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Empirical Psycho-Aesthetics and Her Sisters: Substantive and Methodological Issues—Part II

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Introduction

Several key substantive, methodological, and science-practice issues that concern the field designated as *empirical psycho-aesthetics* were examined in part I (in the Winter 2012 issue of *JAE*) of this two-part article. Also presented was an outline of the discipline's origin and its relationship with elder and younger "sisters"—philosophical aesthetics, experimental philosophy, cognitive-science-and-art, (cognitive) neuroscience of art, and neuroaesthetics. The comparative goal was in part approached through the analysis of several recent significant controversies and debates.

Here, in the six sections of part II of the article, empirical work on various problems that are relevant to the discussion initiated in part I is described in some detail. I review five groups of research studies—many of them from my psycho-aesthetic laboratory—that involve a variety of artistic domains, research methods, and kinds of research participants. In all cases the issues subjected to empirical scrutiny are relevant to aesthetic and art theory. In some of them, brain-imaging research is discussed; in others such research would be possible—and welcome if it provided the opportunity for vertical theoretical integration. In no cases, however, are some future neuroaesthetic findings likely to make the behavioral (including aesthetic-choice) and verbal (including self-report) findings redundant.

The five groups of studies are as follows: (1) empirical tests of significant (verifiable) claims made by aestheticians and artists; (2) portraiture: obtaining an empirical handle on the creative process; (3) empirical work

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on the “golden section”; (4) research on “thrills” (or shivers-down-the-spine or “chills”) induced by music; and (5) research on the concept of “aesthetic episode.” The article ends with brief concluding remarks (section 6).

1. Empirical Tests of Significant Claims Made by Aestheticians and Artists¹

One of the most valuable contributions that empirical psycho-aesthetics can make to the analysis and understanding of art is epistemological, by which I mean an objective, empirical scrutiny of speculative thought that surrounds art. Careful empirical tests of theoretical statements, manifestos, and assorted other pronouncements made by aestheticians, art theorists, critics, and artists themselves can bring additional rigor to a field that is sometimes open to arbitrary speculation and occasionally, even if briefly, dominated by doctrinaire authority. This assumption seems especially true when the claims emanating from the artworld concern the nature and degree of emotional, perceptual, cognitive, and social—in short, psychological—impact on listeners, viewers, readers, or theatergoers. And it is perhaps even more valid when the empirical tests examine the general (sometimes extravagantly general) claims about “human experience”—regarding, for example, a piece of music or an artistic style, and not the more modest claims about the response of the composer and a coterie of admirers.

With regard to artists, although many of them have been reluctant or unable to discuss publicly their works and intentions, many have been eager. Moreover, even in the absence of verbal statements, artists implicitly give indications of their beliefs about how the work of art affects or should affect the audience, and aestheticians and critics take this into account. Decisions that after the fact seem obvious to the public—such as to hang a painting in a certain orientation, present the parts of a musical piece in a certain sequence, use short or long paragraphs, or place the actors in a scene in one place on the stage as opposed to another—reflect the painter’s, composer’s, writer’s, and theater director’s beliefs about their work’s optimal impact. Even in the extreme case, when a work of art consists of genuinely random events, there are good reasons to conclude that, for example, John Cage believed that either the very randomness of the work’s components, or the particular method of producing the random events, or both, would have an impact on the audience.

Some of the aesthetic analyses of works of art are of only literary or historical value. However, many statements are more precise and explicit about the relative contribution of individual components to (a) the artist’s intended “message” (in the broadest possible sense), (b) the work’s overall alleged impact, and (c) the overall structure created to achieve a particular

effect. Such statements can often be translated into propositions that are empirically verifiable. In addition to the scholarly value of their empirical work and their engagement with philosophical aesthetics, psycho-aestheticians can on occasion provide a service to artists by informing them of the extent to which the intended message is actually “getting through” to the audience. In other words, is the audience perceptually, cognitively, and emotionally responding in the way that the artist (or aesthetician or critic) expects? Do certain parts of a work or its overall structure have the intended effects?

In some thirty experiments in my laboratory, the same straightforward and highly effective research strategy was used in various art domains to evaluate the claims of experts in the artworld. The starting point was to choose a significant claim made by a recognized expert or artist about the purpose, impact, or effect of a work of art (or some of its components) and translate it into a testable form. The original version of a work was altered in several ways, such that the substantive aspects of the “doctoring” procedures reflected the main line of the argument expressed by the art experts as well as the various degrees of negation of that argument. The original and the systematically altered versions were then presented to research participants in (within- or between-subjects) experimental designs (depending on the topic and feasibility). Research participants varied from reasonably educated laypeople to connoisseurs and experts; the recruitment, with regard to the participants’ degree of expertise, was guided by the generality of the claim being tested. Participants were asked to rate the original and the altered versions on various dimensions, always keeping in mind the main elements of experts’ or artists’ claims, as well as the psychological and aesthetic meaningfulness and theoretical interest. Rating scales addressed the different versions’ respective pleasingness, interestingness, emotional impact, structural integrity, meaningfulness, stylistic purity, originality, and so on. Participants’ desire to own a reproduction of the works and the ease of the works’ details being remembered were also investigated. These measurement procedures were accompanied by interviews with subsets of participants. Statistical analyses of the results allowed the accuracy of experts’ various claims to be systematically evaluated.

The first five groups of studies of this type (described in detail in my articles listed in note 1) examined: (a) the effects of various spatial orientations of representational and abstract paintings; (b) the comprehension of the meaning of songs (with well-articulated lyrics) from various popular genres; (c) the effects of drastic stylistic alterations in the writings of authors ranging from Roland Barthes to (early) Samuel Beckett to Gertrude Stein; (d) the effects of a rearrangement of the order of movements in Beethoven’s string quartets and sonatas; and (e) the influence of varying certain features (type of stage, proximity of audience, aspects of choreography) of a theatrical performance.

The results were highly informative and too numerous to be summarized here. Suffice it to say that in many cases the various experts' and artists' predictions were conclusively disconfirmed, such that drastic alterations of artworks produced minimal effects on the responses of "appreciators" (this in the context of considerable general enjoyment of the works, including many of the doctored versions—which was in itself informative). In other cases the effect predicted by the expert or artist occurred only in the presence of other factors that had been ignored or minimized by experts. Some of the most striking and counterintuitive effects were observed with regard to the relatively minor importance of both global and local musical structure under certain conditions. (Macro-structure is related to organization, form, and style, and micro-structure to a host of musical elements). Therefore, among the subsequent studies in my laboratory that used this research strategy, experiments on the effects of interfering in various ways with musical structure predominated (see note 1).

