

Empirical Psycho-Aesthetics and her Sisters: Substantive and Methodological Issues*

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ABSTRACT. Empirical psycho-aesthetics – an interdisciplinary field with a long tradition – is approached in this article from two directions, in each case with several objectives in mind. The first direction is definitional and organizational: the objectives are to present an outline of the field's origins; to discuss its attributes vis-à-vis the features of several "sister disciplines" – experimental philosophy, (cognitive) neuroscience of art, and neuroaesthetics; and to examine, in part through an analysis of notable in-field and cross-field recent debates (some of them heated, all instructive), a number of substantive, methodological, and science-practice issues regarding these various disciplines. Throughout, the concerns of philosophical aesthetics are very much represented in the discussion. The second direction is empirical: the objectives are to illustrate – on the basis of a detailed presentation of five groups of research studies in a variety of art domains – the broad range of psycho-aesthetic topics, methods, participants, and techniques of stimulus manipulation and measurement; and to use the presented research for the purpose of resuming a constructive dialogue with philosophical aesthetics and neuroaesthetics.

The article has three related objectives. The first is to examine a number of key substantive, methodological, and science-practice issues that concern the field of empirical psycho-aesthetics. The second is to present an outline of its origin and discuss certain important features of several

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related fields – experimental philosophy, cognitive science and art, (cognitive) neuroscience of art, and neuroaesthetics; in part, this will be accomplished through an analysis of several recent significant controversies. Together, these two objectives constitute Part I (with six sections). In Part II (five sections, the third objective), empirical work on various problems that are relevant to the previously initiated discussion is described in some detail (much of the research is from my psycho-aesthetic laboratory). Brief conclusions are presented in Part III (one section, for a total of twelve). With regard to my own theoretical, research, and methodological work, the origin of this article can be traced to a position paper written in 1997.¹ At the time, the neuroscience of art and music was in diapers, but already seeking attention.

Part I — An Overview of Empirical Approaches to Aesthetics

1.1. Empirical Aesthetics Is in Fact Empirical Psycho-Aesthetics

Empirical aesthetics has existed for some 150 years. Its origin is in the work of the University of Leipzig Professor Gustav Theodor Fechner (1801–1887), who thought of it as a new "aesthetics from below." Along with Wilhelm Wundt and Hermann von Helmholtz, Fechner was a founder of experimental psychology and, specifically, of one of its subfields, psychophysics – in which he is credited with the demonstration of the non-linear relationship between the physical intensity of a stimulus and the corresponding psychological sensation. His generalizations were (a) that because certain phenomena of mind were quantifiable, experimental psychology could become a genuine science and (b) that this also implied the possibility of measurement of certain aesthetic phenomena.² Fechner essentially positioned aesthetics from below as a rival to Immanuel Kant's

¹ Vladimir J. Konečni, "Empirical Psycho-Aesthetics: On the Trade-Offs Among Art Theory, Psychological Theory, and Methodological Concerns." Keynote Address at the 32nd Annual Conference of the Australian Psychological Society, Cairns, Queensland, October 1997 [1997a.]

² G. T. Fechner, *Vorschule der Ästhetik* [*Elementary Aesthetics*] (1876).

aesthetics that was based exclusively on the so-called armchair speculation.

Not only in its origin, but also to this day, empirical aesthetics has for all purposes been a branch of empirical psychology, one of its two oldest branches. There is an active body called International Association of Empirical Aesthetics (IAEA) with many hundreds of members worldwide, very few of whom are philosophers (or, for that matter, neuroscientists, with or without the "cognitive" prefix). Most of the practitioners for at least the last fifty years have been psychologists-aestheticians, who have carried out empirical work on questions of aesthetics and the arts – by experimentation (in the laboratory and various "field" locations), by using surveys and self-reports, by measuring artworks in various ways, and by conducting historiometric analyses on archival data. On the IAEA web site, one reads that it "was founded [by Daniel E. Berlyne and Robert Francès] as a union of psychologists who investigate the underlying factors that contribute to an aesthetic experience, as well as aesthetic behaviors, using scientific methods." Members interested in the aesthetics of music have always constituted a (small) minority and usually belonged to music-psychology associations in addition to IAEA.

Addressing the breadth of the field, the description on IAEA's web site continues: "[Included] are studies into to the human capacity to perform aesthetic judgements, to be creative and to receive aesthetic stimuli of a great amount of different fields: music, poetry, paintings and other visual arts, dance [and] new forms of aesthetics [such] as video and computer-animated displays." However, as, or more, important than the considerable breadth is the question of methodology. According to IAEA: "As to scientific methodology, all those methods used in the experimental psychological and empirical social sciences are among the approaches valid for research in the arts and related fields."

In practice, this amounts to all the techniques of observation, stimulus manipulation and presentation, and measurement (at all levels of sophistication, detail, and complexity) known and available to members of any decent *experimental psychology department*. This involves – as a minimum – laboratories in visual and auditory psychophysics, those of various branches of cognitive psychology (such as perception and psycho-linguistics), and social-psychological laboratories (those devoted to the research on emo-

tions, psychophysiology, and music, as well as to observation of different forms of behavior, including those relevant to aesthetics – artists at work, research participants observing art stimuli). In such an experimental psychology department (mine is an example), there are typically no philosophers (even of science) and no non-experimenting theoreticians (psychologists in the area of judgment and decision-making, and even those in mathematical psychology, typically also do research with human participants). Cognitive neuroscientists have been joining in the past 15 years, but brain-scanning machines are located elsewhere on campus. As of this writing, imaging is not a part of an experimental psychologist's research arsenal, nor are average undergraduates trained in scanning techniques.

