The artful mind meets art history: Toward a psycho-historical framework for the science of art appreciation

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Abstract: Research seeking a scientific foundation for the theory of art appreciation has raised controversies at the intersection of the social and cognitive sciences. Though equally relevant to a scientific inquiry into art appreciation, psychological and historical approaches to art developed independently and lack a common core of theoretical principles. Historicists argue that psychological and brain sciences ignore the fact that artworks are artifacts produced and appreciated in the context of unique historical situations and artistic intentions. After revealing flaws in the psychological approach, we introduce a *psycho-historical framework for the science of art appreciation*. This framework demonstrates that a science of art appreciation must investigate how appreciators process causal and historical information to classify and explain their psychological responses to art. Expanding on research about the cognition of artifacts, we identify three modes of appreciation: *basic exposure* to an artwork, the *artistic design stance*, and *artistic understanding*. The artistic design stance, a requisite for artistic understanding, is an attitude whereby appreciators develop their sensitivity to art-historical contexts by means of inquiries into the making, authorship, and functions of artworks. We defend and illustrate the psycho-historical framework with an analysis of existing studies on art appreciation in empirical aesthetics. Finally, we argue that the fluency theory of aesthetic pleasure can be amended to meet the requirements of the framework. We conclude that scientists can tackle fundamental questions about the nature and appreciation of art within the psycho-historical framework.

Keywords: art appreciation; causal reasoning; cognition of artifacts; cognitive tracking; design stance; essentialism; function; history of art; mindreading; processing fluency; psycho-historical framework

Does the study of the mind's inner life provide a theoretical foundation for a science of art? Scientists in empirical aesthetics and neuroaesthetics think so. They adhere to what we, along with Pickford (1972), call the *psychological approach* to art, which uses methods of psychology and neuroscience to study art and its appreciation. Because of its focus on the mind's processes and the brain's internal structures, psychological research often ignores the *historical approach* to art, which focuses on the role of historical contexts in the making and appreciation of works of art. The psychological and historical approaches have developed conflicting research programs in the study of art appreciation and of art in general. They offer diverging accounts of the degree to which historical knowledge is involved in art appreciation. After introducing the debate between these two traditions, we propose in sections 2 and 3 a psycho-historical framework that unifies psychological and historical inquiries into art appreciation. We argue that art-historical contexts, which encompass historical events, artists' actions, and mental processes, leave causal information in each work of art. The processing of this information by human *appreciators*[1] includes at least three distinct modes of art appreciation: basic exposure of appreciators to the work; causal reasoning resulting from an "artistic design stance"; and artistic understanding of the work based on knowledge of the art-historical context. In section 4, we demonstrate that empirical research within the framework is feasible. Finally, we describe in section 5 how an existing psychological theory, the processing-fluency theory of aesthetic pleasure, can be combined with the psycho-historical framework to examine how appreciation depends on context-specific manipulations of fluency.

1. The controversial quest for a science of art appreciation

The quest for an empirical foundation for the science of art appreciation has raised controversies across the humanities and the cognitive and social sciences. Although the psychological and historical approaches are equally relevant to a science of art, they have developed independently and continue to lack common core principles.

1.1. The psychological approach to art appreciation

The *psychological approach* to art aims to analyze the mental and neural processes involved in the production and appreciation of artworks. Early work by psychologists focused on how physiology and psychology may contribute to a scientific approach to aesthetic and artistic preferences (Bullough 1957; Fechner 1876; Helmholtz 1863; Martin 1906; Pratt 1961). The field of *empirical aesthetics* originates from this tradition (Berlyne 1971; Martindale 1984; 1990; Pickford 1972; Shimamura & Palmer 2012).

Research in neuroaesthetics is a recent and more radical branch of the psychological approach (Chatterjee 2011a; Skov & Vartanian 2009). The term *neuroaesthetics* was coined by Zeki, who viewed it as "a neurology of aesthetics" that provides "an understanding of the biological basis of aesthetic experience" (Zeki 1999, p. 2). With regard to the relation to art history, research in the psychology of art does not essentially differ from neuroaesthetics. Like neuroscientists, psychologists think that the appreciation of art depends on internal mechanisms that reflect the cognitive architecture of the human mind (Kreitler & Kreitler 1972; Leder et al. 2004) or of the mind's components such as vision (Solso 1994; Zeki 1999) and auditory processing (Peretz 2006; Peretz & Coltheart 2003). Like neuroscientists, psychologists present artworks as "stimuli" in their

experiments (Locher 2012). Their methodologies usually differ in that neuroscientists measure brain activation, whereas psychologists analyze behavioral responses. Both traditions are, however, dominated by the psychological approach understood as an attempt to analyze the mental and neural processes involved in the appreciation of artworks.

Many contemporary thinkers distinguish art appreciation from aesthetic experience broadly understood (Berlyne 1971; Danto 1974; 2003; S. Davies 2006a; Goodman 1968; Norman 1988; Tooby & Cosmides 2001). In contrast to them, advocates of neuroaesthetics maintain that art "obeys" the aesthetic "laws of the brain" (Zeki 1999; Zeki & Lamb 1994). Like evolutionary accounts of art (Dutton 2005; 2009; Pinker 2002; Tooby & Cosmides 2001), their research is aimed at discovering principles that explain both aesthetic and artistic universals. For example, drawing a comparison with the concept of universal grammar (Chomsky 1966), Ramachandran (2001, p. 11; Ramachandran & Hirstein 1999) defends the universalistic hypothesis that "deep" neurobiological laws cause aesthetic preferences and the appreciation of a work of art.

The search for laws (Martindale 1990) and universals of art is a chief objective for numerous contributions to the psychological approach (Aiken 1998; Dutton 2005; Fodor 1993, pp. 51–53; Peretz 2006; Pinker 1997, Ch. 8; 2002, Ch. 20; Zeki 1999). Among them, Dutton (2005; 2009) and Pinker (2002) argue that there are universal signatures of art, such as virtuosity, pleasure, style, creativity, special focus, and imaginative experience. Pinker even defends the ostensibly ahistorical conjecture that "regardless of what lies behind our instincts for art, those instincts bestow it with a transcendence of time, place, and culture" (Pinker 2002, p. 408).

Many advocates of the quest for aesthetic or artistic universals distrust the historical methods employed in the humanities (Martindale 1990; Ramachandran 2001). Some, like Martindale (1990), have claimed that psychological or neuroscientific methods can discover *laws* of art appreciation without investigating the appreciators' *sensitivity*[2] to particular art-historical contexts. In contrast to neuroaesthetics, we will argue that the science of art appreciation needs to investigate art appreciators' historical knowledge and integrate historical inquiry and the psychology of art. Our view is derived from contextualist principles introduced by the historical approach, which we discuss next.

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1.2. Contextualism and the historical approach to art appreciation

In contrast to the universalism pervasive in the psychological tradition, many scholars advocate a historical approach to the study of art. We use the term *historical approach* to refer to accounts that appeal to appreciators' sensitivity to particular historical contexts and the evolution of such contexts in order to explain art appreciation. We include in the historical approach studies that examine art appreciation from the standpoint of the history of art (Gombrich 1950/1951; Munro 1968; 1970; Panofsky 1955; Roskill 1976/1989), the sociology of art-historical contexts (Bourdieu 1992/1996; Hauser 1951; Heinich 1996b; Tanner 2003), and art criticism specific to historical situations (Danto 1998a; 2009; Foster 2002; Fried 1998; Greenberg 1961). A philosophical tradition representative of the

historical approach is *aesthetic contextualism* (Currie 1989; Danto 1964; 1981; Dickie 1984/1997; 2000; Dutton 1983; Walton 1970). According to aesthetic contextualism, historical and societal contingencies play an essential role in the production of art and in the appreciation of particular artifacts as works of art (Davies 2004; Gracyk 2009; Levinson 1990; 2007). A work of art is the outcome of the causal intervention of human agents, such as artists and curators, embedded in a historical context made of unique unrepeatable events and irreplaceable objects (Benjamin 1936/2008; Bloom 2010). Contextualists investigate the consequences of this historical embeddedness to account for the identity, appreciation, understanding, and evaluation of works of art. They argue that contextual knowledge of artifacts and their context-specific functions are essential processes in art appreciation.