Note that M. Livingstone's work (in *Science* 2000) on the Mona Lisa smile (which I discussed in section 6 of part I of this article) is actually an example of the same psycho-aesthetic research strategy described above (which had been used in my laboratory for a decade after 1982).² Livingstone started with a popular notion ("the mysterious smile") and the opinion of an esteemed authority, E. H. Gombrich, who had suggested a solution of sorts by reference to *sfumato* ("gone up in smoke"), one of four, according to some experts, canonical Renaissance painting modes. She then filtered the image to exaggerate selectively the low and high spatial frequencies. The clear smile was more apparent in the low spatial frequency image than in the high spatial frequency one. Since foveal vision is dominated by considerably higher spatial frequencies than is peripheral vision, the upshot was that Mona Lisa's mouth was smiling when Livingstone looked at, say, the hands, but the smile disappeared when she focused on Mona Lisa's mouth ("like a dim star that disappears when you look directly at it," as Livingstone put it; p. 1299). To the best of my knowledge, Livingstone has not used research participants to confirm her observations; she probably used colleagues as subjects, a common practice in psychophysics laboratories.

An analogous, essentially psycho-aesthetic, research procedure was utilized in the research (also involving high and low spatial frequencies) by L. Bonnar, F. Gosselin, and P. G. Schyns on Dalí's ambiguous (bi-stable) *Slave Market with the Disappearing Bust of Voltaire*.³ The authors filtered a reproduction into different spatial scales and, in their Experiment 2, used (the psychophysical) frequency-specific adaptation procedure before testing their prediction on, in this case, ten "naive" research participants, in a between-subjects design.

2. Portraiture: Obtaining an Empirical Handle on the Creative Process⁴

Unlike the work on artistic creativity—usually conceived as a long-term personality trait, ability, or disposition that is measurable by various general and specialized tests and has been extensively studied by psychometric, psychoanalytic, and other means—the empirical study of the *executive* phase (or “production” phase, as opposed to the preparatory one) of the *process* of creation of artworks has been stymied by the seemingly insurmountable difficulty of obtaining adequate access and empirical control.⁵ The observation and measurement of the exact goings-on in the executive phase, despite the great intrinsic interest these events hold for the aesthician, are usually thwarted by the private and, in some art media, entirely unobservable aspects of the creative process. Even studying the changes an artist makes in a work, or obtaining and analyzing the videotape, film, or speeded-up film record, does not provide an adequate opportunity for manipulation and control.⁶ Note that much more than the difficulty of recruitment of the desired top-echelon research participants is in question here: there is also the crucial problem of the researcher’s very presence. When the creative process is closely observed, measured, and recorded, there is, in most art media, an interference with the authenticity of the process, which in turn affects both the essential nature and the quality of the resulting work. In other words, an analogue of the “Heisenberg principle” in particle physics may be operative.⁷

Working with portraiture is a solid, if partial and modest, solution to the formidable problems of studying the ongoing creative process in visual art in a controlled manner. In the “real world,” portraiture is relatively unique among art-creating situations in that it may involve commissioning an artist to render a specific, often previously unknown, model, whether as a quick sidewalk sketch or as an elaborate studio portrait. In at least some cases, an expectation from the artist to render a “likeness” also exists. In other words, portraiture often involves “art on command” with regard to the subject, the time of execution, and even the form of the work. The drawing of portraits thus provides an opportunity to maintain some experimental control and manipulate variables of psychological, aesthetic, and artistic interest without sacrificing the authenticity of the artistic endeavor. The behavior of the artist while creating and the sequence of changes in the work being created can be studied simultaneously and in detail. Moreover, because quick portrait sketching is so ubiquitous among artists, it is possible to carry out an objective microanalysis of the executive phase of the creative process in the context of an artistically meaningful activity without being overwhelmed by data, as has been the case in some of the earlier studies using video records.

In a series of studies in my laboratory, a new empirical methodology was applied to authentic portraiture as the creative process unfolded *in vivo*. Professional portraitists and skilled amateurs each drew portraits of several live models in succession (people previously unknown to them) either in the model's presence or from memory. The length of time available for execution was systematically varied.

Links among memory task characteristics, artists' mental representations, and performance time constraints are all important in cognitive psychology and in psycho-aesthetics as well as in theories of drawing. The issue of representation is at least implicitly present in most discussions of both figurative and abstract art, and it is intimately related to questions of artistic style. The experimental procedures that were used made it possible to address some classic questions in art theory, such as the transformation of motifs through abstraction and distortion, the problem of "likeness," and artists' application of face schemata and the adjustments they made for particular models.⁸

In addition, the mechanics of drawing (the number of glances per minute, frequency of strokes, and presence of outlining and shading) could be empirically investigated, as well as artists' focus and the temporal facts of the execution (e.g., the order in which artists drew twenty-two different parts of faces, whether or not they returned to them, etc.). In addition to the availability of such data, all of the finished portraits (144 in one major study) were subsequently evaluated by ten previously uninvolved judges on dimensions of aesthetic appeal, interestingness, and—having been shown photographs of the models' faces—the degree of abstraction ("How stylized and lacking in details is this portrait?") and distortion ("How close to the actual facial proportions is this portrait?").

Because the primary purpose of this section is to demonstrate the utility of empirical psycho-aesthetics in studying the creative process, only a few sentences are devoted to the complex and numerous findings. Contrary to standard memory research, drawing from memory did not result in more distortion than did drawing in the presence of the model, even with very short execution times. (Portrait artists are remarkably good at memorizing and accurately rendering facial proportions.) The results—significantly higher ratings of aesthetic appeal given by judges to portraits that had been drawn in the models' presence—were therefore caused not by less distortion, but rather by more abstraction. The idea that artists prefer a somewhat abstract rendition and paradoxically need a model in order to render it subtly is important in relation to the nature of abstraction in art and the long-standing debate about the significance of external stimuli in art creation. Artists may profit from exposure to external stimuli while creating not for the purpose of achieving veridicality, but rather because such stimuli can trigger schemata that would not otherwise be activated.

3. Methodological Issues in the Empirical Work on the “Golden Section”

In the exchange that W. P. Seeley had with Roger Seamon (critically mentioned in section 3 of part I of this article), he made a number of observations that misrepresent the methodological capabilities of psycho-aesthetics and the care with which certain complex problems have been empirically addressed in this field.⁹ In this section I describe a program of research on the “golden proportion” as an illustration of psycho-aesthetic reliance on a multipronged methodological approach that was used in teasing out the facts of a classical and elusive research issue.