What I am maintaining is that the entire described range of instruments and techniques – from those used in visual psychophysics, via those in perception and psychophysiology, to those required for the presentation of visual stimuli to both laypeople and artists (and the recording of their creative behavior) – supports the *psychological* approach to aesthetics and the arts. These are instruments and techniques known to most experimental psychologists, whether or not they are interested in aesthetics. The procedures and the type of data emanating from them are known to them all. They discuss them in departmental colloquia and evaluate various job candidates and each other's graduate students using such procedures.

When I move to the discussion of the related areas mentioned at the beginning of the article, it will become clear why I consider it useful to outline at the outset the full range of experimental-psychology instruments and techniques. For the moment, all I wish to conclude is that the preponderance of the evidence indicates that *empirical aesthetics is in fact empirical psycho-aesthetics* and ought properly to be thus called. The purpose is not "turf defense" or capricious re-naming, but rather my belief that the clear specification of origin and method will make possible a dispassionate choice among competing claims when those arise in the subsequent sections.

1.2. Experimental Philosophy Is in Fact Empirical Philo-Aesthetics

A recent arrival on the scholarly scene has been "experimental philosophy (of art)" – a term that I would claim is a misnomer. Philosophers of

all people know what an experiment is supposed to entail, including as a minimum the manipulation of variables, random assignment of participants, hypothesis testing, and obtaining criterion measures. This is not what the practice in the experimental philosophy of art has tended to be. Most of the work has been restricted to some type of measurement, for example, of base-rates of some phenomenon of aesthetic interest in a sample (rarely representative or random) of respondents. Such data collection, though potentially valuable, is not an experimental procedure and the term empirical philosophy of art would be more appropriate.

Furthermore, because there is an incomplete overlap between "philosophy of art" and "philosophical aesthetics," and the work so far has included domains such as natural locales and industrial design, which, at times, can be devoid of artistic pretensions or interest, but can nevertheless be analyzed from an aesthetic standpoint, it would be more accurate to designate the emerging field as *empirical philo-aesthetics*.

It is easy to imagine collaboration in this area. For example, when a philosopher-aesthetician suspects that his *Gedankenexperiment* can be turned into a feasible real-world study, or she becomes reluctant to use philosophers' excessively malleable "we" and wishes to obtain actual base-rate data on the existence of an aesthetic phenomenon, why not find a collaborator among the experimental psychologists interested in aesthetics, instead of learning the nuts and bolts of research procedures, design, and statistics? Of course, skeptics about the usefulness of any research among philosophers, and skeptics about the usefulness of any armchairs among experimental psychologists, will not be easily convinced that something worthwhile can come from such collaborations.

1.3. Empirical Psycho-Aesthetics Is Not "Cognitive Science"

Experimental psychology is not "cognitive science." There are many areas within experimental psychology that are not primarily concerned with cognition; and while there are important parts that are – cognitive psychology, cognitive development, psycho-linguistics, to name a few – cognitive science is, of course, far broader and includes practitioners and contributions from many disciplines, from anthropology and ethology to computer

science and neurology. For example, when the Cognitive Science Department was set up at my university in 1986, one of the first in the world, the specializations of the founding faculty who migrated from other departments reflected this breadth.

It follows that empirical psycho-aesthetics is also not "cognitive science." This means that when philosophers of art talk of "cognitive science of art" or "science of art" – without mentioning empirical aesthetics, let alone empirical psycho-aesthetics – they are, in effect, excluding from consideration those results that have been obtained by the mentioned psycho-aesthetic methods and techniques. This is the necessary conclusion, on the assumption that my account to this point has been convincing and that these philosophers, in fact, do think seriously beyond mere names – to methodology and the conceptual core and scope. The error may be one of carelessness or of a lack of familiarity with scientific methodology, but in either case it is unfortunate. Or it may be that by cognitive science of art some philosophers actually mean cognitive neuroscience of art or even neuroaesthetics – but those terms raise further issues that will be discussed later.

For the moment I will stop briefly to give just one example. In a recent issue of the *Newsletter of the American Society for Aesthetics*, the philosopher W. P. Seeley wrote a widely discussed piece in the form a scholarly article with the title "What is the Cognitive Neuroscience of Art... and Why Should We Care?"³ In the following issue, the philosopher Roger Seamon responded; his very first sentence reads: "The science of art is as relevant to art as artistic representations are to science."⁴ Note that both "cognitive" and "neuro" in Seeley's title were casually omitted by Seamon (for the sake, presumably, of a better-sounding, but a factually dubious, analogy). More importantly, Seamon immediately went on to address some problems discussed by E. H. Gombrich in *Art and Illusion* as pertaining to "science of art" – without, at least overtly, realizing that the issues in question are perceptual, deeply psychological, and, specifically *psycho-aesthetic* ones. (In section II.3., I shall describe some research that demonstrates how Seeley himself contributed to the confusion, both in his initial article

³ W. P. Seeley, 2011.

⁴ R. Seamon, "A Response to W. P. Seeley, 'What Is the Cognitive Neuroscience of Art... and Why Should We Care?'" , 2011.

and in his response to Seamon.)

1.4. Neuroscience of Art (Neuroaesthetics) Is a Branch of Empirical Aesthetics

Neuroscience of art is at most some fifteen years old. Its core attribute is the reliance on a particular new research methodology: brain imaging. After Raymond Damadian created the first nuclear magnetic resonance imaging (NMRI) machine in 1972, and the setting up around 1980 of MRI machines in medical centers (by then without the "nuclear" that scared patients), *functional* MRI soon followed in the 1990s – after the discovery of the blood-oxygen-level-dependent (BOLD) contrast by Seiji Ogawa. In research, by imaging the *change* in blood-flow oxygenation (hemodynamic response) related to the energy use by brain cells, neural activity could be mapped in participants (confined to scanning machines) in response to stimuli presented visually or auditorily. Because of the comparative (only comparative!) ease of use, fMRI has dominated brain-mapping research. It is often combined with the obtaining of peripheral physiological measures and sometimes with other imaging techniques, such as EEG and MEG (electroencephalography, magnetoencephalography). After mature experimental psychologists and cognitive scientists had gradually acquired the basics of brain scanning in tutorials (often learning about the pitfalls the hard way, like any other students), perceptual-cognitive research flowed in abundance – and it is probably fair to say that the problems of art and aesthetics came at the tail end of that research.

