# Bridging the Arts and Sciences: A Framework for the Psychology of Aesthetics


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ABSTRACT

The investigation of aesthetic processing has constituted a longstanding tradition in experimental psychology, of which experimental aesthetics is the second-oldest branch. The status of this psychology of aesthetics, the science of aesthetic processing, is briefly reviewed here. Building on this heritage and drawing on a host of related scientific disciplines, a framework for a strongly interdisciplinary psychology of aesthetics is proposed. It is argued that the topic can be fruitfully approached from at least seven different perspectives, each with multiple levels of analysis: diachronia, ipsichronia, mind, body, content, person and situation. Eventually, this work may coalesce into a unified theory of aesthetic processing.

Mental aesthetic processing, with its subprocesses of aesthetic appreciation, judgment or production, is a topic that seems to resist a unified approach while illustrating a complex range of issues. This article presents a framework for a modern psychology of aesthetics. In the future, a strongly interdisciplinary version of this branch of psychology could present a general, unified account of the mental processing of aesthetics. It would serve to build bridges between the arts and sciences, having strong ties to both realms (Fig. 1).

This article briefly reviews work showing that aesthetic processing—the evaluation or production of beauty, ugliness, prettiness, harmony, elegance, shapeliness or charm [1]—is governed by a host of factors, such as stimulus symmetry, complexity, novelty, familiarity, artistic style, appeal to social status and individual preferences. Humans appreciate a wide range of entities aesthetically: painting, sculpture, music, opera, theater, literature, design and buildings, as well as faces, flowers, landscapes, food, machinery, habitats and various other objects of everyday life. Cultures differ in what is considered beautiful, and within each culture people differ as well in what they consider beautiful. Therefore, aesthetic processing can be usefully considered from evolutionary, historical, cultural, educational, cognitive, (neuro)biological, individual, personality, emotional and situational perspectives, and probably many more. Hence I argue that human aesthetics as a whole appears best viewed from a number of different perspectives and at several different levels of analysis. A framework of seven such vantage points is introduced here.

## HISTORY

### Gustav Theodor Fechner

The *Vorschule der Aesthetik* summarized Gustav Fechner's major work on psychological aesthetics and was published in Leipzig in 1876 [2]. If one takes this year of publication to mark the beginning of a strongly empirical psychology of aesthetics, this discipline is more than 125 years old and can be considered the second-oldest branch of experimental psychology, after Fechner's psychophysics. In contrast to most of the very popular philosophical aesthetics of his day, Fechner argued for an empirical "aesthetics from below" that would assemble pieces of objective knowledge. He called it "experimental aesthetics," but such expressions as "empirical aesthetics," "psychological aesthetics" or "psychoaesthetics" are common as well. Today's psychology of aesthetics still follows Fechner's example.

### Fechner: A Source of Inspiration

To this day, Fechner's works remain a source of inspiration within experimental psychological aesthetics. Many of his concepts, however, have yet to be adopted into today's inventory of psychological terminology, and some aspects of his work have fallen into oblivion. The concept of the

**Fig. 1. The ScienceTunnel, an international exhibition of Germany's Max Planck Society, 2005. (© MPG/Archimedes GBR) It displays science in an aesthetically pleasing way; therefore it metaphorically bridges art and science.**

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**Fig. 2. The framework for the psychology of aesthetics. (© Thomas Jacobsen) The topic is viewed from seven different vantage points, which are not mutually exclusive: diachronia, ipsichronia, mind, body, content, person and situation. Eventually, this work could coalesce into a unified theory of processing aesthetics.**

aesthetic threshold, for example, implies that a stimulus has to cross a specific individual threshold in order to trigger experiences that are aesthetically pleasant or unpleasant. This concept was subjected to empirical and experimental verification, and the results were published in a renowned psychological journal, the *Psychological Review,* in 1906 [3]. In recent years, however, Fechner's concept of the aesthetic threshold, or the *aesthetische Schwelle,* can no longer be found in the work of international experts.