The golden section (henceforth, GS; $\phi' \cong 0.618 \dots$; ϕ is for Phidias) is a proportion that for twenty-six hundred years has in various artistic, mathematical, and biomorphological contexts fascinated some of the finest minds in European philosophy, science, and the arts. It has been called “divine” by Johannes Kepler and considered the epitome of beauty by many scholars, including Alexander Baumgarten, the father of philosophical aesthetics (with major works in the mid-eighteenth century), Adolf Zeising, who studied GS in some detail in the human body a century later, and, of course, Fechner himself.¹⁰ In the twentieth century, M. Borissavlievitch, among others, discussed the pervasive role of GS in aesthetic theory; Charles Bouleau analyzed it as one of the keys to Western painters’ “secret geometry”; and Le Corbusier made it the building block of his *Modulor*—the proposal for a fusion of the functional and the aesthetic in architecture.¹¹

Following Fechner, who performed the first experiments on ordinary people’s preferences for rectangles of various dimensions (the “golden” one was favored) in the 1860s, many researchers, mostly psychologists, have examined GS empirically. The problem is that much of this research has been unnecessarily restricted to (1) nonartistic stimuli (usually geometric shapes), (2) objects presented without an aesthetic context, and (3) nonartists and non-art connoisseurs as research participants. Such self-imposed research limitations can perhaps be attributed to the mistaken belief that GS is a concept (and research “factor,” in the technical sense) so powerful that it can be captured with almost any research stimuli, setting, and type of participant; and if it cannot, then it is not worth bothering with it.¹² The results appeared inconclusive: when an entire issue of a journal of empirical aesthetics was devoted to GS in 1997 (*Empirical Studies of the Arts* 15, no. 2), skepticism was widespread. This state of affairs motivated the continuation of my research program on GS that began in 1995.¹³

The first group of studies (“Vase on the Mantelpiece”) was an attempt to aestheticize and contextualize GS while continuing to use psychology students as participants. In three classroom and laboratory experiments, using a total of 260 participants, GS was investigated, for comparative reasons,

by means of both traditional research tasks (line bi-section, production of rectangles), and novel stimuli (contours and cutouts of vases constructed by GS and non-GS rules) and tasks (the placement of “vases” on an imaginary, as well as on a laboratory, purpose-built, mantelpiece). In the latter case, participants were to imagine the vase as precious (Greek, Ming) and the “fireplace” as the focal place of one’s home: “The exact placement of the vase on the mantelpiece would [allegedly] become a salient visual element of one’s daily life.”

Several conclusions could be reached. First, using traditional tasks and stimuli, GS did not emerge as a notable proportion. Second, there were many complex but interpretable statistical interactions involving the type of stimuli, type of task, and type of research setting. Third, the use of GS in quasi-aesthetic objects produced no advantage of their placement on the GS points of either the entirely imaginary or the almost-real (laboratory-built) mantelpieces. Yet the participants’ consistent use of *balance* principles (the larger the vase, the closer to the center of the mantelpiece it was placed), shows that they took the task seriously: The perception of a big vase close to the end of the mantelpiece is uncomfortable, even if the vase is a cutout and the mantelpiece made of solid wood. Fourth, when participants were asked to choose one from among eleven simultaneously presented “vases”—five from the GS series and six from the non-GS series (but with other interesting proportions, such as 0.50, 0.67, and 0.75, also present)—almost 50 percent of the respondents chose the same, GS, vase. For the significance of GS to be demonstrated, it is not sufficient that the stimuli are *somewhat* aestheticized and contextualized. These half steps cannot offset the disadvantage of GS when it is pitted against a powerful aesthetic need—for balance. Yet one of the vases from the GS series was the overwhelming favorite. GS may be important, but only in conjunction with other factors and kinds of participants.

These ideas were explored in the next part of my program (“Painters’ Accuracy in Capturing GS”), in which a new unobtrusive methodology, the modified Fechnerian “method of production,” was used. Fourteen professional painters sketched under controlled laboratory conditions—with instructions to do so “accurately and realistically”—many complex stimuli presented as slides: (1) key vases from the previous experiments photographed at four points of the mantelpiece (0.50, 0.62, 0.70 = “control,” 0.75); (2) color slides of original abstract and semiabstract paintings by a local painter, who had incorporated GS and other proportions both unintentionally, prior to having a formal knowledge of the concept, and later intentionally; and (3) color slides of paintings containing various proportions by artists known to have used GS intentionally (e.g., Mondrian) and by those about whom this is not known (e.g., Whistler). GS and other significant and control proportions were identified beforehand in the stimuli. The 378 sketches produced by the painters were measured to determine the accuracy with which the

various proportions (a grand total of 1,680 instances) had been reproduced by them.

Hypotheses were derived from psychological notions concerning attention, cognitive processing, and the “prestige effect,” and from extensive interviews with professional painters (other than those used as participants), who were thus treated as research “informants.” It was predicted that the sketching accuracy would depend on the amount of attention devoted to the stimuli and that the painters would experience more of a welcome challenge when confronted with authentic paintings—especially by well-known painters—in comparison to the vase stimuli. It was also expected that GS would be *differentially* more accurately sketched than would other proportions *but only when the stimuli were famous paintings*. Finally, the greatest accuracy of sketching and the greatest advantage of GS were predicted to occur in the works by Mondrian—because of the challenge he would pose to participants as the modern master of proportions and relational details of geometric forms.

The findings confirmed most of the predictions. The highest accuracy in capturing proportions occurred for works by famous painters (though not especially Mondrian), 42 percent overall. Moreover, the accuracy for GS (61 percent) and 1.00 (57 percent) was significantly higher than for other proportions in these paintings (28–43 percent range; the mean accuracy for the vases and the unknown painter’s works was 20 percent and 22 percent, respectively). Since the square and the circle were considered in the Gestalt perception and aesthetics theory as strong, perfect forms by authorities such as Rudolf Arnheim and Kurt Koffka, the very accurate rendering of 1.00 in the paintings certainly does not decrease the significance of GS.¹⁴ The results also validated the new research method. Extensive exit interviews with the participating painters revealed that they had not found the request to sketch accurately odd and that they had been unaware throughout that GS was the special object of investigation; hence the methodology deserves to be called “unobtrusive.”¹⁵

These findings show that GS is considerably more important than one would have concluded on the basis of the research with vases and undergraduates. It is subtle, but its elusiveness can be considerably decreased by using authentic, first-rate paintings as research stimuli, professional painters as methodological informants and research participants, and an appropriate new methodology with which to tease out unobtrusively such participants’ selective viewing and responding to different critical proportions.