According to contextualism and the historical approach, the appreciation of an artwork requires that appreciators become sensitive to the art-historical context of this work, including its transmission over time. Because defenders of the psychological approach have usually investigated art appreciation without analyzing the appreciator's sensitivity to art-historical contexts, many contextualists (Currie 2003; 2004; Dickie 2000; Gombrich 2000; Lopes 2002; Munro 1951; 1970) doubt that current psychological and neuroaesthetic theories succeed in explaining art appreciation. In our interpretation, a decisive *contextualist objection* can be outlined as follows:

1. The appreciator's competence in artistic appreciation of a work of art is an informed response to – or *sensitivity to* – the art-historical context of this work (see sect. 3).

2. Most psychological and neuroaesthetic theories do not explain the appreciator's sensitivity to the art-historical context of the work (see sects. 1 and 4).

3. Therefore, most psychological and neuroaesthetic theories do not explain the appreciator's artistic appreciation.

In sum, most psychological and neuroaesthetic theories fail to account for artistic appreciation because they lack a model that accounts for the contextual nature of art and of the appreciators' sensitivity to art-historical contexts. In contrast to such ahistorical theories, we will outline a contextualist model in sections 2 and 3.

The contextualist objection is sound when directed at studies that investigate the neural responses to art without a theory of the neural basis of the sensitivity to art-historical contexts, as in neuroaesthetics. Consider, for example, Andy Warhol's *Brillo Soap Pads Boxes* (1964, hereafter "*Brillo Boxes*"; Danto 1992). This piece has aesthetic properties that are absent from regular Brillo boxes in a supermarket. Because these objects are visually indistinguishable, they are likely to elicit the same kind of activation in the *visual* brain areas of appreciators. The reference to neural responses in visual areas may identify necessary conditions for appreciation through basic exposure (sect. 3.1). However, the reference to visual processes does not explain the fact that the appreciators' artistic understanding of the work derives from their sensitivity to its art-historical context (sect 3.3). As contextualists such as Danto (1981; 1992; 2003) have argued persuasively, a work like Warhol's *Brillo Boxes* can be appreciated *as art* only if its audience is sensitive to certain historical facts. Here, facts of relevance are that Warhol adopted the reflective attitude of artists in his artworld, or that he rejected the separation between fine art and mass culture (Crane 1989;

Danto 1992: pp. 154–55; 2003: p. 3; 2009: Ch. 3). Therefore, a neuroaesthetics of the neural responses to Warhol's *Brillo Boxes* must investigate the neural mechanisms that underlie the appreciators' sensitivity to facts in Warhol's art-historical context (Frigg & Howard 2011). We do not know of any neuroscientific studies that have directly examined this question.

This is but one example of the disagreements between the proponents of the psychological and the historical approaches. Since the early attempts to explain art in scientific terms (Fechner 1876), controversies have been raging about ontological assumptions, methods, and objects of inquiry. As a result of these disagreements, psychologists and neuroscientists often ignore the concepts proposed by historical theories, such as aesthetic contextualism, sometimes simply because they originate from the "non-scientific" humanities (Martindale 1990; see sect. 4). Reciprocally, only a few art historians (Freedberg 1989; Freedberg & Gallese 2007; Gombrich 1960; 1963; 1979; Stafford 2007; 2011) and philosophers (Currie 1995; 2004; Dutton 2009; Kieran & Lopes 2006; Lopes 1996; 2004; Nichols 2006; Robinson 1995; 2004; 2005; Scharfstein 2009; Schellekens & Goldie 2011) consider psychological findings when discussing art. The separation between psychological and historical approaches is an illustration of the so-called "two cultures" (Carroll 2004; Leavis 1962; McManus 2006; Snow 1959), the divide between the sciences and the humanities that our psycho-historical approach seeks to overcome.

2. A psycho-historical framework for the science of art appreciation

In sections 2 and 3, we introduce a *psycho-historical framework for the science of art appreciation* ("psycho-historical framework" henceforth). This framework expands Bullot's (2009a) research aimed at combining the psychological and historical approaches to a theory of art. Figure 1 represents the central concepts and relations identified by our framework, namely the concepts of art-historical context (sect. 2.1), the artwork as artifact (sect. 2.2) and as carrier of information (sect. 2.3), and the appreciation of the work through three modes of information processing (sect. 3).

2.1. Art-historical context

As illustrated in Figure 1, *art-historical contexts* include persons, cultural influences, political events, and marketplaces governing the production, evaluation, trade, and conservation of works of art. Artists, patrons, curators, sellers, politicians, and audiences belong here. Contextualist philosophers (Danto 1964; Dickie 1984/1997) investigate the ontological dependence of artworks on art-historical contexts (artworlds). Since at least Vasari (1550/1991), art historians have examined art-historical contexts to understand the lives and oeuvres of artists (Guercio 2006). Others use sociological methods to explain trends or mechanisms, in particular art-historical contexts (Bourdieu 1979/1987; Crane 1989; Hauser 1951; Heinich 1996b).

Here, we do not aim to provide a detailed theory of the art-historical context. The psycho-historical framework only requires that researchers agree on two principles about the nature of the art-historical context: First, a work of art is an
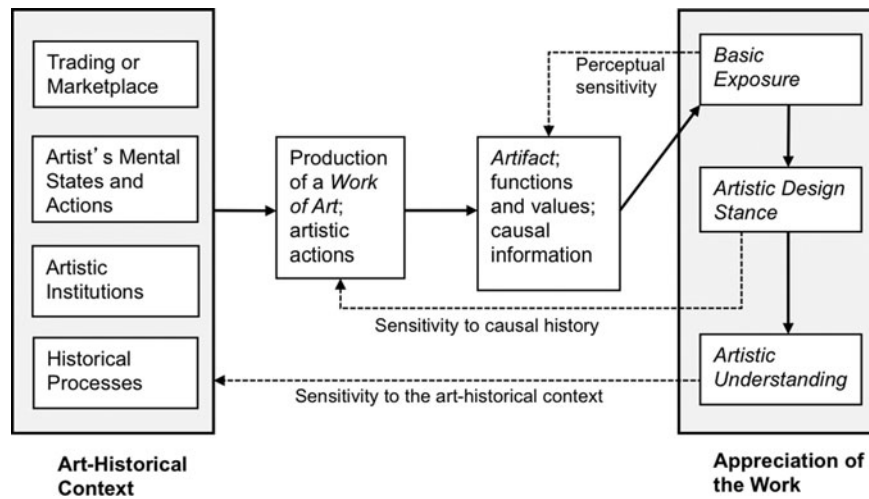
Figure 1. The psycho-historical framework for the science of art appreciation. Solid arrows indicate relations of causal and historical generation. Dashed arrows indicate information-processing and representational states in the appreciator's mind that refer back to earlier historical stages in the production and transmission of a work. Details about the core concepts are provided in the text.

artifact that has historical functions (sect. 2.2). Second, it carries causal-historical information (sect. 2.3).