When we consider the history of experimental aesthetics, a few major trends can be identified. Following Fechner's seminal writings, some works in particular stand out. On the one hand, Gestalt psychology had a strong influence on the psychology of art and aesthetics. In this context, Arnheim's work represents an important application of the famous Gestalt laws of perception to art and aesthetics [4]. Particular importance should be attached to Berlyne's work, done mainly during the 1960s and 1970s [5]. He advocated a psychobiological approach and managed to revive experimental aesthetics on a large scale after it had attracted much less attention in the preceding decades. His work emphasized the importance of physiological arousal and suggested relations expressible as inverted U shapes between so-called collative variables (complexity, novelty, etc.) and aesthetic appreciation. Berlyne's impetus can still be felt today. Eysenck [6], an eminent theorist in personality structure research, also contributed a great number of mostly comparative and psychometric publications to experimental aesthetics. Another milestone is Martindale's cognitive theory [7]. Martindale put particular emphasis on the determining role of a person's structure of knowledge in aesthetic processes. According to their main orientations, these trends all have contributed specific findings to the psychology of aesthetics.

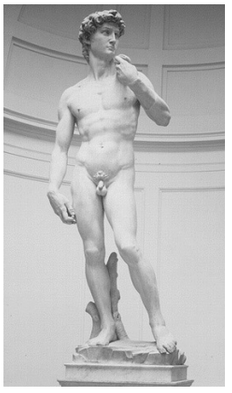
## The Status of Our Knowledge

A host of factors influencing aesthetic experience and behavior have been identified throughout the course of research [8]. It is known that the symmetry or asymmetry of an object [9], complexity or simplicity [10], novelty or familiarity of an object [11], proportion or composition [12], semantic content as opposed to formal qualities of design [13] and the significance of or mere exposure to a stimulus [14] all influence aesthetic experience and judgments. In addition, aspects of a person's emotional state [15]; degree of interest in a stimulus [16]; appeal to social status or financial interest [17]; education; and historical, cultural or economic background [18] are known to influence aesthetic judgments. Various situational aspects also play a role; we might appreciate an object differently in a museum as opposed to in a supermarket, for example. In addition, aesthetic judgment is also determined by inter-individual differences [19]. Naturally, there are numerous other findings. However, even this short listing shows that aesthetic experiences and behavior are subject to a relatively complex network of stimulus-, person- and situation-related influences.

## Problems of Methodology

Present-day psychology of aesthetics is characterized by a mosaic of empirical discoveries. In many cases, however, the problems that have to be faced today are the same as in the past: for instance, the conflict between the degree of experimental control on the one hand and the range of generalizability of the findings on the other. The logic of experiment requires that only clearly defined aspects of the experimental setup be changed, within well-defined conditions, while other factors remain constant. In the case of aesthetic considerations, the result is that geometrical shapes, or mere simple lines, become attractive stimulus material for the scientist, because controlled variations are possible. Can individuals, however, produce genuine aes-

**Fig. 3. Diachronia: Examples of how sculpture changes over time. (a, left) Michelangelo, *David*, 1504 (Photo: Bildarchiv Foto Marburg); (b, center) Duane Hanson, *Bodybuilder*, 1995 (© VG Bild-Kunst, Bonn 2005); (c, right) Salvador Dalí, *Hommage à Newton*, 1980. (© Salvador Dalí; Foundation Gala—Salvador Dalí/VG Bild-Kunst, Bonn 2005)**



thetic judgments about such objects? Usually individuals are more inclined to make aesthetic judgments about paintings, sculptures or buildings, which are much more complex. These objects, however, mostly combine variations of a multitude of stimulus dimensions that make adequate experimental control very difficult or even impossible. If, for this reason, researchers often restrict themselves to simple, easy-to-control stimuli, they will be very much confined in their statements about combinatory effects and interactions between the facets investigated. In the worst case, it is impossible to come to any conclusions about the objects of interest. This is a challenge, a challenge of successfully bridging art and science, that still stands today.

## The Status of the Psychology of Aesthetics as a Discipline

Since the days of Fechner, psychology has developed significantly and has become a fully established scientific discipline. Today, the mainstream of psychological aesthetics works with experimental or empirical methods. Thus, it has accepted and continued Fechner's original conceptual and methodological ideal of "bottom-up aesthetics," in contrast to a theoretical and introspective kind of psychological aesthetics, and thus clearly follows this tradition.