The twentieth century is of interest with regard to GS, because it is conspicuous, on one hand, for the relative rejection of traditional aesthetic and artistic ideas, and, on the other, for geometricity and abstraction. The next step in my research program, “GS in the Structure of 20th-Century Paintings,” was to ask whether and in which way GS was used and also which other proportions were typically represented in the works that contained

GS. The intention of this research was obviously not to obtain the accurate incidence and prevalence values (in epidemiological terms) of GS in the total population of twentieth-century paintings—an impossible task of induction—or even in a genuine random sample (because various insurmountable logistical problems precluded such sampling). Rather, the goal was to scrutinize closely—with regard to GS and other significant proportions—each of the paintings in a sizable sample of about one hundred works (selected so that each contained at least one GS).

The precise measurement (by two skilled coders working independently) and the measurement targets within paintings constituted a novel psycho-aesthetic methodological approach that had not previously been used to explore problems of interest to art theory. The approach made possible a complex investigation of composition and perceptual weights that are intertwined with artists' use of proportions, especially GS. An initial pool of 250 twentieth-century paintings was sufficient for the detection of 95 paintings, each of which contained at least one GS; these works were by fifty-two painters from all the decades. The selection criterion was that only the most prominent structural and compositional elements, on which there was general agreement among the art authorities, author, and his colleagues, were measured in candidate paintings.

The following elements were measured in each of the 95 works: (1) overall dimensions ("picture size"); (2) vertical bi-section, which addressed the issue of left-right balance or the horizontal distribution of perceptual weights; and (3) horizontal bi-section, which addressed top-bottom balance or the vertical distribution of weights. Finally, (4) various proportions, including GS, were identified and measured in various geometric shapes that occurred in paintings either as pure forms (e.g., the GS rectangle, where $a/b = 0.62$) or incorporated into the depicted objects. For example, the facial and bodily proportions of key human figures were identified and measured, as well as the dimensions of various structurally prominent objects, such as houses, bridges, crosses, windows, and vases. Voluminous results were obtained, statistically analyzed, and presented in the following categories (among others): Symmetry and Balance; Vertical Bi-Section; Horizontal Bi-Section; Vertical and Horizontal Bi-Sections Considered Jointly; and Proportions Within Paintings. Only one aspect of these results will be mentioned.

What art judgment tests and psycho-aestheticians alike mean by "imbalance" is the situation where the weights within a painting deviate from the harmonious distribution around the central (vertical and, to a lesser extent, horizontal) axis.¹⁶ However, almost every painting thus unbalanced can be considered balanced, but with reference to an imaginary vertical (and/or horizontal) axis that is *shifted from the center*. This research documented in a detailed manner the existence and the degree of such shifts.

For example, when artists avoided the (too boring?) centrally placed vertical bi-section, they also avoided the (fuzzy and irritating?) adjoining region of the perceptible, but too small, shift from the central axis. GS (0.62) was the just-right region between the midpoint and two-thirds. However, left-right imbalance *greater than the placement of the vertical axis in the GS region* was completely unacceptable to artists in this sample. In addition, with regard to the centrally placed horizontal axis, there was a high degree (74 percent) of “safe” top-bottom balance (at 0.50). For painters represented in the sample, the top-bottom direction was thus a less attractive one for the purpose of experimentation with balance, an aesthetically less hospitable medium.

When the vertical and horizontal bi-sections are considered jointly, over half of the paintings in the sample (49) are found in the cell defined by both bi-sections being at, or very close to, 0.50. However, the pattern of shifts away from the double central balance is highly instructive. The most interesting cell is undoubtedly the one with the paintings (there were seven) displaying the greatest displacement from both central axes, that is, those shifted into the GS region with regard to both kinds of bi-section. A detailed analysis was conducted on these paintings. In six of the seven, *the double displacement to the GS region* was used highly effectively to *maximize both interest and focus* on the desired feature(s). These key structural or thematic attributes would have been too predictable or awkward had they been more centrally placed with regard to either axis. Painters sought viewers’ interest more than pleasure.

Finally, a few words are in order about another direction that my GS research program took (“The ‘Golden Woman’: Western Art and Evolution”). Because of both ancient claims of beauty being associated with GS in the human face and body and contemporary evolutionary ideas about the relation between physical health and (lay judgments of) beauty, twenty-four paintings in the sample, by sixteen painters, were subjected to additional analysis. In each of these works, female faces and bodies were visible and measurable. Two facial measurements were obtained (both regarding GS). Additionally, two measurements pertaining to the body were obtained: one regarding GS, the other the waist-to-hip ratio. (The latter, when in the range 0.67–0.73, has been associated with healthy childbearing.)¹⁷ In addition, eighty-one respondents (fifty of them women) estimated the age and physical attractiveness of the painted figures.

When these painters depicted young female figures, they tended also to impart physical attractiveness to them. The most attractive figures differ from the rest of the subsample in three of the four proportions that were measured; and two of these three proportions—“facial cross” (the ratio of the distance between the cheekbones and face length) and body bi-section at the navel—are GS. Two thousand years after Greek thought about GS and

beauty, painters in the subsample (European men), despite working in a variety of styles, collectively conveyed the accumulated beliefs regarding the relationship of female proportions and “reproductive fitness”—mediated by attributes such as age (i.e., health) and attractiveness. Moreover, their meaning was correctly communicated many decades later to young Californian viewers of both sexes, mostly unschooled in the arts.

Some general conclusions on the basis of my GS research are: (1) the use of GS is subtle but detectable, and its key purpose in composition seems to be the introduction of an optimal degree of tension; (2) it is possible that the status of this “epitome of beauty” misdirected many psycho-aestheticians into a futile search for GS as a powerful single factor; and (3) there appears to be a marked nonlinearity and contextuality of GS’s application, one implication being that differences between Western and Far Eastern aesthetic ideals may have been needlessly exaggerated in many accounts. Had GS been more appropriately investigated by empirical aestheticians, the results might have muted some recent descriptions of Western art as “linear” and “hierarchical”—attributes that are then contrasted with those in Far Eastern aesthetics, such as, for example, Zeami Motokiyo’s fourteenth-/fifteenth-century *yūgen*. Intriguingly, all seven attributes of Zen aesthetics that are described by the twentieth-century philosopher and Zen Buddhist scholar Shin’ichi Hisamatsu, including the fifth, the aforementioned *yūgen* (“profound subtlety”), are shared, in my opinion, by GS.¹⁸

4. Thrills (or Shivers-Down-the-Spine or Chills) Induced by Music

It seems indisputable that an important task of both philosophical and psychological aesthetics ought to be the delineation of aesthetic responses of different quality and intensity, with particular care reserved for *peak aesthetic experiences*. For a number of years, I have been gradually developing a theoretical position (the Aesthetic Trinity Theory, or ATT) that deals with such experiences.¹⁹ ATT involves three conceptually, phenomenologically, and empirically separable subjective states in a hierarchic arrangement: *Aesthetic Awe* (the rarest and most profound); *Being-Moved*; and physiological *Thrills* or chills or shivers-down-the-spine (henceforth, Thrills; the most frequent, and the least pronounced and memorable state).