Once one ignores the media-promoted "brain vogue," it is easier to realize that the neuroscience of art (with or without the "cognitive" prefix) is fully *dependent on method*: It has no store of knowledge unique to it as an art discipline. Moreover, like all methods, imaging has serious limitations: Respondents need to be stationary and solitary; the length of sessions is limited by the discomfort of confinement in the scanner; and many brain areas have multiple responsibilities (needless to say). Noting that the presentation of a stimulus had an effect in a brain area that is "also responsible" (usually with an unknown degree of certainty) for some "other phenomenon of interest" is the type of *correlational* information that has

led many incautious neuroscientists, psychologists, and philosophers to commit elementary inferential fallacies.

Before turning to some telling reactions to the neuroscience of art by the "non-neuro" aestheticians, I shall devote a few words to the term "neuroaesthetics." Seeley, who prefers the term "cognitive neuroscience of art," says this: "I am often surprised by the degree to which the folks I interact with on the neuroscience side of these endeavors are committed to a core aestheticism. In this regard the term 'neuroaesthetics' isn't just a name. It reflects an ideological bias about the nature of art. And this is a sticking point."⁵

Analogous remarks have been made by John Hyman and James Croft (to whom I shall return) and it is easy to agree with these philosophers' opposition to what may be described as the "fundamentalist" version of the neuroscientific epistemic stance.

1.5. Some Reactions to the Neuroscience of Art by Philosophical Aestheticians

There is no doubt that most experimental psychologists, including psychoaestheticians, are pleased to receive information about the brain areas that are activated by stimuli for which other measures (e.g., behavioral, self-report, peripheral-physiological) already exist. The addition of information about the central level raises the fascinating possibility of *vertically integrated, multi-level* theories about significant phenomena. But note this key proviso: The addition of data from the higher centers, while very welcome, does not, in any way, diminish the importance of observations of behavioral, self-report, and psychophysiological responses to the stimuli in question; nor can it replace functional theories and phenomenological accounts of *aesthetic experience* – which is, as one has learned from Fechner and seen in the IAEA mission statement, one of the focal concerns of psycho-aesthetics.

Reactions to the neuroscience of art in philosophical aesthetics have varied in both the visual-art and music areas, occasionally being negative or dismissive (sometimes with good reason). Peter Kivy has strongly (and

⁵ Seeley, "What Is the Cognitive Neuroscience of Art?", p. 2.

I believe correctly) criticized Laura Sizer for relying – in her defense of Noël Carroll's position on mood and absolute music – on (in any case only partly relevant) neuroscientific speculations about music processing by Bharucha, Curtis, and Paroo.⁶ In the sharpest (and, again, largely justified) rebuttal to date issued by a philosopher of art to date to a neuroscientist's (or neurologist's, as V. S. Ramachandran prefers) "theory of [visual] art," John Hyman has dismissed the Ramachandran-Hirstein views as the "*Bay-watch* Theory of Art."⁷ Interestingly, Hyman was able to dispute successfully not only Ramachandran's and Hirstein's familiarity with the basics of philosophical aesthetics, but also their use of a specific psychological research finding in animal learning (the peak-shift effect) in building their theory – making his critique more potent and convincing.

Hyman's carefully reasoned criticisms of key ideas in Semir Zeki's *Inner Vision* are milder on the surface, but equally uncompromising. Hyman traces Zeki's statement that "artists are in some sense neurologists, studying the brain with techniques that are unique to them" to a lecture given by Helmholtz in 1871 and concludes, on the basis of a detailed critique, that this is "a very weak idea" if it is to serve as the foundation of a "neurological theory of art... [the] prospect [of which] is utterly implausible."⁸ Hyman provides equally cogent reasons to show why Zeki's notion of "ambiguity" (Hyman prefers "imaginative multiplicity") is only one of many very general attributes, all of which may contribute to "great art" in one situation or another, and each of which, when promoted by itself as the central, is rather disappointing and trivial.

In an article that asks, "Do current attempts to use neuroscience to explore art meet rigorous interdisciplinary quality criteria?," James Croft ap-

⁶ Carroll, "Art and Mood: Preliminary Notes and Conjectures" (2003); Sizer, "Moods in the Music and the Man: A Response to Kivy and Carroll" (2007); Kivy, "Moodology: A Response to Laura Sizer" (2007); Jamshed Bharucha, Meagan Curtis, and Kaivon Paroo, "Varieties of Musical Experience" (2006). For a detailed discussion of the mentioned issues, see V. J. Konečni, "Music, Affect, Method, Data: Reflections on the Carroll v. Kivy Debate" (2013b).

⁷ Hyman, "Art and Neuroscience" (2010), see p. 250; Vilayanur Ramachandran and William Hirstein, "The Science of Art: A Neurological Theory of Aesthetic Experience" (1999).