The psychology of aesthetics is not, unfortunately, a strong academic discipline today. How can the status of a discipline be measured? Perhaps by the number of its full-time scientists, the number of publications, the status of specialist journals in which the articles are published, the number of specialist journals in the field, professional societies and so forth. When measured by these parameters, the discipline shows a great potential for development in comparison with others. There is no general textbook for the psychology of aesthetics, either in German or in English. Essentially, the discipline has only one specialist journal, *Empirical Studies of the Arts* [20], the organ of the International Association of Empirical Aesthetics. Furthermore, there are few scientists who completely devote their work to psychological aesthetics; for most of those who attend to it, it is their second or third area of research activity. This leads to a situation very much in contrast to other sub-disciplines in psychology, where scientists are almost forced to focus completely on a single field of research. Moreover, the psychology of aesthetics is rarely an integral part of standard psychological curricula. Whether or not students of psychology become familiar with it often depends on the individual teacher's interest in the field. Thus it is not unusual to encounter qualified psychologists who consider experimental aesthetics to be a trend in modern art rather than the second-oldest branch of experimental psychology.

The psychology of aesthetics is not a homogeneous discipline but consists of fragmented sub-disciplines. Experimental aesthetics as outlined above mainly deals with research on art, as well as with artifacts in a wider sense. In order to cover the full range of aesthetic behavior and experience, however, the psychology of aesthetics must include a wide range of subject areas. Research on human attractiveness in social psychology, for instance, deals with aspects of human beauty. Market research covers numerous aspects of the identification of aesthetic preferences. Although the focus in that case is on the application—the direct utility of the research—aesthetic experience and behavior are of immediate relevance for the marketing of products. There are numerous overlapping areas in the psychology of art and in psychological aesthetics. Aesthetic processing, however, is not limited to art; therefore the two fields should not be equated. There are also many similarities between this field and the psychology of music. Anthropology and evolutionary biology deal with the origins and bases of aesthetic behavior. In architecture, researching and integrating aesthetic aspects of buildings are natural components of the work. The other applied arts work in a similar way. This is also true, although to a far lesser extent, of media and literary studies. Art history can provide a cornucopia of insights. In addition, oral and facial surgery and dentistry contribute to the empirical study of aesthetics in their fields. As a consequence, the psychology of aesthetics, being rather fragmented at present, could develop an interdisciplinary and integrative approach, bridging and uniting a range of disciplines and applications.

## A Framework for the Psychology of Aesthetics

The framework presented here adopts seven vantage points on the topic of aesthetic processing. Each vantage point can have different levels of analysis, rendering it a perspectival pillar. These levels are not mutually exclusive. Rather, they all are concerned with the processing of aesthetics, while approaching the subject in a multifold way from different angles, covering a broad range of partly interrelated topics, focusing on different aspects. These seven perspective pillars are: diachronia, ipsichronia, mind, body, content, person and situation (Fig. 2). They are introduced below.

### Terminology

Psychology is the science of experience and behavior. The psychology of aesthetics is the subdiscipline of psychology concerned with the mental processing of aesthetics. For this purpose, the term *entity* refers to an object of aesthetic

**Fig. 4. Ipsichronia: Experimental stimulus material for the empirical investigation of male and female attractiveness based on variations of the waist-to-hip ratio (WHR) and body weight. (© Devendra Singh) Attractiveness of the WHR is subject to variation across cultures.**