2.2. The work of art as artifact

We use the term *artifact* in a broad sense to refer to an object or a performance intentionally brought into existence through the causal intervention of human action and intentionality (e.g., Hilpinen 2004; Margolis & Laurence 2007). This concept deviates from the sense of "artifact" that refers exclusively to manufactured objects. It entails that all artistic performances are artifacts in the sense of being products of human actions.

Artifacts usually have intended functions (Bloom 1996a; Dennett 1987; 1990; Millikan 1984; Munro 1970). Arguably, the function of an artifact is initially specified by its inventor or designer. However, many artifacts acquire additional functions or have their main function abandoned over time. Therefore, reference to the intended function and original context is not sufficient to explain the functions of an artifact (Dennett 1990; Parsons & Carlson 2008; Preston 1998). Preston (1998) and Parsons and Carlson (2008, p. 75) propose a way to analyze the function of an artifact without exclusively relying on the intentions of its maker. In their analysis, artifacts of a particular sort have a *proper function* if these artifacts currently exist because their ancestors were successful in meeting some need or want in cultural and trade contexts because they performed this function, leading to production and distribution of artifacts of this sort.

Though alternative accounts of the relationships between artifacts and functions have been proposed (Grandy 2007; Sperber 2007; Vermaas & Houkes 2003), it is significant that all the proposed accounts need to refer to the *historical context* of artifacts to explain the way they acquire proper or accidental *functions*. Reference to particular historical contexts seems indispensable in explaining the functions of artifacts. It is therefore not surprising that cognitive development and adults' understanding of artifact concepts seems guided by a historical understanding of objects (Gutheil et al. 2004).

With Parsons and Carlson (2008) and in agreement with empirical research on artifact cognition (e.g., Matan & Carey 2001; see sect. 3.2), we propose to apply this historical approach to artifact functions to works of art (understood in the broad sense that refers to both art objects and performances). Because an artwork is a product of human agency with context-dependent functions, assessing the appreciators' understanding of its context-dependent functions is essential to explaining art appreciation (sect. 3.3). This premise underlies contextualism (sect. 1.2) and a few intentionalist theories of art in art history (Baxandall 1985), anthropology (Gell 1998), philosophy (Levinson 2002; Livingston 2003; Rollins 2004; Wollheim 1980), and psychology (Bloom 2004; 2010).

2.3. The work as carrier of information

In contrast to ahistorical psychologism, contextualism entails that explaining the appreciator's sensitivity to art-historical contexts is crucial to any account of art appreciation. We argue that this antagonism can be overcome if psychological and neuroscientific theories consider whether art appreciation depends on the processing of causal and historical information carried by an artwork, especially information related to its context of production and transmission.

Like Berlyne (1974), we adopt an information-theoretic conception of the work of art and its properties; and thus we assume that features of an artwork can be sources of syntactic, cultural, expressive, and semantic information. However, Berlyne's account is misleading because it is *ahistorical*. It overlooks the facts that the information carried by a work is the end product of a causal history and that appreciators extract information to acquire knowledge about the past of the work. We use the term *causal information* (Bullot 2011; Dretske 1988; Godfrey-Smith & Sterelny 2007; "natural meaning" in Grice 1957; Millikan 2004: p. 33) to denote objective and observer-independent

causal relations or causal data. A familiar example used to introduce causal information is tree-ring dating. In some tree species, one can draw inferences about age and growth history of a tree specimen from the number and width of its tree rings because ring-related facts carry causal information about growth-related facts (Speer 2010). In a similar way, features in artworks are carriers of causal information and therefore allow appreciators to acquire knowledge about facts from the past.

As depicted in Figure 1, any work of art carries causal information. This phenomenon can be illustrated by the slashed paintings made by Lucio Fontana (Freedberg & Gallese 2007; Whitfield 2000). The fact *that there is a cut in the canvas of this painting by Fontana* is evidence of the elapsed fact *that Fontana is slashing the canvas* because the former carries information about the causation of the latter. Knowledge of the causal link between the two facts is essential to authenticate that the work was made by Fontana and is not an act of vandalism or a forgery (sect. 3.3). Similarly, music or dance performances and works of poetry carry causal information. For example, the actions of dancers performing choreographies by Pina Bausch carry information about the decisions made by the choreographer while planning the performance.

It is often possible to retrieve from an artwork its connections to antecedent events because certain causal or lawful processes at the time of its creation or transmission preserve certain properties (e.g., Fontana's slashing the canvas with a knife caused the cut in the canvas, and this cut was preserved over time). A work also carries information about events after its initial production, like the translation of a poem written in Middle English into Modern English, or Mendelssohn's decisions in his performance of Bach's St. Matthew Passion in 1829 (Haskell 1996). Crucially, one can study such causal information in each particular artifact to infer its history, as illustrated above with the example of tree rings.

The historical study of artifacts always requires investigation into causal information to resolve a problem of *reverse engineering* (Chikofsky & Cross 1990; Rekoff 1985) in the interpretation of causal information: How can one infer the properties of an object's history or the intentions of the producer from the features one perceives in the object? In the specific case of artworks, we will argue that this problem can only be resolved when one adopts the "artistic design stance" (sect. 3.2).

Although the features of artworks can be the outcome of deliberate actions performed by an intentional agent, such as Fontana or Bausch, much of the causal information carried by a work is the outcome of processes that are not products of intentional actions. For example, Pollock intentionally made his movements in order to cast paint on the canvas of *Number 14: Gray* in specific patterns. The time and effort he invested in planning and performing his seemingly accidental paintings contributed to the making of his artistic stature (Kruger et al. 2004; Steinberg 1955). However, the distribution of paint in his painting also carries causal information (causal data) derived from physical or physiological constraints that led to outcomes not intentionally planned by Pollock.

Causal-historical information is fundamental to the unification of the psychological and historical approach because it is the missing link between the history of an artwork and its appreciation (Bullot 2009a). This linkage has been overlooked by most theories in the two traditions.

2.4. The neglect of art-historical contexts by psychology

Some proponents of the psychological approach (Fodor 1993; Ramachandran 2001) claim that sensitivity to art-historical contexts is not a requisite of art appreciation and art understanding (see sect. 1.1). Other advocates of the psychological approach do not explicitly deny the historical nature of the artistic context and of artistic actions. However, they usually do not offer proper theoretical and methodological consideration of the role of the appreciator's knowledge of art-historical contexts (sect. 4).[3]

This oversight of the sensitivity to art-historical contexts persists despite research demonstrating the role of causal-historical knowledge and essentialist assumptions in the categorization of artifacts (Bloom 1996a; 2004; 2010; Kelemen & Carey 2007; Newman & Bloom 2012), and despite the greater importance experts give to historical contexts in art appraisal compared with novices (Csikszentmihalyi & Robinson 1990; Parsons 1987). Some of the most radical historicists (Gopnik 2012; Margolis 1980; 2000) have concluded from this oversight that psychological research is irrelevant in principle to the theory of art appreciation. To rebut these objections, psychological theories must address the contextualist objections and examine the links between art-historical context and appreciation of an artwork.

3. Three modes of art appreciation

A work of art carries causal information about art-historical contexts. When appreciators perceive a work, they are exposed to such causal-historical information. This exposure may lead appreciators to develop their sensitivity to related art-historical contexts and deepen their understanding of the making, authorship, content, and functions of the work. Appreciators of a work can process the information it carries in at least three distinct ways (see boxes and dashed arrows on the right-hand side of Fig. 1), through three modes of art appreciation (Fig. 2).