In this article I shall limit myself to Thrills—specifically those that have been induced by music—and further constrain the discussion by addressing a single problem of aesthetic importance: do music-induced Thrills constitute a genuine, full-fledged emotional state? In the process, I hope to demonstrate the pitfalls of appealing to brain-imaging findings when attempting to resolve aesthetic issues framed in terms of *subjective experience* and of *emotion*. To accomplish this, I need to return to some of the issues in the neuroscience

of art that were discussed in part I of this article, or, more specifically in this case, to those in the neuroaesthetics of music. Therefore, I shall focus, on one hand, on the neuroscientific findings (much cited—and overinterpreted—by the music-emotion enthusiasts) that were obtained in 2001 by Anne Blood and Robert Zatorre (henceforth, BZ);²⁰ and, on the other hand, on the behavioral/observational/self-report experiments reported in 2007 by Vladimir Konečni, Rebekah Wanic, and Amber Brown (henceforth, KWB).²¹

Thrills are an archaic physiological response of short duration to aesthetic (and other) stimuli, usually consisting of piloerection on the back of the neck and shivers down the spine. The response can be reported by participants with a high degree of reliability (validated by peripheral physiological measurement and observation).²² Since Goldstein's survey and pharmacological study, there has been a considerable amount of work on Thrills induced by music;²³ in addition (in the work by KWB), stories, paintings, and architectural objects in combination with music (including instrumental versions of national anthems) have been examined as possible induction stimuli.

In the KWB experiments, it was demonstrated that Thrills could be reliably and predictably induced in U.S. college students by music carefully chosen by the experimenters: in 40 percent of the participants by, for example, the final portion of Rachmaninoff's Piano Concerto no. 2 in C minor, op. 18, and by the U.S. national anthem (a significantly greater proportion than in the various control conditions, including the Australian anthem). However, Thrills to music could not be primed by prior Thrills that had been induced by other music (and stories). In addition, the experience of Thrills had no impact on a number of measures (mood, altruistic inclinations) that should have been affected if the Thrills experience was psychologically and emotionally significant. Therefore, one could conclude that although Thrills may often serve as the *physiological platform* for profound aesthetic experiences, they are fleeting events and can hardly—in and of themselves—be considered a *genuine emotional response*.

The question then arises: how can this conclusion be reconciled with BZ, who refer to Thrills as “intensely pleasurable responses to music” in the very title of their article? My proposed answer, which the arguments and methodological considerations that follow are meant to justify, involves a causal path that leads from physiological effects (that include Thrills) to the *emotional state of Being-Moved*—via the associative networks and other mediators, such as imagery, that are unique to individual listeners. My contention is that BZ's participants were not experiencing merely Thrills (as was the case in the KWB study), but were also *moved* by the music.

A close inspection of procedural details in the BZ and KWB studies supports such a conclusion. Whereas KWB intentionally drew participants from the general (student) population, BZ used musicians, who were “selected on the basis of their reports of frequent, reproducible experiences of chills

in response to certain pieces of music" (BZ, 11818). Whereas KWB relied on pretesting and "imposed" music selections on their participants, the BZ participants themselves "selected one piece of music [instrumental, classical genre] that consistently elicited intensely pleasant emotional responses, including chills [in them]" (11818; in other words, *more than chills*). For each participant, BZ used a unique ninety-second excerpt, "including the section that [had previously reliably] elicited chills [in that participant]" (11819) in the imaging study (positron emission tomography, or PET, was employed). It is therefore likely that BZ's participants subjectively experienced the *more profound and consequential Being-Moved state—in addition to Thrills*.

The notion that BZ's participants reached the state of Being-Moved by virtue of individual associations with past emotional events is supported by the fact that in the BZ experiment, each participant's powerful, Thrill-inducing music selection served as *another participant's neutral control piece*, and that "chills were never reported for control [pieces]" (11820).²⁴ Furthermore, BZ state that they have statistically verified that the effects of Thrills induced by each participant's own piece on the increases in cerebral blood flow (CBF) in the left ventral striatum and dorsomedial midbrain and decreases in CBF in the right amygdala were "not simply due to differences in attention, familiarity, or acoustic features between subject-selected and control music" (11821).

The BZ statement that acoustic features of the pieces and any differential familiarity with them could not account for the effects supports the conclusion that participants' private and individualized mental associations must have been responsible. However, surprisingly, BZ explicitly state: "Subjects reported that their emotional responses were intrinsic to the music itself, producing minimal personal associations and/or memories" (11819). This BZ contention, based apparently on unverified reports, is in sharp disagreement not only with the previous methodological analysis but also with Avram Goldstein's and Nikki Rickard's empirical findings.²⁵ Moreover, if the acoustic features, familiarity, and personal associations are all eliminated, one must wonder what precisely BZ had in mind when they wrote of Thrills as "responses . . . intrinsic to the music itself" (11819).

Only two possibilities remain. One is that there existed a set of interactions between the subjective preferences and structural features (untapped by the acoustic analysis) in one's own versus others' pieces. This explanation is weakened by the fact that all participants were musicians, but it cannot be eliminated altogether. The second, a more likely alternative, and theoretically quite an interesting one, is that in the BZ experiment, the first chords of the participants' often-heard piece acted as a powerful classically conditioned stimulus for the induction of "uniquely their own" Thrills. KWB's data show that for many people their national anthem has precisely such an effect. In other words, the entire personal associative context of the musi-

cal piece may be condensed as a classically conditioned stimulus for Thrills induction.

In summary,

- (1) As shown by KWB, Thrills may be elicited in people by music not of their choice, but in order for participants to reach the more profound state of Being-Moved, one must resort, as BZ and Rickard did, to special populations and procedures.
- (2) It seems likely that BZ participants' Being-Moved state (not merely Thrills) correlated with CBF changes "in brain regions implicated in reward and emotion" (11818). Other evidence indicates that Being-Moved has some characteristics of emotions but can be distinguished phenomenologically from the *basic* emotions, such as joy, sadness, anger, and fear.
- (3) Indeed, there exists no evidence in the BZ experiment for the basic emotions to have been induced. The correlation of the occurrence of Thrills with increased CBF in brain regions "thought to be involved in reward/motivation, emotion, and arousal, including ventral striatum, midbrain [and] amygdala" (11818) does not point either to the basic emotions as a category nor to a particular basic emotion.
- (4) In fact, BZ do not provide any evidence of what their participants subjectively experienced while listening to music in the experiment. Any even remotely relevant information about music enjoyment was limited to that obtained in the recruitment procedure. But this seems too informal and indirect to justify the insertion of the phrase "intensely pleasurable responses" into the title of BZ's article. Prior to the experiment, the participants knew which music was likely to induce Thrills in them, but that music may have been associated with numerous important *nonmusical* events on the previous listening occasions—and this was unfortunately left unexplored by BZ.