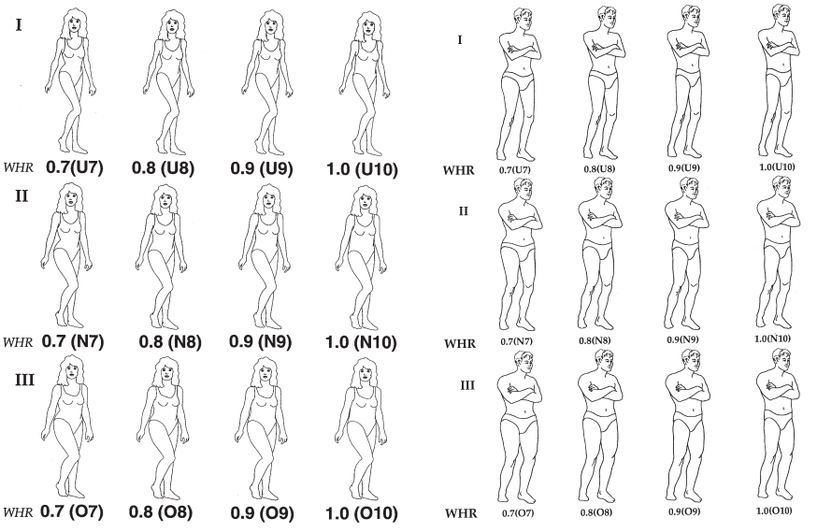


**Fig. 5. Mind: Experimental stimulus material for the investigation of mental cognitive memory representations of semantic categories. (© William Labov)**

**Fig. 6. Body: Anton Räderscheidt, *Selbstbildnisse nach Schlaganfall* (Self-Portraits of a Patient/Painter with Hemi-Neglect). (© VG Bild-Kunst, Bonn 2005)**

processing. An entity may be a thing, a living being, an event, scenery or an environment.

The meaning of the word *aesthetics* is multifold and has changed over time. Two main clusters of meaning can be identified. One is related to processes of sensation, as derived words such as *anesthetic* (relating to the absence of sensation) and *synesthetic* (involuntary co-sensation) illustrate. The second cluster is related to discussion in the arts, philosophy and art history. In a recent study of German college students, a bipolar beautiful-ugly dimension clearly appeared to be the primary and prototypical descriptive dimension for the aesthetics of objects [21]. This result, of course, converges with the main aesthetic conceptualization in philosophical and psychological aesthetics: beauty. At a secondary level, there is a conceptual system entailing a larger set of concepts (e.g. elegant, harmonious, shapely, small, big, round, colored, etc.). The descriptive approach of such a study yields information about a given state, without negating potential change due to historical, educational, cultural and other influences. The study showed that in contemporary Western culture the latter range of meanings of the word *aesthetics* predominates. The former meaning, related to sensation, however, is entailed in that a sensory component is mandatory for aesthetic processing. For instance, an aesthetic judgment of beauty requires sensory processes, whereas a memory-based judgment of beauty does not. Consequently, aesthetic processing is sensation-based evaluation of an entity with respect to the above conceptual system, primarily the beauty dimension. The sensory subcomponents of aesthetic processing can be mentally simulated using imagination.

## Diachronia

Diachronia is the perspective concerned with change over time (Fig. 3). It can be pursued at different levels of analysis —for instance, from the perspective of evolutionary biology or evolutionary anthropology. Biological evolution afforded substantial changes in the progression from nonhuman to human primates. The question of the origins of and reasons for aesthetic behavior are at the center of attention here. Why do individuals produce splendid and elaborate tools and weapons that are not intended for use? Why do faces have to show a certain degree of symmetry to be perceived as beautiful? What is the role of evolution in the development of our aesthetic faculties

and skills? [22] These questions lead to a classical complex of questions in psychology: the nature-nurture question. This question of the relation between heredity and biological setup on the one hand and the impact of a cultural superstructure on the other hand was, for example, the subject of a heated debate in intelligence research and is a matter of widespread discussion in current linguistic research [23].

This leads to the other side of the nature-nurture question, that of historical change and cultural development. Cultural evolution explains the major variations in aesthetic processing today. Another perspective of psychological aesthetics is the historical one, especially connected with the history of civilization. Aesthetic judgments and preferences change over time [24]. On the one hand, aesthetic usage is changed by the availability of tools, the development and availability of materials and production techniques. On the other hand are temporal changes not determined by what is feasible.

Here fashion comes into play. Fashion, another aspect of historical change, can be due to mere trends that can be based on or independent of current technical development. Trends can lead to extreme instantiations of an ideal of beauty, including unwearable clothes, plastic surgery and (self-)mutilations. Considering these two aspects, the historical method can open up an important perspective on aesthetic behavior and experience that can also contribute to finding answers to questions that are psychological in nature.

