within a given cultural niche.

Our lives and behavior are organized around a few givens; the rest consists of strands tying us together, because we are woven around a simple set of values and derived symbolic relationships the rest of what matters grows like hand-woven threads knotted in an irregular, unpredictable pattern to strengthen our relationships. Some people complain these irregularities make it difficult to decipher. That is what behavioral analysis is all about, isn't it?

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