First, appreciators can extract information about the work by drawing their attention to its observable features in *basic exposure* (sect. 3.1). Second, once exposed to an artwork, appreciators may adopt the *artistic design stance*, which triggers interpretations of the causal information carried by the work (sect. 3.2). Taking the design stance enables appreciators to acquire *artistic understanding* derived from knowledge of the art-historical context (sect. 3.3). As depicted by the solid arrows in Figure 2, exposure to a work is a necessary condition for adopting the artistic design stance, and taking the design stance is necessary for artistic understanding.

3.1. Basic exposure

An elementary mode of appreciation is *basic exposure* to the work or one of its reproductions. Basic exposure is the set of mental processes triggered by perceptual exploration of an artwork without knowledge about its causal history and art-historical context. Perceptual exploration employs a variety of processes necessary to

Modes of Appreciation

Basic Exposure to the Work

- *Perceptual representation* and *attentional tracking* of observable features of the work (e.g., its shape, colors, tones, duration)
- Basic *syntactic and semantic processing* of symbols and narrative structures
- *Implicit learning* of regularities (e.g., styles); anticipations based on probabilistic learning
- Automatic *elicitation of emotions*
- Prompting of *pretense* and *mindreading*

Basic Exposure

Design Stance

Design Stance about the Work and its Context

- *Causal reasoning* about observable features and causal attributions (derived from essentialist assumptions)
- *Identification, localization, and genealogy* of the work and the agents and actions that caused the production of the work
- *Mindreading of the mental states of agents in the art-historical context*; re-enactment of certain mental states

Artistic Understanding

Artistic Understanding of the Work

- *Theory-based reasoning* about the content, form, and functions of the work and the causal information it carries (e.g., theory-based classification of styles)
- *Emotions elicited by epistemic processes* in the appreciator's discovery of the contextual functions and the art-historical context
- *Appreciation of look-alikes and forgeries* based on the historical tracking of the work and its art-historical context
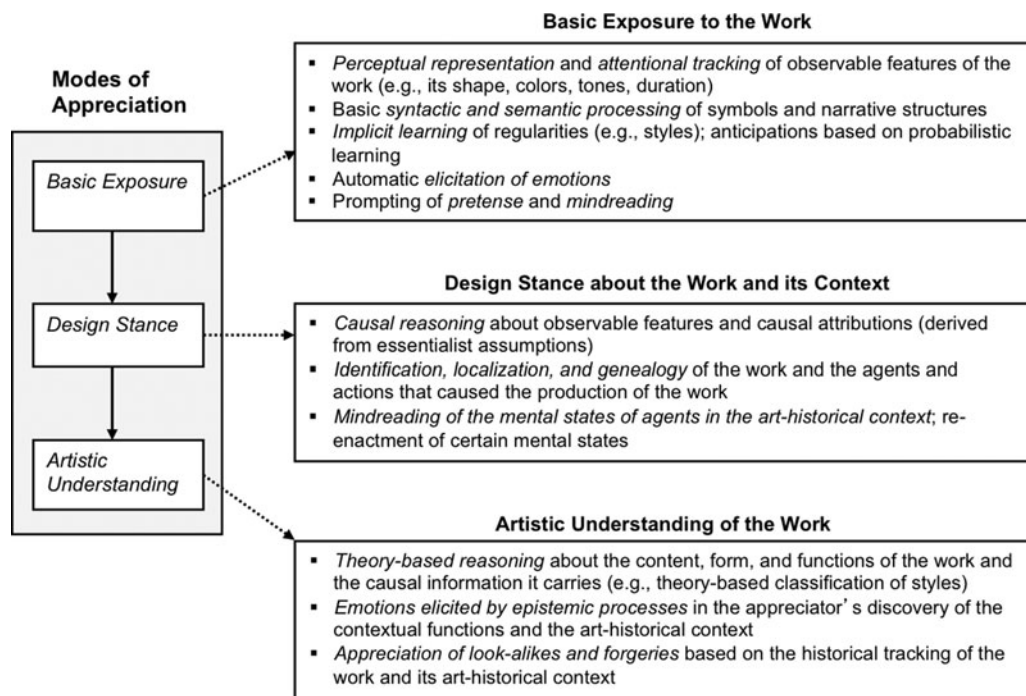
Figure 2. The three modes of appreciation of a work of art posited by the psycho-historical framework. Solid arrows depict necessary conditions. Dashed arrows specify typical mental activities elicited by each mode.

appreciation that we will not discuss here (Fig. 2).[4] Instead, we outline basic principles and focus on three processes that play a key role in our justification of the psycho-historical framework: the implicit learning of regularities, the elicitation of emotions, and pretense. Such processes may elicit cognitive analysis of artwork content and aesthetic pleasures. But they do not provide appreciators with explicit knowledge of the links between the work and its original art-historical context.

3.1.1. Implicit learning of regularities and expectations. Because artworks carry causal-historical information, repeated exposure to a work may nonetheless allow its appreciators to implicitly develop their sensitivity to historical facts or rules, even if such appreciators are deprived of knowledge about the original art-historical context. For example, exposure to musical works leads listeners without formal expertise in music to acquire an ability for perceiving sophisticated properties such as the relationships between a theme and its variations, musical tensions and relaxations, or the emotional content of a piece (Bigand & Poulin-Charronnat 2006).

Perceptual exposure to an artwork leads to types of implicit learning that may occur even if the learner does not possess any explicit knowledge about the history of the work. Consider style. Stylistic traits indicative of a particular artist, school, or period are important features of artworks that connect form and function (Carroll 1999, Ch. 3; Goodman 1978, Ch. 2). The classification of artworks according to their style is an important skill in art expertise (Leder et al. 2004; Munro 1970; Wölfflin 1920/1950). Machotka (1966) and Gardner (1970) observed that young children classify paintings according to the represented content, whereas older children begin to classify paintings according to style. However, there is reason to

doubt that artistic understanding is a requisite of basic stylistic classifications; one study suggested that even pigeons can learn to classify artworks according to stylistic features (Watanabe et al. 1995), and we do not know of any evidence for artistic understanding in pigeons. This indicates that basic style discrimination stems from probabilistic learning that does not require an understanding of the processes that underlie styles of individual artists (Goodman 1978) or historical schools and periods (Arnheim 1981; Munro 1970; Panofsky 1995; Wölfflin 1920/1950). Such understanding is more likely to derive from inferences based on historical theories rather than on similarity (sect. 3.3).

3.1.2. Automatic elicitation of emotions. The sensory exposure to form and content of a work of art can elicit a variety of automatic emotional responses (Ducasse 1964; Peretz 2006; Robinson 1995; 2005). These may include the emotions that are sometimes described as *basic* (Ekman 1992) or *primary* (Damasio 1994) – such as anger, fear (Ledoux 1996; Walton 1978), disgust, and sadness – and other basic responses such as startle (Robinson 1995), erotic desire (Freedberg 1989), enjoyment, or feeling of empathetic engagement (Freedberg & Gallese 2007). The historical knowledge that appreciators gain from the elicitation of these basic emotions by means of basic exposure to a work is shallow at best.