As for the experiment itself, there is a low-probability alternative to the Being-Moved explanation: it is possible that Thrills and the correlated CBF fluctuations were in fact produced by the classical-conditioning effects (described above), with participants' *actual experience* during brain imaging relatively *free of aesthetic enjoyment*.

In conclusion, although imaging results can supply certain general information on brain-area involvement, they cannot replace introspection and carefully obtained reports of participants' *aesthetic experience*.²⁶ Moreover, the unjustifiably assured or sweeping tone of some neuroscientific statements contributes to their being erroneously represented in both philosophy and psychology as favoring one or another theoretical position when in fact most imaging findings are far too crude to be relevant in the resolution of subtle disputes among positions and arguments (for example, in the areas of emotion and aesthetic experience).

5. The Concept of “Aesthetic Episode”

Empirical psycho-aestheticians do not differ from philosophers of art in recognizing the importance of studying the pinnacles of achievement in various art forms and their effects on knowledgeable connoisseurs who consistently approach art in a canonical manner. In addition to this approach, however, psycho-aestheticians wish to contextualize aesthetic experience and delve into myriad contemporary aesthetic encounters involving people with different backgrounds and from various walks of life, who have a very broad range of strongly held aesthetic preferences.

In this endeavor both works of art and aesthetic experience need to be generously defined. The study of *mundane aesthetic encounters* recognizes that for a very large proportion of people, the frequency of engagement with the pinnacles of art in any traditional sense is exceedingly low and that in many contemporary contexts, the new appreciation modes may be vastly different from the canonical or normative.²⁷

Especially in the domain of music, the more-or-less active listening has become fully embedded in the stream of daily life of ordinary appreciators—and yet aesthetic preference and choice are often treated in conceptual statements as if they, and the process of appreciation, occur in a social, emotional, and cognitive vacuum. In contrast, one can propose that a thorough understanding of aesthetic behavior cannot be achieved without examining how it changes as a function of its immediate social and nonsocial antecedents, concurrent cognitive activity, and resultant emotional states.²⁸

In order to acknowledge these ideas explicitly and stimulate a broader approach to psycho-aesthetic research, one needs to expand the concept of aesthetic experience into that of a *contextualized aesthetic episode*. Such episodes are conceived as often mundane, but aesthetically relevant, sequences that occur to ordinary people with considerable frequency. They are socio-emotional units, with behavioral implications, in which the central place is occupied by a person’s (appreciator’s) *aesthetic choice*—an observable behavior by which a person selects one of the available aesthetic options.

In psycho-aesthetic experiments the alternatives are usually arranged to differ on theoretically significant dimensions, such as novelty, complexity, meaningfulness, incongruity, distortion, abstraction, and other, relatively straightforward dimensions. However, the options that are made available to research participants can also be considerably more sophisticated and designed specifically to accommodate the intricacies of the research problem in question.

The model of a prototypical aesthetic episode is presented in figure 1.²⁹ In the model, aesthetic episodes are regarded as recursive events that take place while appreciators participate in a continuous exchange with their

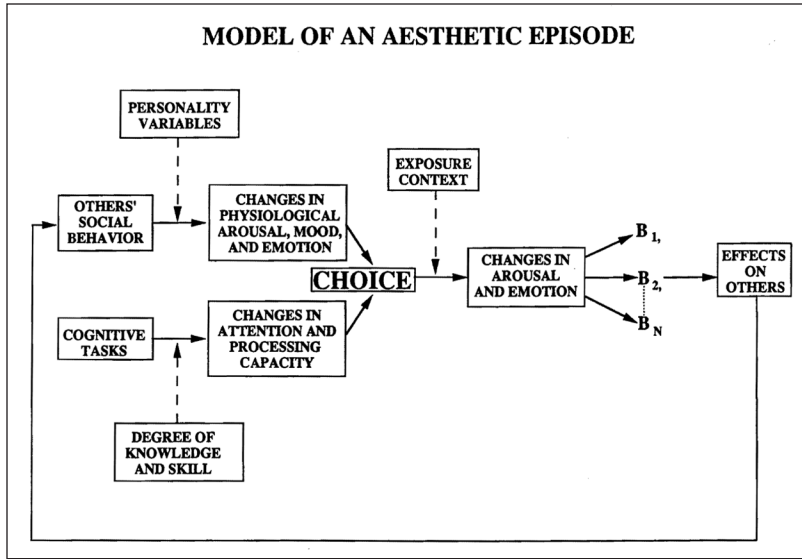


Figure 1. Model of a prototypical aesthetic episode. Letters $B_1, B_2 \dots B_N$ indicate different available behavioral alternatives (including those that are aesthetically relevant). Note the socio emotionally mediated feedback loop suggesting the possibility of recursive aesthetic episodes.

social and nonsocial environment, of which aesthetic stimuli are a significant part. The social behavior of others—I am referring to the ordinary, everyday behaviors that are unambiguously interpreted as indicating support, love, or antagonism—is assumed to have an important effect on a person’s emotional state, which in turn affects aesthetic choices that a person will make in a given situation. The clearest examples of this come from music, in which one can also observe the influence on aesthetic choice of the preceding and concurrent cognitive factors, such as attention and the available processing capacity.³⁰

The degree of enjoyment of the chosen alternative presumably to some extent varies as a function of the concurrent social and nonsocial micro-environmental conditions, which may affect the probability of a particular artwork being chosen again in the future. Exposure to artworks is further assumed to produce changes in appreciators’ emotional states and thereby affect their behavior toward others. And since social behavior is by definition interactive, it is safe to assume that others’ behavior toward appreciators will, in turn, also change—leading to a further modification in appreciators’ emotional states and possibly to new and different aesthetic choices. The model in figure 1 therefore contains a feedback-loop feature representing

the ongoing nature of a person's interaction with the social and aesthetic environment and the recursiveness of aesthetic episodes.

The context (conceptual and phenomenological) in which the choice among aesthetic alternatives has been placed in the model in figure 1 is sufficiently multifaceted for the model to have heuristic value, in the sense that a considerable amount of research on the various links among the model's components has already been stimulated, especially in the area of music. However, a discussion of such studies exceeds the scope of this article.