⁸ Hyman, "Art and Neuroscience," pp. 254, 257, 260; Zeki, *Inner Vision: An Exploration of Art and the Brain* (1999), see p. 10.

plies several sensible standards of interdisciplinary epistemology and concludes that most recent work in neuroaesthetics fails them. Croft approvingly discusses Hyman's critique of Ramachandran and Hirstein, and adds his own highly skeptical view of the value of Zeki's recent musings about Michelangelo's difficulties in realizing "synthetic brain concepts." Having quoted Zeki at length, Croft writes: "Note how little the word 'brain' adds to the above argument. It can happily be removed and the form of the argument is entirely unchanged." But Croft's most scathing comments are reserved for Colin Martindale's "A Neural Network Theory of Beauty." Croft's judgment is that Martindale blends "a thin approach to aesthetics with neuroscience," reaching the (justifiable) conclusion that the "neurological information supplied by Martindale adds practically nothing to our understanding of beauty, the stated goal of the enterprise."⁹

Several comments are in order. First, neuroscience-enthusiasts among philosophers have nevertheless adopted, albeit with some modifications, the "artist as neurologist" view that Hyman criticized and are promoting it as a "general model for a cognitive neuroscience."¹⁰ Second, Anjan Chatterjee has suggested that Hyman's and Croft's critiques were quite properly directed at "speculative science... [that] trades on neuroscience" but that they did not (or should not?) challenge the hands-on neuroaestheticians' work.¹¹ However, as I shall show in section II.4. (in the case of Blood's and Zatorre's 2001 research on "chills" induced by music) even competent hands-on work can fall short of the desirable in how it is interpreted and promoted – both by its authors and others.

⁹ Croft, "The Challenges of Interdisciplinary Epistemology in Neuroaesthetics" (2011) – my quotes are from pp. 5 and 7-8; Zeki, *Splendors and Miseries of the Brain: Love, Creativity, and the Quest for Human Happiness* (2009) – see p. 103; Martindale, "A Neural-Network Theory of Beauty" (2007).

¹⁰ Seeley, "What Is the Cognitive Neuroscience of Art?", p. 1; see also N. Carroll, Margaret Moore, and William Seeley, "The Philosophy of Art and Aesthetics, Psychology, and Neuroscience: Studies in Literature, Visual Arts, and Music" (2012); for their part, Martin Skov and Oshin Vartanian, in stating "[n]ot only do we hope that puzzles in aesthetics can be solved by insights from biology, but that the contribution can be truly bidirectional," seem both to accept implicitly the "artist as neurologist" view and to limit neuroaesthetics to solving "puzzles" (2009), p. 6.

¹¹ Chatterjee, "Where There Be Dragons: Finding the Edges of Neuroaesthetics" (2011).

The third point is that both Seeley (with regard to the work in perception, cognition, and information processing in visual art and music) and Chatterjee (with regard to emotion) vastly understate the fund of knowledge that exists on these topics in empirical psycho-aesthetics, while simultaneously exaggerating the accomplishments and potential of the neuroscience of art.¹² In addition, in the previously mentioned exchange between Seamon and Seeley, one observes multiple examples of a kind of thesis substitution in which the discussion and examples utilize standard psycho-aesthetic concepts and procedures – only for both writers, notably Seeley, to leap to "neuroscientific" claims when time comes for conclusions to be drawn.¹³

What is perhaps more surprising is that Hyman, when discussing the Ramachandran-Hirstein art-is-caricature idea, does not mention the concepts of incongruity and distortion that have been investigated by psycho-aestheticians. Also, when discussing Zeki's notions, Hyman stops at Helmholtz and does not enrich his critique by acknowledging, as an example, the complex relationship between pleasingness and interestingness of artworks (first studied by Daniel Berlyne) when he mentions these dimensions of judgment. Nor does Hyman discuss the impact of stimulus (including artwork) variables (such as complexity, novelty, and good continuity) that are relevant for dealing with ambiguity (or "imaginative multiplicity") in visual illusions – even though there is a store of information on these issues in empirical psycho-aesthetics going back to Rudolf Arnheim (and, again, Berlyne). In fact, a close re-reading of Berlyne's 40-year-old book *Aesthetics and Psychobiology* may be regarded as an urgent task for all of the above-mentioned aestheticians and neurologists.¹⁴

¹² Seeley, "What Is the Cognitive Neuroscience of Art?", p. 2; Chatterjee, "Where There Be Dragons", p. 5.

¹³ Seamon, "A Response to W. P. Seeley" (2011). 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" (2011).

¹⁴ D. E. Berlyne, *Aesthetics and Psychobiology* (1971). One could do much worse than read Berlyne's erudite book by relying on a recent article that ambitiously attempts (in some 16 sections on seven journal pages) to build no less than a "framework for the psychology of aesthetics." Perhaps the title of the final section, "A psychological-aesthetic utopia," is appropriate, given the disproportion between the thinness of the material and the extravagant range of topics – see Thomas Jacobsen, "Bridging the Arts and Sciences: A

After all, Croft, like Hyman, does not acknowledge even the elementary relevant aspects of empirical psycho-aesthetics, which could considerably deepen and broaden his critique of the various neuroscientific culprits that are mentioned. For example, like Hyman, Croft does not seem to realize fully that brain imaging is the methodological tool of the neuroscience of art. And, also like Hyman, Croft does not seem to realize that the end product of imaging – data about the more-or-less specific location of brain activity when certain art stimuli are presented to research participants (locations used for many other activities also) – is *not informative* about the quality of the participant's *aesthetic experience*.

Yet Croft, like almost everyone involved in either philosophical or psychological aesthetics, recognizes the central place of experience in aesthetic investigations (e.g., in the first sentence of his Abstract). Meanwhile, with the help of painstakingly accumulated methodological sophistication in dealing with the various types of participants' *self-report* – *the only currently available gateway to aesthetic experience* available to researchers – empirical psycho-aesthetics can obtain access to private aesthetic episodes as well as is currently humanly possible. An objective observer would, I think, be forced to conclude that the behavior vis-à-vis empirical psycho-aesthetics of the philosophical aestheticians whose views I have presented here is rather odd. I shall resume this discussion in the next section.