3.1.3. Prompting of pretense and mindreading. The appreciator's perception of the work can prompt processes aimed at representing mental states, so-called *mindreading* (Carruthers 2009; Nichols & Stich 2003). Most empirical evidence about mindreading comes from research on child development (Bartsch & Wellman 1995; Wellman 1990) and cognitive evolution (Premack & Woodruff

1978; Sterelny 2003; Whiten & Byrne 1997). To our knowledge, mindreading in art appreciation has not been an object of research in empirical aesthetics and neuroaesthetics. In contrast, philosophical arguments by Walton (1990), Currie (1990; 1995), Schaeffer (1999), Gendler (2000; 2006), and Nichols (2006) provide reason to think that mindreading and imagination are essential to art appreciation. For a work of art can prompt free imaginative games and pretense involving the attribution of fictional beliefs or desires to characters. These games often are stunning constructions of imagination (Harris 2000; Nichols & Stich 2003) and need no sensitivity to the causal history of artworks.

When watching fictitious battle scenes in an antiwar movie, viewers ignorant of its intended antiwar function may imagine themselves as military heroes and enact pretend-plays that ascribe pretend military-functions to objects (e.g., pretend that a cane has the function of a gun). These appreciators may experience imaginative contagion, the phenomenon that imagined content may facilitate thoughts and behaviors, here pretend-plays (Gendler 2006). The viewers are exposed to the movie, discriminate between fictional worlds (Skolnick & Bloom 2006), ascribe fictional intentions to their enemies, experience fear or "quasi-fear" (Meskin & Weinberg 2003; Walton 1978), and do not conflate fiction and reality (Currie & Ravenscroft 2003; Harris 2000; Nichols & Stich 2003). However, their responses to the work are not sensitive to the original art-historical context because of their ignorance of the antiwar function originally intended. We therefore must distinguish the engagement of mindreading in basic exposure from its engagement in inquiries about art-historical contexts (sect. 3.2).

Basic exposure to artworks is the mode of appreciation most frequently studied by empirical aesthetics and neuroaesthetics. However, the contextualist objection (sect. 1.2) entails that research restricted to basic exposure cannot characterize processes of artistic understanding based on sensitivity to art-historical contexts and functions because a requisite of such an understanding is thinking about causal information carried by the artwork. For example, as explained in section 3.3, a theory of basic exposure cannot resolve the classic conundrum of the appreciation of look-alikes (Danto 1981; Rollins 1993) and forgeries (Bloom 2010; Dutton 1979; 1983). Contextual understanding of the causal history of a work requires adoption of the artistic design stance, which we discuss next.

3.2. The artistic design stance

Once exposed to a work, appreciators may investigate the production and transmission of the work understood as an individual exemplar (Bloom 2010, Ch. 4–5; Bullot 2009b; Rips et al. 2006). Far from being historically shallow, this mode enables appreciators to become sensitive to the art-historical context of the work. Evidence from research on essentialism and the cognition of artifacts supports this hypothesis.

Research reviewed by Kelemen and Carey (2007) indicates that the understanding of artifact concepts by humans relies on the adoption of a "design stance" (Kelemen 1999; Kelemen & Carey 2007). Kelemen and Carey adopt the theory-theory of concepts (Carey 1985;

Gopnik & Meltzoff 1997; Gopnik & Wellman 1994; Keil 1989), which posits that development is best understood as the formulation of a succession of naïve theories. They combine this theory-theory with the hypothesis that humans adopt *essentialism* (Bloom 2010; Gelman 2003) when reasoning about natural kinds such as *tiger*, *gold*, or *water* (Boyd 1991; Griffiths 1999; Putnam 1975; Quine 1969). Psychological essentialism is the view that human adults assume that natural kinds have causally deep, hidden properties that constitute their essence. These properties explain the existence of individual members of the kind, determine their surface or structural properties, and explain the way they behave while exposed to causal interactions with other entities.

Going beyond the use of theory-theory to study concepts of natural kinds (Keil 1989; Quine 1969), Kelemen and Carey (2007) argue that it applies to concepts of artifact too. They provide evidence that adults use a causal-explanatory scheme to acquire artifact concepts and to reason about the history of artifacts (e.g., Bloom 1996a; 1998; German & Johnson 2002; Matan & Carey 2001). Their evidence suggests that artifact categorization is sensitive to the original function intended by the designer of an artifact. According to this psychological essentialism, the intended function of the artifact is its essence.

Humans adopt the design stance when they reason about artifacts and their functions. Because artworks are artifacts, humans are likely to adopt the design stance when they reason about works of art and understand their functions. Specifically, our proposal is that the *artistic design stance* involves at least three kinds of activities. First, appreciators begin adopting the design stance when they reason about the causal origins of the information carried by the work. Second, appreciators deploy this design stance if they elaborate hypotheses about the unique causal history or genealogy of the work, its functions, and the agents who produced it. Third, appreciators adopt a properly artistic design stance if they use their mindreading abilities to establish that the work was designed to meet artistic and cultural intentions within an art-historical context.

Although our analysis of the design stance is not expressed in the exact terms proposed by Kelemen and Carey (2007), we think that it is compatible with the principles of their proposal and the essentialist account of art and artifacts introduced by Bloom (2004; 2010). We thus propose that, like detectives (Eco & Sebeok 1983; Ginzburg 1979), appreciators adopt the artistic design stance when they use inferences – such as abductive inferences (Carruthers 1992; 2006a; Kelemen & Carey 2007; Lipton 1991/2004; Lopes 2005, p. 136) – to process causal-historical information carried by artworks and discover facts about past art-historical contexts. Through this kind of processing, appreciators combine their autobiographical and contextual knowledge for tracking the history of the artwork or for interpreting the intentions of the artist.

3.2.1. Causal reasoning and causal attribution. Works of art carry diverse sorts of information, for example, about craftsmanship, style, and political allegiance. When an audience begins to infer from observable features of the work the causal history of unobserved actions that have led to these observable features, they begin to engage in the design stance. This claim is supported by the fact that humans spontaneously try to track down the cause of an

event, especially if it is surprising or salient, a process that triggers causal reasoning (Gelman 2003, Ch. 5; Heider 1958). Once appreciators engage in the design stance, this engagement triggers the search for what caused the features perceived in an artwork. Such a search for causal information in artworks is a requisite for artistic understanding.

3.2.2. Deciphering the causal history of a work.

Once appreciators adopt the design stance, they start processing information carried by the artwork as causal and historical information. This stance enables them to address basic questions about the history of the work such as authorship attribution, dating, influence on the design, provenance, state of conservation, or reception. Appreciators need to decipher the causal history of the work, often by means of theory-based reasoning (Murphy & Medin 1985), to address such questions about unobservable states of affairs. For example, authentication and dating can be guided by the use of theories about the causal history of a work, such as Giovanni Morelli's theory of authentication (Morelli 1880/1893; Wollheim 1974, pp. 177–201). Morelli claims that in order to decide authorship of paintings, it is necessary to study apparently insignificant details (e.g., rendering of ears, handwriting) that reveal the author's idiosyncrasies of handling and thus enable appreciators to individuate the unique style of an artist.

3.2.3. Mindreading of agents in the art-historical context.

In addition to triggering causal attribution and tracking history, the design stance may also prompt mindreading (Baron-Cohen 1995; Nichols & Stich 2003) and an artistic *intentional stance* (Dennett 1987). In basic exposure, appreciators often use their mindreading abilities to engage in pretense without investigating its art-historical context (sect. 3.1). In contrast, the design stance leads appreciators to inquire into the mental states of important agents in the original art-historical context of the work (e.g., intentions of the artist or patron).