6. Concluding Remarks

Empirical psycho-aesthetics, an interdisciplinary field with a long tradition, was approached in this article from two directions. One is definitional and organizational (part I of the article, in the Winter 2012 issue of *JAE*), while the other (part II, here) is concerned with the variety and scope of research areas and techniques. Throughout both parts of the article, substantive as well as methodological issues were addressed.

Part I contained a discussion of the problematic relations of empirical psycho-aesthetics with her "sisters"—the neighboring fields of research and scholarship, including several emerging ones. These are problems that have been compounded by the disorderly nomenclature of the various domains of expertise (often imprecise, sometimes illogical). At present, three of the key interdisciplinary issues seem to be these:

- (1) There is an awkward relationship between empirical psycho-aesthetics and philosophical aesthetics, with roots in mutual distrust and occasional disrespect, which are based on inadequately detailed knowledge by each side of the other and driven by practices, some of which can be described as less than rigorous, also on the part of both sides.³¹
- (2) Relations between philosophical aesthetics and the neuroscience of art are also strained; they are adversely affected by the growing pains and excesses of neuroaesthetics and by the mixture of (a modicum of) panic and (inordinate) enthusiasm on philosophy's part. And, finally:
- (3) As a cumulative result of the preceding points, there is a certain degree of ambivalence that is displayed by philosophical aestheticians with regard to how to position themselves toward empirical work—some of which is no longer only *ante portas* but inside the gates (for example, as "experimental philosophy")—which is accompanied by these scholars' occasional puzzling errors concerning the true methodological origins of some of the empirical research they most praise. The detailed and hopefully evenhanded discussion (in part I of this article) of various controversies and debates, including several very recent ones, attempts to contribute constructively to the resolution of some of the problems.

The content of part II is one of many possible illustrations of the impressive breadth of empirical psycho-aesthetics with regard to art domains, topics, methods, experimental procedures, kinds of research participants, and techniques of stimulus manipulation and measurement. In order to describe the ins and outs of psycho-aesthetic research in some detail, much of the research chosen for inclusion was carried out in one laboratory: the intention was to enrich the description by capitalizing on close-range, hands-on, familiarity. A complementary goal was to show the variety of topics in aesthetics that can be addressed by multiple methods, a great variety of methods, in fact. Finally, the research topics that were chosen for presentation allowed that the dialogue with philosophical aesthetics and neuroaesthetics, begun in part I, be fruitfully continued in the various sections of part II.

It is difficult to chart the optimal course in interdisciplinary fields. Empirical psycho-aesthetics is sometimes described as “fragmented,” but this is an indictment made by scholars who have (insufficiently thought-through) visions of a unifying theory that others (myself included) believe is a mirage in aesthetics. Empirical psycho-aesthetics can best help advance the common field of aesthetics by exploring a wide range of appreciators, aesthetic objects, and locales; by developing precise, medium-scale theoretical models; and by further increasing its methodological sophistication.

Notes

1. This section draws on the following (and other) papers: Vladimir J. Konečni, “Elusive Effects of Artists’ ‘Messages,’” in *Cognitive Processes in the Perception of Art*, ed. W. R. Crozier and A. J. Chapman (Amsterdam: Elsevier, 1984); Heidi Gotlieb and Vladimir J. Konečni, “The Effects of Instrumentation, Playing Style, and Structure in the *Goldberg Variations* by Johann Sebastian Bach,” *Music Perception* 3 (1985): 87–102; Mitchell Karno and Vladimir J. Konečni, “The Effects of Structural Interventions in the First Movement of Mozart’s Symphony in G Minor K. 550 on Aesthetic Preference,” *Music Perception* 10 (1992): 63–72; Vladimir J. Konečni and Mitchell Karno, “Empirical Investigations of the Hedonic and Emotional Effects of Musical Structure,” *Musikpsychologie* 11 (1994): 119–37.
2. Margaret Livingstone, “Is It Warm? Is It Real? Or Just Low Spatial Frequency?” *Science* 290 (2000): 1299. Also see M. Livingstone, *Vision and Art: The Biology of Seeing* (New York: H. N. Abrams, 2002), 71–73.
3. Lizann Bonnar, Frédéric Gosselin, and Philippe G. Schyns, “Understanding Dali’s *Slave Market with the Disappearing Bust of Voltaire*: A Case Study in the Scale Information Driving Perception,” *Perception* 31 (2002): 683–91.
4. This section draws on Vladimir J. Konečni, “Portraiture: An Experimental Study of the Creative Process,” *Leonardo* 24 (1991): 325–28. See also Irving A. Taylor, “The Nature of the Creative Process,” in *Creativity: An Evaluation of the Creative Process*, ed. P. Smith (New York: Hastings House, 1959); and Charles A. Tijus, “Cognitive Processes in Artistic Creation: Toward the Realization of a Creative Machine,” *Leonardo* 21 (1988): 167–72.
5. For a discussion of the preparatory phase in music composition, the distinction between inspiration and insight, and the recent relevant neuroscientific findings