In addition to these group levels of analysis of diachronia, there are individual levels. During ontogenesis, individuals can acquire different degrees of developmental refinement [25] through aesthetic education and other developmental achievement. Furthermore, aesthetic processing is subject to differing degrees of individual temporal stability, also governed by novelty or mere exposure to stimuli [26].

## Ipsichronia

The vantage point of ipsichronia focuses on comparisons within a given time segment. Together with diachronia, it covers the entire realm of aesthetic processing. A wide range of entities of aesthetic processing is subjected to cultural and social processes. Hence, effects of culture, influences of social roles, social status or cultural differences are taken into consideration [27] (Fig. 4).

Comparisons of cultures can be a very informative method [28]. The investigation of major cultural tendencies and their predominant ideals of beauty and contrasting trends in subcultures is becoming more and more important. When looking at the picture of a man in his shirtsleeves in the 1950s, for example, the answer to the question of what is missing would have been "the tie." This was the correct answer in the most widely used intelligence test of the time. Today, people in Western metropolitan areas would perhaps instead suggest a tattoo or facial piercing. This is certainly true for some subcultural groups. A systematic survey of the cultural shaping of possibly universal aesthetic tendencies would be an interesting facet in an interdisciplinary approach. There are numerous examples of aesthetic preferences that are peculiar to a given culture or subculture. Research in the psychology of aesthetics can take advantage of research in other disciplines on cultural specificities in order to avoid the proposition of psychological models that are culture dependent and therefore not general.

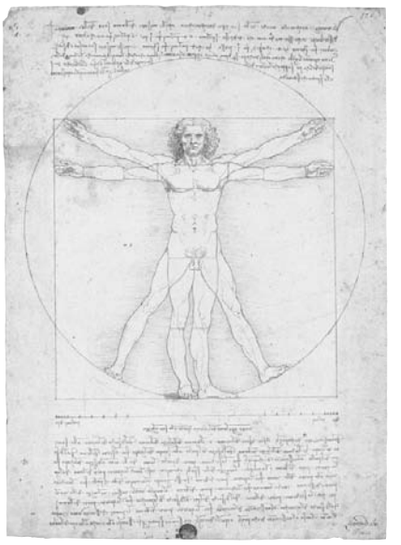


**Fig. 7. Content: Leonardo da Vinci's famous drawing *Vitruvian Man*, 1485, shows the realm of natural beauty and artistic beauty in one illustration, an example of the blend of art and science during the Renaissance.**

## Mind

This is the view on aesthetic processing from the perspective of modern academic psychology (Fig. 5). Of course, the psychology of aesthetics is an integral part of this scientific discipline. A number of investigators have adopted cognitive terminology in accounting for aesthetic processing [29]. The preference-for-prototype model, for example, holds that prototypical exemplars of a given category will be preferred over less typical ones [30]. This theoretical account in the psychology of aesthetics applied an influential *cognitive model* [31]. The systematic transfer of contemporary psychological concepts, however, has yet to be carried out.

Here there are many possibilities for

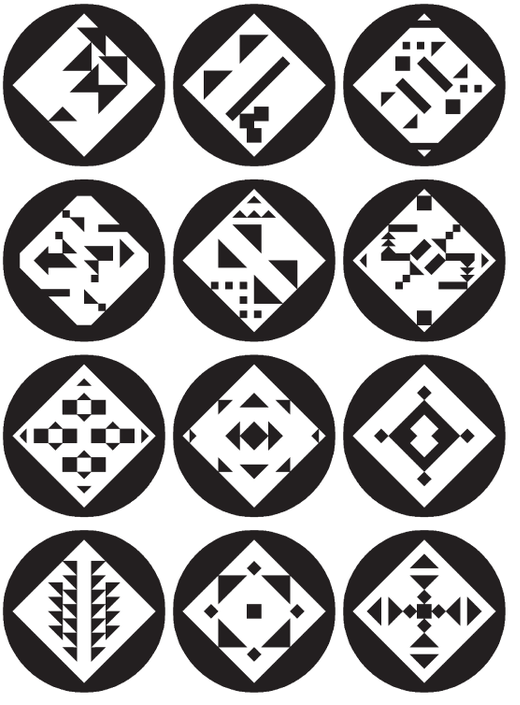


**Fig. 8. Person: Examples of graphic patterns that elicited considerable interindividual differences in aesthetic judgments of beauty in the studies by Jacobsen and Höfel [45]. (© Thomas Jacobsen and Lea Höfel)**