Appreciators may use simulation (Goldman 2006) or reasoning based on relevance and optimality (Dennett 1990; Sperber & Wilson 2002) to interpret the intentions of agents in bygone art-historical contexts. For example, an appreciator may interpret an artist's intention as a state aimed at producing a work whose function is to cause a specific emotional or cognitive process in the appreciator's mind. Mindreading driven by the intentional stance can enable audiences to apprehend an artwork from the perspective of the artist (sect. 3.3). The audience may reason about the problem the artist tried to solve. In contrast to basic exposure, an appreciator who takes the design stance can imagine alternative solutions to the artistic problem and hence use counterfactual reasoning (Gendler 2010; Nichols & Stich 2003; Roese & Olson 1995) for inferring how the artist might have solved it. This kind of mindreading is aimed at refining an appreciator's sensitivity to the causal history of the work and therefore enabling artistic understanding.

3.3. Artistic understanding

If appreciators take the design stance as a means to interpret a work, they will increase their *sensitivity to* and *proficiency with* the art-historical context and content of this work. This increase in proficiency enables appreciation of art *based on understanding*. Appreciators have artistic understanding of a work if art-historical knowledge acquired as an outcome of the design stance provides them with an ability to explain the artistic status or functions of the work. Given the variety of the processes involved in understanding (Keil 2006; Keil & Wilson 2000; Ruben 1990), we need to carefully distinguish the variety of scientific and normative modes of artistic understanding.

The *normative mode* of artistic understanding aims to identify and evaluate the artistic merits of a work and, more generally, its value (Budd 1995; Stecker 2003). It is commonly based on contrastive explanations that compare the respective art-historical values of sets of artifacts. These evaluations are often viewed as essential to the practice of art critics (Beardsley 1958/1981; Budd 1995; Foster 2002; Greenberg 1961) and art historians (Gombrich 1950/1951; 2002). The *scientific mode* of artistic understanding aims not to provide normative assessments but to explain art appreciation with the methods and approaches discussed in the present article. In a way that parallels the combination of normative and scientific aspects in folk-psychology (Knobe 2010; Morton 2003), the normative and scientific modes of understanding are often intermingled in commonsense thinking about art and scholarly writings about art (Berlyne 1971, pp. 21–23; Munro 1970; Roskill 1976/1989).

The normative mode is a traditional subject matter of philosophy. For example, Malcolm Budd (1995) derived from Hume's analysis of the standard of taste (1757/1993) and Kant's aesthetics (1793/2000) a novel normative conception of artistic understanding (see also Levinson 1996; Rollins 2004). Budd characterizes artistic understanding as an assessment of the *value* and the function of a work, a task typically conducted in art criticism (1995, pp. 40–41). On his account, the *artistic* value of an artwork is determined by the intrinsic value of the experience it offers (1995, pp. 4, 40). By "experience the work offers," Budd means an experience in which the work is adequately understood and its context-dependent and historical functions (sect. 2.2) and individual merits grasped for what they are. Such artistic understanding requires that appreciators become sensitive to the artistry, creativity, and achievement inherent in a work apprehended in its unique art-historical context of creation (Dutton 1974).

Two premises of the psycho-historical framework seem compatible with Budd's account. First, the appreciator's normative understanding of a work relies on the design stance to track the aspects of art-historical contexts that explain the value of the experience the work offers. Second, because the aesthetic functions, along with the cultural, political, or religious functions of works of art, are determined by historical contexts and lineages (G. Parsons & Carlson 2008), sensitivity to art-historical contexts is a necessary condition to Budd's normative artistic understanding. In contrast to the psycho-historical account, however, Budd's analysis includes neither the scientific mode of understanding nor the psychological processes underlying (normative or scientific) understanding. In our framework, examples of psychological processes encompass theory-based reasoning about the functions or values of the work, emotions elicited by the appreciator's understanding of the art-historical context of a work, and

differences in appraisal of indistinguishable artworks with distinct histories.

3.3.1. Theory-based reasoning. The appreciator's understanding of a work has to rely on naïve or scientific theories (Gopnik & Meltzoff 1997; Kelemen & Carey 2007; Murphy & Medin 1985) and causal reasoning (Gopnik & Schulz 2007; Shultz 1982). Theories have characteristics such as conceptual coherence, power of generalization, and representations of causal structures (Gopnik & Meltzoff 1997). These characteristics enable users of art-related theories to make predictions, produce cognitively "rich" interpretations of an artwork, and generate abductive inferences (or inferences to the best explanation; see Carruthers 2002; 2006a; Coltheart et al. 2009; Lipton 1991/2004). Theories of the art-historical context are therefore necessary conditions for the appreciators' competence in reliably identifying and explaining key aesthetic properties such as authenticity, style, genre, and context-dependent meanings or functions.

Consider style. Basic exposure may lead appreciators to recognize artistic styles by means of probabilistic learning and similarity-based classification (sect. 3.1). Because such processing is shallow in respect of art history, appreciators can hardly come up with accurate explanations of the identification of styles and the assessment of their similarities. In contrast, appreciators who develop artistic understanding can use historical theories about the relevant art-historical context to identify styles more reliably. Theories are needed in this case because stylistic properties of individuals or schools are difficult to identify and often result in disagreements (Arnheim 1981; 1986; Goodman 1978; Lang 1987; Walton 1987; Wölfflin 1920/1950). Therefore, relevant identification of styles must appeal to theories of art-historical contexts that provide explanations for such classifications.

Theories of aspects of an art-historical context can also inform the appreciators' understanding of the mind of important intentional agents. This can be illustrated by the role of theories to inform simulations aimed at understanding the decisions made by an artist or attempting to reenact the artist's decision or experience (Croce 1902/1909; 1921).

Taking the design stance opens up the possibility of misunderstandings in art interpretation. Artistic misunderstandings may depend on fallacies or incorrect explanation of the relationships between the work and its art-historical context, and not just on errors in the processing of observable features of the artwork, as in basic exposure. For example, there is evidence that communicators tend to overestimate their effectiveness in conveying a message (Keysar & Barr 2002). Likewise, some artists might overestimate the degree to which an audience is capable of understanding their intention. Similar biases in appreciators (Ross 1977) and cultural differences in causal attribution (Miller 1984; Morris et al. 1995; Nisbett 2003) may result in causal reasoning on the side of the audience that leads to misunderstandings in art appraisal.

3.3.2. Causal reasoning and emotions. Inferences about the causes of an artwork are epistemic processes, and epistemic processes can trigger emotions (Hookway 2002; Thagard 2002). Though emotions are often elicited by basic exposure to an artwork (sect. 3.1; Carruthers 2006b;

Harris 2000, Ch. 4; Juslin & Västfjäll 2008; Silvia 2009), appreciators may experience different types of emotions in the mode of artistic understanding. The quality of the emotions and feelings elicited by an artwork may depend on causal attribution.

A study on helping behavior of bystanders illustrates this point (Piliavin et al. 1969). The authors found that helping depended on the attribution of the cause of an emergency, such as handicap versus drunkenness, and the effect of causal attributions on helping behavior was mediated by emotions, such as anger and pity (Reisenzein 1986; Weiner 1980). Transferred to art appreciation, these findings suggest that the same artwork may elicit different emotions, depending on the attributions the audience makes. For example, Manet's paintings that glorified bullfighting (Wilson Bareau 2001) are certainly seen from a different perspective by most contemporary audiences and elicit emotions far from glorifying bullfighting. However, appreciators may take the perspective of an admirer of bullfighting and appreciate these paintings as intended in their original context.[5] If findings on causal attributions and emotions in the context of helping behavior could be transferred to art appreciation, it would mean that the design stance, compared with basic exposure, would result in improved artistic understanding because different causal inferences may result in the experience of different emotional qualities.