- regarding problem solving, see Vladimir J. Konečni, "Composers' Creative Process: The Role of Life-Events, Emotion, and Reason," in *Musical Imaginations: Multidisciplinary Perspectives on Creativity, Performance, and Perception*, ed. David J. Hargreaves, Dorothy E. Miell, and Raymond A. R. MacDonald (Oxford: Oxford University Press, 2012).
6. Examples of many of the problems can be seen in Roe's study of twenty living painters; see Anne Roe, "Painters and Painting," in *Perspectives in Creativity*, ed. J. A. Taylor and J. W. Getzels (Chicago: Aldine, 1975).
 7. There is at least one exception to this generalization—the seventy-five-minute film *Le Mystère Picasso* (1956), directed by H.-G. Clouzot, with cinematography by Claude Renoir. In the film, Picasso, at seventy-five, created some twenty black-and-white sketches and color paintings in real time.
 8. Many of these theoretical issues were addressed by E. H. Gombrich in *Art and Illusion: A Study in the Psychology of Pictorial Representation* (Princeton, NJ: Princeton University Press, 1960).
 9. W. P. Seeley, "The Science of Art Is as Relevant to the Philosophy of Art as Artistic Representations Are to Science: A Reply to Roger Seamon," *Newsletter of the American Society for Aesthetics* 31, no. 3 (2011): 6–7.
 10. Alexander G. Baumgarten, *Aesthetica* (Frankfurt an der Oder: J. Ch. Kleyb, 1750–1758; also Hildesheim: G. Olms, 1961); Adolf Zeising, *Neue Lehre von den Proportionen des menschlichen Körpers* [*A New Theory of the Proportions of the Human Body*] (Leipzig: R. Weigel, 1854); A. Zeising, *Der goldne Schnitt* [*The Golden Section*] (Halle: Leopoldinisch-Carolinische Akademie, 1884); G. T. Fechner, "Über die Frage des goldnen Schnitts" ["On the Question of the Golden Section"], *Archiv für die zeichnenden Künste* 11 (1865): 100–12.
 11. M. Borissavlievitch, *The Golden Number and the Scientific Aesthetics of Architecture* (London: Alec Tiranti, 1958); Charles Bouleau, *The Painter's Secret Geometry: The Study of Composition in Art* (London: Thames and Hudson, 1963); Le Corbusier [C. E. Jeanneret-Gris], *Modulor* (London: Faber and Faber, 1954).
 12. For an early review, see C. D. Green, "All That Glitters: A Review of Psychological Research on the Aesthetics of the Golden Section," *Perception* 24 (1995): 937–68; and for a recent mathematical treatment of GS and the related proportions, see David Navon, "The Sisters of the Golden Section," *Perception* 40 (2011): 705–24.
 13. The article draws on the following papers by Vladimir J. Konečni: "The Vase on the Mantelpiece: The Golden Section in Context," *Empirical Studies of the Arts* 15 (1997): 177–208; "The Golden Section in 20th-Century Paintings," *Proceedings of the International Conference "20th-Century Art: Traditions, Achievements, Innovations,"* held at the Ermitage Museum, Sankt-Peterburg, Russian Federation, 1999; "The Golden Section in the Structure of 20th-Century Paintings," *Rivista di Psicologia dell'Arte* (Nuova Serie) 22 (2001): 27–42; (with Laney E. Cline) "The 'Golden Woman': An Exploratory Study of Women's Proportions in Paintings," *Visual Arts Research*, 27 (2001): 69–78; "The Golden Section: Elusive, but Detectable," *Creativity Research Journal* 15 (2003): 267–76; and "On the 'Golden Section,'" *Visual Arts Research* 31 (2005): 76–87.
 14. Rudolf Arnheim, *Art and Visual Perception* (Berkeley: University of California Press, 1974); Kurt Koffka, *Principles of Gestalt Psychology* (New York: Harcourt, Brace and World, 1935).
 15. E. J. Webb, D. T. Campbell, R. D. Schwartz, and L. Sechrest, *Unobtrusive Measures: Nonreactive Research in the Social Sciences* (Chicago: Rand McNally, 1966).
 16. P. J. Locher and Y. Nagy, "Vision Spontaneously Establishes the Percept of Pictorial Balance," *Empirical Studies of the Arts* 14 (1996): 17–31; I. C. McManus, D. Edmondson, and J. Rodger, "Balance in Pictures," *British Journal of Psychology* 76 (1985): 311–24.
 17. V. S. Johnston, "Female Facial Beauty: The Fertility Hypothesis," *Pragmatics and*

- Cognition* 8 (2000): 107–22; D. Singh, “Adaptive Significance of Female Physical Attractiveness: Role of Waist-to-Hip Ratio,” *Journal of Personality and Social Psychology* 65 (1993): 293–307.
18. Shin’ichi Hisamatsu, *Zen and the Fine Arts* [trans. from Japanese by G. Tokiwa] (Tokyo: Kodansha International, 1958/1971).
 19. Vladimir J. Konečni, “The Aesthetic Trinity: Awe, Being Moved, Thrills,” *Bulletin of Psychology and the Arts* 5 (2005): 27–44; V. J. Konečni, “Does Music Induce Emotion? A Theoretical and Methodological Analysis,” *Psychology of Aesthetics, Creativity, and the Arts* 2 (2008): 115–29; V. J. Konečni, “Aesthetic Trinity Theory and the Sublime,” *Proceedings of the European Society for Aesthetics* 2 (2010): 244–64, with the revised version in V. J. Konečni, “Aesthetic Trinity Theory and the Sublime,” *Philosophy Today* 55 (2011): 64–73.
 20. Anne J. Blood and Robert J. Zatorre, “Intensely Pleasurable Responses to Music Correlate with Activity in Brain Regions Implicated in Reward and Emotion,” *Proceedings of the National Academy of Science* 98 (2001): 11818–23; incidentally, these neuroscientists do not use the term “neuroaesthetics.”
 21. Vladimir J. Konečni, Rebekah A. Wanic, and Amber Brown, “Emotional and Aesthetic Antecedents and Consequences of Music-Induced Thrills,” *American Journal of Psychology* 120 (2007): 619–43.
 22. See Konečni, “Aesthetic Trinity,” 36, and KWB (in note 21).
 23. For some examples of research on Thrills, see Avram Goldstein, “Thrills in Response to Music and Other Stimuli,” *Physiological Psychology* 8 (1980): 126–29; Jaak Panksepp, “The Emotional Source of ‘Chills’ Induced by Music,” *Music Perception* 13 (1995): 171–207; and Nikki S. Rickard, “Intense Emotional Responses to Music: A Test of the Physiological Arousal Hypothesis,” *Psychology of Music* 32 (2004): 371–88.
 24. The finding reported by BZ (see note 20) that not one of their participants experienced Thrills to the objectively powerful pieces chosen by other participants is not in agreement with the literature; cf. Panksepp’s studies (see note 23).
 25. Goldstein, “Thrills in Response to Music,” 127; Rickard, “Intense Responses to Music,” 384.
 26. On this point, see Vladimir J. Konečni, “Music, Affect, Method, Data: Reflections on the Carroll versus Kivy Debate (forthcoming in *American Journal of Psychology*).
 27. For an early treatment of these issues, see Vladimir J. Konečni, “Determinants of Aesthetic Preference and Effects of Exposure to Aesthetic Stimuli: Social, Emotional, and Cognitive Factors,” in *Progress in Experimental Personality Research*, vol. 9, ed. Brendan A. Maher (New York: Academic Press, 1979).
 28. Vladimir J. Konečni, “Social Interaction and Musical Preference,” in *The Psychology of Music*, ed. Diana Deutsch (New York: Academic Press, 1982).
 29. The diagram is from Vladimir J. Konečni, “Interactive Effects of Music and Visual Art in Different Emotional States,” *Proceedings of the 3rd Congress of the European Society for the Cognitive Sciences of Music*, 22–25, Université de Liège, Belgium, 1994.
 30. Vladimir J. Konečni, “The Influence of Affect on Music Choice,” in *Music and Emotion: Theory, Research, Applications*, ed. Patrik N. Juslin and John A. Sloboda (Oxford: Oxford University Press, 2010).
 31. See Konečni, “Music, Affect, Method, Data.”