**Fig. 9. Situation: An example of an object that receives differing aesthetic appreciation depending on the current situation of viewing—Marcel Duchamp's *Fountain*, the first ready-made art object, 1917, 1964 (third version, replicated under the direction of the artist in 1964 by the Galerie Schwarz, Milan). (© Succession Marcel Duchamp/VG Bild-Kunst, Bonn 2005)**

establishing connections with modern psychological theories. Judgments of taste may serve as an example. A determining judgment requires the mental representation of the object to be judged as well as the assessment by the judge. In the case of a determining judgment, both are "retrieved." Cognitive social psychology employs elaborate research and a conceptual framework—the concept of "attitudes"—for these mental processes [32]. A theoretical link is quite possible here. In addition, cognitive social psychology has developed a theoretical inventory that could be used more intensely for research into the psychology of aesthetics.

This also applies to the psychology of emotions [33]. How does mood influence aesthetic judgment? What is the effect of emotional styles? Certainly, there are a number of other perspectives from which one could view psychological aesthetics. Philosophical aesthetics, especially, could be an almost inexhaustible source. Psychological penetration of many concepts is yet to be undertaken. Famous philosophical concepts, such as the distinction between reflecting and determining aesthetic judgments or the conception of artificial versus natural beauty, remain to be studied in psychology.

## Body

The body perspective views aesthetic processing according to somatic aspects. Together, mind and body also cover the entire realm of aesthetic processing.

Biology contributes to our understanding of aesthetics. The neurosciences, in particular, have made dramatic advances in the last decade. Our knowledge of brain function has increased substantially. These achievements will also be used in research on aesthetics.

Furthermore, the integration of findings of cognitive neuroscience also is becoming increasingly feasible. For instance, some areas of the brain contribute in a special way to the perception of faces, whereas they hardly respond to the presentation of artifacts [34]. How is this face-specific processing connected with the predominant status of the aesthetic judgment of human faces? What is the role of hemispheric asymmetries? [35] (Fig. 6) Here we can easily establish a quite comprehensive catalog of questions.

A few studies have begun directly to investigate brain activity during aesthetic processing [36]. Furthermore, there are some initial insights into how acquired lesions in the central nervous system affect aesthetic production [37].

## Content

Human aesthetic processing relates to a large number of different entities (as discussed above) (Fig. 7). These different realms of content may show vastly different characteristics that in turn lead to different determiners of aesthetic processing. Evolution has left humans more attuned to certain stimulus characteristics than to others. The sensory modalities are governed by different principles. The brain has specialized areas for processing certain stimulus categories. Some entities are highly socially relevant, others less so. All these factors lead to a differentiation of content in aesthetic processing. Therefore, investigators will carefully evaluate the generalizability of their findings. For instance, does the Gestalt law that accounts for a given preference in the visual modality extend to music or culinary preferences [38]? Most likely not. Color preferences, for example, appear to be highly context dependent. They depend on the object that is to be colored [39].

## Person

This perspective focuses on individual processing characteristics and preferences. As expressed in the ancient Roman saying *De gustibus non est disputandum,* it is well known that there is no accounting for taste. There is, however, discussion about matters of taste—and sometimes quite violent arguments. A systematic examination of interindividual differences in aesthetic processing remains to be carried out. Relatively little is known about such interindividual differences of aesthetic processing within homogeneous groups.