1.6. Empirical Psycho-Aesthetics: A Neglected Partner of Philosophical Aesthetics?

The most common sentiment in the long tradition of empirical psycho-aesthetics – one that is prevalent to this day – is hope for cooperation with philosophical aesthetics, or at least as peaceable a division of labor as possible, along obvious lines. Conscientious empirical psycho-aestheticians have labored on the construction of various types of aesthetic stimuli, paying attention, when possible, to ecological-validity issues; they have used multiple methods when this was opportune; they have done what they could for their experimental work not to oversimplify aesthetic objects

Framework for the Psychology of Aesthetics" (2006).

and phenomena; and in a certain, admittedly modest, proportion of cases, they have paid attention to philosophers' concerns.¹⁵

In general, the quiet, steady progress of psycho-aesthetics has been underappreciated in the philosophy of art although, and this is a curious phenomenon, a greater amount of genuine interest could have been shown by philosophical aestheticians even while they remained behind their favorite barricade – that the truly important questions in aesthetics cannot, by definition, be addressed by empirical methods. "Experimental philosophy" has perhaps caused minor discomfort to some philosophical aestheticians, but it is a development that they can gradually accommodate.

The arrival (not to say advent) of the neuroscience of art has been quite a different kind of story. And while empirical psycho-aestheticians, most of whom have psychology as their home department at universities, quickly learned (a) about the potential and limitations of brain imaging, and (b) that this new field tended to be rather loud in the long tradition of emerging fields, many philosophical aestheticians were stunned. They were overwhelmed by the amount of new information that they needed to acquire quickly, impressed by the new method, intimidated by its medical origin, and, above all, shocked by the flash and bombast with which "mere neurologists" each proclaimed *The Scientific Theory of Art*. And not only were people who seemed to know very little about art suddenly pontificating about it, but they had the media at their beck and call each time they said "brain" – which was practically all the time. (It is also interesting to note that some neuroscientists and neurologists are in the habit of saying that "the brain does X" and even that "the brain thinks or feels X," thus giving it an independent status within the person; but that is an old

¹⁵ Occasionally the attention results in excessive humility, perhaps especially undesirable when *artistic value* is at issue. For example, the psychologist Rolf Reber wrote, "[P]hilosophers... define the *criterion* of what the [aesthetic] experience is expected to be [and] psychologists... provide a *test* of whether this criterion is fulfilled," in "Art in Its Experience: Can Empirical Psychology Help Assess Artistic Value?" (2008), p. 367 (italics in the original). The philosophical aesthetician Vincent Bergeron, who has expressed appreciation for the achievements of "empirical aesthetics," disagrees with Reber's proposal of a division of labor and instead advocates full cooperation – see V. Bergeron, "What Should We Expect from the New Aesthetic Sciences?" (2008); see also V. Bergeron and Dominic McIver Lopes, "Aesthetic Theory and Aesthetic Science: Prospects for Integration," in *Aesthetic Science: Connecting Minds, Brains, and Experience* (2012).

and separate philosophical problem.) Figuratively speaking, neuroscientists told the world, standing in front of brain images and scanners, about "The Secret of Beauty" and "Why We Love Music."¹⁶

It is in this context, I think, that one should view the articles by Hyman, Croft, and also, at a more popular level, Raymond Tallis.¹⁷ These articles are a belated, but a justifiably strong, response to excess in the neuroscience of art. It is nevertheless all the more surprising that Hyman and Croft have not imported and assimilated psycho-aesthetic findings in order to enrich their critiques.

Instead, philosophers of art seem to be relieved when they can say something positive about a "neuroaesthetic finding," and the ideal candidate would be one that is straightforward and interesting, yet not threatening or couched in grandiose terms. Margaret Livingstone's research on Mona Lisa's smile fulfills all these criteria.¹⁸

The research is clearly linked to aesthetics and to painting by reference to E. H. Gombrich's discussion of the smile in terms of Leonardo's use of the technique of *sfumato*. Presumably for all these reasons, and restricting myself to philosophers I have already cited, Carroll, Moore, and Seeley in their paper, and Croft and Seeley, respectively, in theirs, all go out of their way to praise Livingstone's Mona Lisa research highly. However, the fact is that her finding is an application of basic vision psychophysics – the type of work one does in a vision laboratory in a psychology department. It could have been obtained long before the birth of neuroaesthetics. And it does not remotely involve brain scanning. Nor does Livingstone mention either neuroaesthetics or imaging in her letter in *Science*. The finding is an issue of perception, spatial resolution, and focus at, or away from, Mona Lisa's mouth. Furthermore, Livingstone's finding would be even more convincing if she formally used research participants to confirm it (which I do not believe she did). But even without the use of participants, Livingstone's Mona Lisa finding clearly belongs to the domain of empirical

¹⁶ See Croft, "The Challenges of Interdisciplinary Epistemology" for related information.

¹⁷ R. Tallis, "The Neuroscience Delusion: Neuroaesthetics Is Wrong About Our Experience of Literature – and It Is Wrong About Humanity" (2008).

¹⁸ M. Livingstone, "Is It Warm? Is It Real? Or Just Low Spatial Frequency?" (2000), p. 1299. Also see Livingstone, *Vision and Art: The Biology of Seeing* (2002), pp. 71-73.

psycho-aesthetics. I shall return to this work in Section II.1.

A somewhat analogous example was recently provided by the philosophical aesthetician Vincent Bergeron. In the same breath (so to speak) with favorably mentioning Vittorio Gallese's (in my opinion, speculative and far-fetched) claims regarding "action simulation" by "mirror neurons" in humans, Bergeron, with equal approval, discusses Jane Davidson's sound research on the contribution of visual information to how research participants evaluate the "expressive intensity" of musicians performing on the violin and piano. Davidson's work is a fine example of empirical psycho-aesthetic research in the area of music performance and has nothing to do with neuroaesthetics; the juxtaposition may give a false impression to the casual reader.¹⁹

Part II — An Overview of Selected Pertinent Research

In the five sections of this part of the article, I shall review groups of research studies – many of them from my own psycho-aesthetic laboratory and involving five different artistic domains – that address various issues raised in Part I. In all cases, the issues subjected to empirical scrutiny are relevant to aesthetic and art theory. In some of them, brain-imaging research would be possible and welcome if it provided the opportunity for vertical theoretical integration. In no cases, however, would some future neuroaesthetic findings make these behavioral (including aesthetic-choice) and verbal (including self-report) findings redundant.