This analysis can be contrasted with a suggestion made by Fodor (1993). To rebut theories of art appreciation that stress the role of historical expertise like Danto's or Dickie's contextualist theories, Fodor conjectures that appreciators can adequately interpret a work of art without knowing its intentional-causal history, simply by imagining a fictitious causal history (a "virtual etiology") and fictitious art-historical contexts. In contrast to Fodor's hypothesis, the psycho-historical framework predicts that virtual etiologies based on arbitrary premises would result in deficient artistic understanding because they do not track the actual causal history. Appreciations based on fictitious causal histories are likely to lead to mistakes in artistic understanding, unless the appreciators' use of a fictitious causal history plays the role of a thought experiment (Gendler 2004; Gendler & Hawthorne 2002) and helps them track *real* artistic properties and art-historical contexts.

Theories of expression in art (Collingwood 1938; 1946; Robinson 2005) tend to agree with these predictions of the psycho-historical framework, because such theories entail that understanding the way a work expresses a particular content cannot be achieved without some understanding of its *actual* (rather than virtual) history and psychological effects.[6]

In the realm of everyday behavior, Elias (1939/1969) has shown that the triggers of certain emotions can be specific to a particular period of history. The above-mentioned paintings of bullfighting by Manet support this phenomenon for the realm of art. Elias's work and the example from Manet illustrate the point that the cognitive architecture of mental and brain processes underlying the experience of emotions probably remained the same in written history and may be seen as a universal; however, the *triggers* of emotions may have changed and are therefore an object of historical inquiry. To understand an artwork that was intended to convey an emotion, appreciators

have to know what triggered an emotion at the time of the production of a work and may attempt to reproduce the same kind of response.

3.3.3. The appreciation of look-alikes and forgeries.
Consider the classic conundrums of artistic appreciation of look-alikes (Danto 1981) or forgeries (Dutton 1979; Stalnaker 2005) and of the attribution of authorship (Ginzburg 1979; Morelli 1880/1893; Vasari 1550/1991; Wollheim 1974). If art were appreciated only at the level of basic exposure, and thus without causal understanding, two artworks that look alike – as in Danto's red squares (1981, pp. 1–5) and other indiscernibles (Wollheim 1993) – would elicit equivalent responses in appreciation. Thus, *Brillo Boxes* made by Warhol (Danto 2009) would elicit equivalent appraisal as the stacks of Brillo boxes in supermarkets. However, analysis of the artistic appreciation of look-alikes (Danto 1981) and historical records of responses to the discovery of forgeries (Arnau 1961; Godley 1951; Werness 1983) contradict the prediction of an equivalent appraisal of look-alikes.

Appreciators value look-alikes differently once they understand that the look-alikes have different causal history. First, this view is supported by the well-documented ubiquity of essentialism in human cognition because psychological essentialism leads people to search for hidden causes and therefore go beyond the similar appearances of look-alikes (Bloom 2010, Ch. 4–5). Second, it is supported by conceptual research (Bullot 2009b; Evans 1982; Jeshion 2010) and empirical evidence (Rips et al. 2006) demonstrating the ubiquity in human adult cognition of the ability to track individuals as unique exemplars. Hood and Bloom (2008) provided evidence that the interest in the historical discrimination of look-alikes is present even in children, who preferred an object (a cup or a spoon) that had belonged to Queen Elizabeth II to an exact replica. This preference for originals compared to replica or forgeries is inexplicable by a psychological approach that considers *only* basic exposure such as Locher's (2012) account.

The discovery that works allegedly painted by Vermeer (Bredius 1937) were in fact fabricated by van Meegeren (Coremans 1949) has led their audience to reassess their artistic value precisely because the causal history of the works and their relations to their maker and art-historical context matter to their artistic value. Van Meegeren's forgeries are profoundly misleading when they are taken to be material evidence of Vermeer's past action and artistry. Our psycho-historical framework suggests that appreciators dislike being misled by artistic forgeries precisely because forgeries undermine their historical understanding of artworks and their grasp of the correct intentional and causal history.[7]

3.4. Recapitulation

The psycho-historical framework posits that there are at least three modes of appreciation and suggests testable empirical hypotheses for each mode. According to the core hypothesis, appreciators' responses to artworks vary as a function of their sensitivity to relevant art-historical contexts. This account contradicts the claim that sensitivity to art-historical contexts is not a requisite of art appreciation and art understanding (sect. 1.1 and 2.4). Our

objections to the universalist claims that deny the historical character of art appreciation does not entail a radical form of cultural relativism, which would view scientific research on art appreciation impossible in principle because of its historical variability. In contrast to anti-scientific relativism, research on artifact cognition and essentialism (sect. 3.2) demonstrates that contextual variables moderate the effects of mental processes in ways that can be investigated empirically.

We suggested that basic exposure is a requisite for adopting the design stance, which is in turn a requisite for artistic understanding (Figure 2). Parsons (1987) provided a framework that lends support for this claim. His account of the development of understanding representational painting – from the stage of novices to expertise – seems to reflect the modes of art appreciation presented here. In the first two stages of this development, viewers do not go beyond the characteristics seen in the picture. The appreciators' interest in the meaning of the artwork and its connection to a culture and art history emerges only in the later stages.

Our claim that artistic understanding depends on adopting the design stance and adopting the design stance on basic exposure does not entail that appreciators' processing follows the three stages in a rigid order. Experts might have an ability to summon historical information very rapidly by means of fast recognition of task-relevant patterns (Chase & Simon 1973; Pylyshyn 1999, pp. 358–59) and attention routines (Ullman 1984) controlled by causal reasoning elicited by the design stance. Although we are lacking direct empirical evidence to adjudicate these hypotheses applied to art appreciation, findings from basic cognitive phenomena like top-down processing in understanding events (Zacks & Tversky 2001) and stories (Anderson & Pearson 1984; Kintsch 1998; 2005; Schank 1990; 1999) indirectly suggest that searching for causal information and employing knowledge about art history should influence the interpretation of a painting from the very first moment one is exposed to it.

The main prediction – that responses to artworks vary as a function of appreciators' sensitivity to art-historical contexts – receives preliminary support from the fact that experts often differ from novices in their evaluation of visual (e.g., McWhinnie 1968) or musical stimuli (e.g., Smith & Melara 1990). The difference might be explained by the fact that art experts are more likely to adopt the design stance and be proficient in art and its history than novices. However, this explanation awaits further research to corroborate that the effect of expertise on evaluation of artworks is mediated by these two modes of appreciation. To develop such research and address these questions, empirical aesthetics and neuroaesthetics have to conduct their research within the psycho-historical framework.

4. Empirical aesthetics, neuroaesthetics, and the psycho-historical framework

Most research in empirical aesthetics disregards the theoretical consequences of historical and contextualist approaches to art (sect. 1 and 3.4). Researchers in empirical aesthetics rarely discuss what is unique to art appreciation in comparison to the appreciation or use of other kinds of

artifacts, often assuming that using works of art as stimuli is sufficient to study art appreciation. We argue that this narrow approach cannot succeed because it is incomplete. The psycho-historical framework suggests two additional requirements for productive experimental research on art appreciation: First, researchers have to consider sensitivity to art-historical contexts when they choose the independent variables in their studies. Second, instead of focusing exclusively on mental processes related to basic exposure, investigators might instead measure dependent variables that track processes specific to other modes of appreciations, such as adoption of the design stance and acquisition of context-sensitive artistic understanding.