In a recent study, aesthetic judgments of beauty of 49 novel formal graphic patterns were collected from nonartist participants [40] (Fig. 8). The data were subjected to individual analyses, resulting in models reflecting the individual's strategy of aesthetic judgment. Individual case modeling can capture these differences. The study also derived a group model based on data averages. This model, however, could sufficiently account for only one-half of the participants' judgments, whereas the individual models gave a much more precise account. Thus, it also appears to be reasonable that some nomothetic studies may have camouflaged noted individual differences by using data averaging. Hence one may debate whether or not the mere nomothetic approach is justified, given such a data pattern. Thus it is argued that the idiographic approach should be additionally adopted, if such

an equivocal empirical situation is encountered. In that sense, there is (no) accounting for taste, indeed.

Some differences between individuals are, however, reasonably well accounted for at the level of group differences. Experts and nonexperts, laymen or novices differ in their abilities and skills. Experts have specific, structured knowledge of their areas of expertise. Knowledge systems show different degrees of complexity. These different cognitive systems in turn can lead to different aesthetic processing. The typical study contrasted the performance of groups of experienced judges with the performance of groups of naive or inexperienced judges [41]. There is also a considerable literature based on personality-structure research [42]. In addition to the consideration of individuals versus groups, the comparison of cultures is another important perspective.

### Situation

The combination of a given time and a given place—the situation—affects aesthetic processing (Fig. 9). The perspectives of content, person and situation, taken together, also provide full coverage of the topic of aesthetic processing.

A can of tomato soup, for instance, will most likely be processed differently when it is encountered in a supermarket versus a museum. Such situational conditions elicit the use of a mentally stored script or schema [43]. *Schemata* or *scripts* are organized memory representations that store domain-specific knowledge that is used to guide behavior in a given situation. Hence schemata can drastically reduce processing load. They are predominantly socially determined, thus culturally limited, and individually acquired. Being in a museum, a theater, an opera or a gallery usually facilitates aesthetic processing, because a corresponding cognitive schema is put to use. A gas station or supermarket script, on the other hand, does not. Consequently, one and the same entity will be processed differently because a different mind-set is induced by the currently active schema. The right schema will help to activate a mental mode of aesthetic contemplation or aesthetic productivity.

When using the present framework, one research task would be to extract the information relevant for the psychology of aesthetics from the cornucopia of material provided by the seven perspectives.

## A Psychological-Aesthetic Utopia

One could go further and conceive a utopia for psychological aesthetics. It is quite conceivable to develop a discipline with a strong focus on application. The design process in architecture may serve as an example. Often, buildings are meant to convey a certain message. The architect intentionally incorporates this semantic aspect in the design process. In most cases, however, the user or observer, the person who will experience the building and should understand its message, is not included in this process. The expertise and spirit of the gifted, professional designer is relied upon. Empirical research, however, shows that there are substantial differences in the processes of perception and evaluation of experts and nonexperts (Fig. 10). Could an elaborate psychology of aesthetics help to bridge the gap here? Fields such as this have a great, untapped potential for development.

**Fig. 10. Komar and Melamid, *America's Most Wanted*, oil and acrylic on canvas, 24 × 32 in, 1994. (Courtesy Ronald Feldman Fine Arts, New York. Photo: D. James Dee.) <www.diacenter.org/km/homepage.html>. Komar and Melamid introduced an empirical method of painting by basing their painting on professional, large-scale market research surveys, also a way to bridge art and science. Their paintings are indicative of biological evolution in that they depict the human habitat preference.**

## Finale

As mentioned above, the psychology of aesthetics today is quite heterogeneous. In a strongly interdisciplinary approach, all above-mentioned disciplines in the arts and the sciences would make their contributions to it. The ultimate goal would be a unified theory of the mental processing of aesthetics that describes and explains the whole network of stimulus-, personality- and situation-related factors. To meet this huge challenge, it could be helpful to approach the subject matter from the different perspectives introduced above, identify and extract psychologically relevant aspects and gradually integrate these step by step. Nonetheless, an inherently complex and finely textured theoretical structure will eventually emerge.

Such a strongly interdisciplinary approach is not impossible. In cognitive neuroscience, for instance, this is a basic and very common approach [44]. For the psychology of aesthetics, this approach remains to be undertaken. Taking this statement one step further: In today's work in the psychology of aesthetics, the interdisciplinary perspective should be sensibly upheld and broadened. Following this lead, many fruitful, fascinating bridges between the arts and the sciences will be built in the future.

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