¹⁹ V. Bergeron, "What Should We Expect from the New Aesthetic Sciences?" (2011); J. W. Davidson, "Visual Perception of Performance Manner in the Movements of Solo Musicians" (1993); neuroscientists Istvan Molnar-Szakacs and Katie Overy have extended Vittorio Gallese's speculations further in "Music and Mirror Neurons: From Motion to 'E'motion" (2006); for his part, the aesthetician Tom Cochrane is responsible for an even more speculative extension – in "Expression and Extended Cognition" (2008); recently, his speculations were criticized in detail by V. J. Konečni in "Constraints on Manipulations of Emotions by Music: A Critique of Tom Cochrane's Assumptions" (2012b).

II.1. Empirical Tests of Significant Claims Made by Aestheticians and Artists²⁰

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, manifestoes, and assorted other pronouncements made by aestheticians, art theorists, critics, and artists themselves can bring additional rigor to a field 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 theatregoers. 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 small group of admirers.

With regard to artists, although many 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 the way in which the work of art affects or should affect the audience – and aestheticians and critics take this into account. Decisions that after the fact seem to the public obvious – 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, as opposed to another, place on the stage – reflect the painter's, composer's, writer's, and theatre director's, respectively, belief about their work's optimal impact. Even in the extreme case, when a

²⁰ This section draws on the following (and other) papers: V. J. Konečni, "Elusive Effects of Artists' 'Messages'" (1984); Heidi Gotlieb and V. J. Konečni, "The Effects of Instrumentation, Playing Style, and Structure in the *Goldberg Variations* by Johann Sebastian Bach" (1985); Mitchell Karno and V. J. Konečni, "The Effects of Structural Interventions in the First Movement of Mozart's Symphony in G Minor K. 550 on Aesthetic Preference" (1992); V. J. Konečni and M. Karno, "Empirical Investigations of the Hedonic and Emotional Effects of Musical Structure" (1994).

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 30 experiments in my laboratory, the same straightforward and highly effective research strategy was used in various art domains to evaluate artworld experts' claims. 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 lay people 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 scaling procedures were accompanied by interviews with subsets of participants. Statistical analyses of the results allowed that the accuracy of experts' various claims be systematically evaluated.

The first five groups of studies of this type (described in detail in my articles listed in footnote 20) 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 writing 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 far 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 footnote 20).

Note that Livingstone's work (in *Science*, 2000) on the Mona Lisa smile (that I discussed in Section I.6.) is actually an example of the same psycho-aesthetic research strategy described above (that had been used in my laboratory for a decade after 1982). She started with a popular notion ("the

mysterious smile") and the opinion of an esteemed authority, 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. Livingstone 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-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). 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 Bonnar, Gosselin, and Schyns on Dali's ambiguous (bi-stable) *Slave Market with the Disappearing Bust of Voltaire*.²¹ 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, 10 "naive" research participants, in a between-subjects design.

II.2. Portraiture: Obtaining an Empirical Handle on the Creative Process²²

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 psychomet-

²¹ 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" (2002).

²² This section draws on V. J. Konečni, "Portraiture: An Experimental Study of the Creative Process" (1991); see also Irving A. Taylor, "The Nature of the Creative Process," (1959) and Charles A. Tijus, "Cognitive Processes in Artistic Creation: Toward the Realization of a Creative Machine" (1988).

ric, 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. The observation and measurement of the exact goings-on in the executive phase, despite the great intrinsic interest these events hold for the aesthetician, are usually thwarted by the private and, in some art media, entirely unobservable aspects of the creative process.²³ 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.²⁴ Note that much more than the difficulty of recruitment of the desired top-echelon research participants is in question here: There is 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 to the "Heisenberg principle" in particle physics may be operative.²⁵

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, sometimes 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

²³ 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 V. J. Konečni, "Composers' Creative Process: The Role of Life-Events, Emotion, and Reason" (2012a).

²⁴ Examples of many of the problems can be seen in Anne Roe's study of 20 living painters; see A. Roe, "Painters and Painting" (1975).

²⁵ There is at least one exception to this generalization – the 75-min film *Le Mystère Picasso* (1956), directed by H.-G. Clouzot, with cinematography by Claude Renoir. In the film, Picasso, at 75, created some 20 black-and-white sketches and color paintings in real time.

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.²⁶

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 22 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 10 previously uninvolved judges on dimen-

²⁶ Many of these theoretical issues were addressed by E. H. Gombrich in *Art and Illusion* (1960).

sions 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 purpose of this section was primarily to demonstrate the utility of empirical psycho-aesthetics in studying the creative process, only a few of sentences will be 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.

II.3. Methodological Issues in the Empirical Work on the "Golden Section"

In the exchange (critically mentioned in section I.3.) that Seeley had with Seamon, 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.²⁷ In this section, I shall describe a program of research on the "golden proportion" – as an illustration of psycho-aesthetic reliance on a multi-pronged methodological approach that was used in teasing out the facts of a classical and elusive research issue.

²⁷ Seeley, "The Science of Art... A Reply to Roger Seamon," pp. 6-7.

The golden section (henceforth: GS; $\phi' \cong 0.618\dots$; ϕ is for Phidias) is a proportion that has in various artistic, mathematical, and biomorphological contexts fascinated, for 2,600 years, 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 mid-18th century), Adolf Zeising, who studied GS in some detail in the human body a century later, and, of course, Fechner himself.²⁸ In the 20th century, M. Borissavlievitch, among others, has discussed the pervasive role of GS in aesthetic theory; Charles Bouleau has 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.²⁹

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 (a) non-artistic stimuli (usually geometric shapes), (b) objects presented without an aesthetic context, and (c) non-artists 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.³⁰ The results appeared inconclusive: When an entire issue of a journal of empirical aesthetics was devoted to GS (*Empirical Studies of*

²⁸ A. G. Baumgarten, *Aesthetica* (1750-1758/1961); A. Zeising, *Neue Lehre von den Proportionen des menschlichen Körpers* [*A New Theory of the Proportions of the Human Body*] (1854); A. Zeising, *Der goldne Schnitt* [*The Golden Section*] (1884); G. T. Fechner, “Über die Frage des goldnen Schnitts” [“On the Question of the Golden Section”] (1865).

²⁹ M. Borissavlievitch, *The Golden Number and the Scientific Aesthetics of Architecture* (1958); Charles Bouleau, *The Painter’s Secret Geometry: The Study of Composition in Art* (1963); Le Corbusier, *Modulor* (1954).

³⁰ For an early review, see Christopher D. Green, “All That Glitters: A Review of Psychological Research on the Aesthetics of the Golden Section” (1995); and for a recent mathematical treatment of GS and the related proportions, see David Navon, “The Sisters of the Golden Section” (2011).

the Arts, 1997, 15, No. 2), skepticism was widespread. This state of affairs motivated the continuation of my research program on GS that began in 1995.³¹

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, 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% of the respondents chose the same, GS,

³¹ The article draws on the following papers by V. J. Konečni: "The Vase on the Mantelpiece: The Golden Section in Context" (1997b); "The Golden Section in 20th-Century Paintings" (1999); "The Golden Section in the Structure of 20th-Century Paintings" (2001); "The Golden Section: Elusive, but Detectable" (2003); "On the 'Golden Section'" (2005a); and (with Laney E. Cline) "The 'Golden Woman': An Exploratory Study of Women's Proportions in Paintings" (2001).

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: (A) key vases from the previous experiments photographed at four points of the mantelpiece (0.50, 0.62, 0.70 = "control," 0.75); (B) color slides of original abstract and semi-abstract 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 (C) color slides of paintings containing various proportions both by artists known to have used GS intentionally (e.g., Mondrian) and 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 1680 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% overall. Moreover, the accuracy for GS (61%) and 1.00 (57%) was significantly higher than for other proportions in these paintings (28%-43% range; the mean accuracy for the vases and the unknown painter's works was 20% and 22%, 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.³² 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."³³

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 20th 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 20th-century paintings – an impossible task of

³² R. Arnheim, *Art and Visual Perception* (1974); K. Koffka, *Principles of Gestalt Psychology* (1935).

³³ Eugene J. Webb, Donald T. Campbell, Richard D. Schwartz, and Lee Sechrest, *Unobtrusive Measures: Nonreactive Research in the Social Sciences* (1966).

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 100 works (selected so that each contained at least one GS).

The precise measurement (by two skilled coders working separately), 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 20th-century paintings was sufficient for the detection of 95 paintings, each of which contained at least one GS; these works were by 52 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: (a) overall dimensions ("picture size"); (b) vertical bi-section, which addressed the issue of left-right balance or the horizontal distribution of perceptual weights; and (c) horizontal bi-section, which addressed top-bottom balance or the vertical distribution of weights. Finally, (d): 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 – 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 ex-

tent, horizontal) axis.³⁴ 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, a 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%) 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 (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 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 this 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, 24

³⁴ P. J. Locher and Y. Nagy, "Vision Spontaneously Establishes the Percept of Pictorial Balance" (1996); I. C. McManus, D. Edmondson, and J. Rodger, "Balance in Pictures" (1985).

paintings in the sample, by 16 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) and two measurements pertaining to the body: 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.)³⁵ In addition, 81 respondents (50 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 the three – “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: (a) 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; (b) 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 (c) there appears to be a marked non-linearity 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 14th/15th-century *yūgen*. Intriguingly, all seven attributes of Zen

³⁵ V. S. Johnston, "Female Facial Beauty: The Fertility Hypothesis" (2000); D. Singh, "Adaptive Significance of Female Physical Attractiveness: Role of Waist-to-Hip Ratio" (1993).

aesthetics that are described by the 20-century philosopher and Zen Buddhist scholar Shin'ichi Hisamatsu, including the fifth, the aforementioned *yūgen* ("profound subtlety"), are shared, in my opinion, by GS.³⁶

II.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 (Aesthetic Trinity Theory, or ATT) that deals with such experiences.³⁷ 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 *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 the 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);³⁸ and, on the other hand, on the behavioral/observatio-

³⁶ Shin'ichi Hisamatsu, *Zen and the Fine Arts* (1958/1971).

³⁷ V. J. Konečni, "The Aesthetic Trinity: Awe, Being Moved, Thrills" (2005b); V. J. Konečni, "Does Music Induce Emotion? A Theoretical and Methodological Analysis" (2008); V. J. Konečni, "Aesthetic Trinity Theory and the Sublime" (2011).

³⁸ A. J. Blood and R. J. Zatorre, "Intensely Pleasurable Responses to Music Correlate

nal/self-report experiments reported in 2007 by Vladimir Konečni, Rebekah Wanic, and Amber Brown KWB (henceforth: KWB).³⁹

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).⁴⁰ Since Goldstein's survey and pharmacological study, there has been a considerable amount of work on Thrills induced by music;⁴¹ 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% 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

With Activity in Brain Regions Implicated in Reward and Emotion" (2001); incidentally, these neuroscientists do not use the term "neuroaesthetics."

³⁹ V. J. Konečni, R. A. Wanic, and A. Brown, "Emotional and Aesthetic Antecedents and Consequences of Music-Induced Thrills" (2007).

⁴⁰ Konečni, "The Aesthetic Trinity" (2005b), p. 36, and KWB (footnote 39).

⁴¹ For some examples of research on Thrills, see: Avram Goldstein, "Thrills in Response to Music and Other Stimuli" (1980); Jaak Panksepp, "The Emotional Source of 'Chills' Induced by Music" (1995); and Nikki S. Rickard, "Intense Emotional Responses to Music: A Test of the Physiological Arousal Hypothesis" (2004).

very title of their article? My proposed answer – which the arguments and methodological considerations that follow are meant to justify – involve a causal path that leads from physiological effects (that include Thrills) to the *emotional state of Being-Moved* via 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 in addition *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 – “selected on the basis of their reports of frequent, reproducible experiences of chills in response to certain pieces of music” (BZ p. 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]” (p. 11818: in other words, *more than chills*). For each participant, BZ used a unique 90-sec excerpt, “including the section that [had previously reliably] elicited chills [in that participant]” (p. 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]” (p. 11820).⁴² 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 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” (p. 11821).

⁴² The finding reported by BZ (footnote 38) 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 (footnote 41).

The BZ statement that acoustic features of the pieces and any differential familiarity with them could not account for the effects support the conclusion that participants' private and individualized mental associations must have been responsible. However, surprisingly, BZ (p. 11819) explicitly state: "[S]ubjects reported that their emotional responses were intrinsic to the music itself, producing minimal personal associations and/or memories." This BZ contention, based apparently on unverified reports, is in sharp disagreement not only with the previous methodological analysis, but also with Goldstein's and Rickard's experimental findings.⁴³ 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" (p. 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 cannot be eliminated altogether. The second, a more likely and theoretically quite an interesting alternative, 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 musical piece may be condensed as a classically conditioned stimulus for Thrills induction.

In summary: (A) 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.

(B) It seems likely that BZ participants' Being-Moved state (not merely Thrills) correlated with CBF changes "in brain regions implicated in reward and emotion" (p. 11818). Other evidence indicates that Being-Moved has some characteristics of emotions, but can be distinguished phenomenologically from the basic emotion – such as joy, sadness, anger, and fear.

⁴³ Goldstein, "Thrills in Response to Music," p. 127; Rickard, "Intense Responses to Music," p. 384.

(C) Indeed, there exists no evidence in the BZ experiment for 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, mid-brain [and] amygdala" (p. 11818) does not point either to the basic emotions as a category, nor to a particular basic emotion.

(D) 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 apparently 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*.⁴⁴ 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).

II.5. The Concept of Aesthetic Episode

Empirical psycho-aestheticians do not differ from philosophers of art in

⁴⁴ On this point, see Konečni, "Music, Affect, Method, Data" (2013b).

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.⁴⁵

Especially in the domain of music, the more-or-less active listening has become fully imbedded 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.⁴⁶

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 among the available aesthetic options.

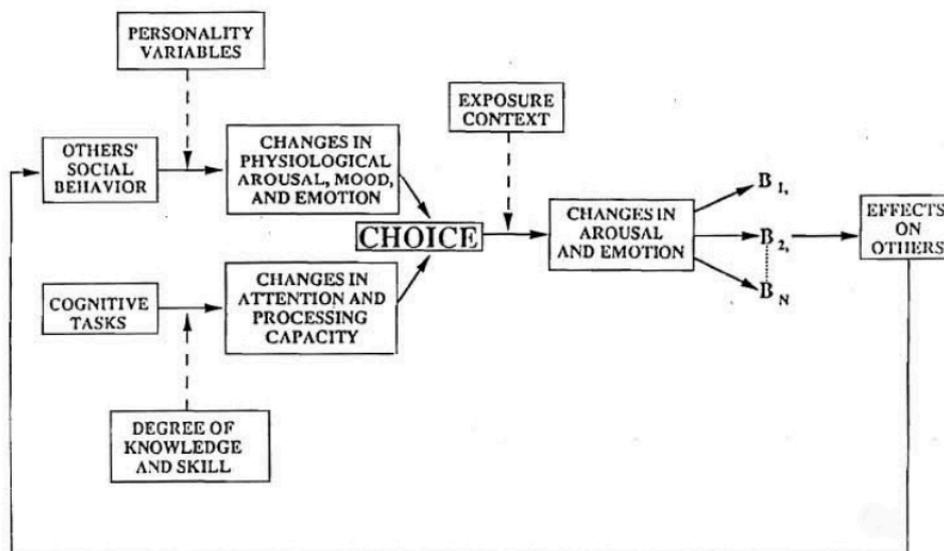
In psycho-aesthetic experiments, the alternatives are usually arranged

⁴⁵ For an early treatment of these issues, see V. J. Konečni, "Determinants of Aesthetic Preference and Effects of Exposure to Aesthetic Stimuli: Social, Emotional, and Cognitive Factors" (1979).

⁴⁶ V. J. Konečni, "Social Interaction and Musical Preference" (1982).

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 1:⁴⁷

MODEL OF AN AESTHETIC EPISODE



In the model, aesthetic episodes are regarded as recursive events that take place while appreciators participate in a continuous exchange with their 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

⁴⁷ The figure is from V. J. Konečni, "Interactive Effects of Music and Visual Art in Different Emotional States" (1994).

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.⁴⁸

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 state 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 state 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.

Part III — Concluding Remarks

Empirical psycho-aesthetics – an interdisciplinary field with a long tradition – was approached in this article from two directions. One was definitional and organizational (Part I of the article), while the other was concerned with the variety and scope of research areas and techniques (Part II). 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

⁴⁸ V. J. Konečni, "The Influence of Affect on Music Choice" (2010).

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:

(a) 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;⁴⁹

(b) 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,

(c) as a cumulative result of (a) and (b), 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 even-handed discussion (in Part I) of various controversies and debates, including several very recent ones, attempted 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, techniques of stimulus manipulation and measurement, and kinds of participants. 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

⁴⁹ See Konečni, "Music, Affect, Method, Data" (2013b).

and neuroaesthetics, begun in Part I, be fruitfully continued in 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 – which, others believe (myself included), 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.

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