4.1. Independent variables and art-historical contexts

Adopting a method introduced by Fechner (1876; see also Martin 1906; Pickford 1972; Ch. 2), some studies in empirical aesthetics use simplified stimuli, such as geometrical patterns, to examine the influence of perceptual variables on aesthetically relevant judgments. Such studies may reveal what Palmer et al. (2012) term *default aesthetic biases* (p. 213) in perceptual exposure.

Berlyne (1974) used simplified stimuli to show that people preferred medium complexity and therefore medium arousal potential, supporting his seminal psychobiological account of aesthetic preference. Using artworks, however, Martindale et al. (1990) presented data that contradicted Berlyne's seminal psychobiological account. They showed that preference increased linearly with complexity, presumably because complexity was positively correlated with judged meaningfulness of the paintings. This result suggests that theories derived from studies that do not use artworks as stimuli have limited explanatory value for explaining the complex phenomena of art appreciation. Recently, Silvia (2012) criticized the fluency theory of aesthetic pleasure proposed by Reber et al. (2004a) for exactly that reason.

The psycho-historical framework suggests that studies of art appreciation lack explanatory power if they use simplified stimuli that are disconnected from an art-historical context. Instead of examining the appreciators' sensitivity to art-historical contexts by presenting artworks, experimenters collect data about ambiguous patterns within an experimental situation that result in interpretations (Schwarz 1994) that are different from appreciation of actual artworks. In contrast, there are two kinds of empirical studies that, in our opinion, come very close to meeting the methodological criteria defining empirical research within the psycho-historical framework. First, some studies manipulate appreciators' art-historical knowledge as an independent variable (Kruger et al. 2004; Silvia 2005c). Second, one laboratory study manipulated the art-historical context experimentally (Takahashi 1995).

4.1.1. Manipulation of historical knowledge.

Kruger et al. (2004) provided evidence that appreciators use an effort heuristic to rate the quality of artworks. In their study, participants gave higher ratings of quality, value, and liking for a painting or a poem the more time and effort they thought the work took to produce. Although Kruger et al.'s study did not use the concepts of the design stance or functions of artifacts, we conclude from two premises that their effort heuristic is likely to reflect the use of the artistic

design stance. First, in this study the concept of effort refers to an essential characteristic of the production of the artwork. Second, veridical attribution of effort in this study cannot be made without an inquiry into the causal history of the artifact. Because the design stance elicits an inquiry into the causal history of the artifact, the effort heuristic is likely to be an indicator of the design stance.

Silvia (2005c) proposed another type of manipulation of appreciators' knowledge. He predicted that people become interested in a novel artwork if they have the potential to cope with it in such a way that they eventually understand it. In one study, Silvia presented participants with an abstract poem by Scott MacLeod (1999). While a control group just read the poem, another group was given the contextual information that the poem was about killer sharks. Provided with this information, this group showed more interest in the poem than the control group. Although Silvia's theory is ahistorical, his experimental design introduced information about an art-historical context that was not available in the poem itself. The communication of the artist's intention to write a poem about killer sharks provided the audience with an opportunity to take the artistic design stance (sect. 3.2).

4.1.2. Experimental manipulation of the art-historical context.

Takahashi (1995) manipulated artistic intentions and revealed their connection to appreciators' experience. The author examined whether interindividual agreement occurs in the intuitive recognition of expression in abstract drawings. To this end, she first instructed art students to create nonrepresentational drawings that express the meanings of concepts like anger, tranquility, femininity, or illness. At a later stage, students without a background in art had to rate a selection of these drawings in regard to their meanings on a semantic differential scale (Osgood & Suci 1955). In addition, participants were instructed to complete the same scale for the words used to express these concepts (e.g., "anger," "tranquility," etc.). Takahashi (1995) found a surprising degree of agreement between the expressive meanings of the drawings and the word meanings. This agreement supports her claim that human appreciators have intuitions about expressive meanings of nonsymbolic attributes in drawings, at least within the same culture.

Takahashi showed how participants who adopt the design stance can infer an artist's intention from exposure to a drawing. From the standpoint of the psycho-historical framework, her study suggests that researchers can study such phenomena with experimental materials generated by a laboratory model of an art-historical context. The artistic design stance is a necessary link between this basic exposure to the drawing and the process of inferring artistic intentions from a work designed to express meaning. However, as participants in Takahashi's study were instructed by the experimenter to assess the drawings along emotional dimensions, it remains unclear whether participants would have adopted this design stance spontaneously.

Because the empirical paradigms used by Kruger et al. (2004), Silvia (2005c), and Takahashi (1995) meet the methodological requisites of the psycho-historical framework, these studies indicate that experimental research within the framework is feasible. Providing participants with knowledge about intentions guiding the production

of a work, as Silvia did, may serve as a shortcut to inducing better knowledge of the art-historical context. Takahashi's study demonstrates that research based on a psycho-historical approach does not have to be limited to guesswork about the artist's intentions or statements by the artists about their art-historical contexts. Such artistic intentions can be instructed and lead to rigorous experimental manipulations within a laboratory model of artistic production and experience.

4.2. Dependent variables that measure appreciators' sensitivity to art-historical contexts

From the standpoint of the psycho-historical framework, dependent measures relevant to the empirical study of art appreciation should inform investigators about participants' sensitivity to art-historical contexts. However, this is often not the case in empirical aesthetics.

Two studies representative of empirical aesthetics illustrate this point. McManus et al. (1993) and Locher (2003) observed that participants untrained in art detected changes in pictorial composition, at least when the deviations from the original composition were considerable. The dependent variables in these studies were judgments regarding which painting is the original (Locher 2003) or the participants' preferred work (McManus et al. 1993). In both experiments, participants chose the original painting that apparently had the more balanced composition. Locher later concluded that "balance is the primary design principle by which the elements of a painting are organized into a cohesive perceptual and narrative whole that creates the essential integrity or meaning of the work" (Locher et al. 2005, p. 169). These studies fail to consider the predictions suggested by a contextualist approach to the appreciation of imbalance.

According to a contextualist approach, appreciators' responses to violation of balance in a work should be influenced by context-specific factors such as understanding the function of an imbalanced composition in a particular situation. Investigators in this case need to design experimental paradigms using dependent measures that are sensitive to appreciator's sensitivity to balance in the art-historical context. For example, in the art-historical context of Minimalism, the monumental steel sculptures by Richard Serra (b. 1939) often use imbalance in the composition of their parts for expressive site-specific effects (Crimp 1981; Kwon 2002; 2009). Appreciators of Serra's sculptures must therefore deploy the design stance to understand that imbalance has expressive functions in Serra's sculptures. In a study (Palmer et al. 2012) presenting photographs as stimuli, imbalance was used to convey contextual meaning. In contrast to the studies by Locher and McManus et al., the authors observed that violation of balance can enhance judged preference if imbalance fits the content a photograph is supposed to convey, providing empirical evidence for the context-sensitivity of the preference for pictorial composition and appreciation. We assume that similar effects would be observed with other artistic media.

Neuroaesthetics (Ramachandran & Hirstein 1999; Zeki 1998; 1999) may take art-historical context into account to make sure that the measured brain activation is connected to the artwork and not just an irrelevant epiphenomenon. For example, Ramachandran and Hirstein (1999)

propose eight laws of artistic experience. These laws of artistic experience hypothesize that a few basic psychobiological processes – such as learning, grouping, and heightened activity in a single dimension or "peak shift" – are necessary conditions of aesthetic experience. The psycho-historical framework suggests that, to be relevant to art theory, the observed psychobiological process (e.g., grouping, peak shift) needs to be connected to art-historical contexts and explained as an effect of artistic creation in such contexts.

In conclusion, relevant dependent variables in experiments on art appreciation should be measures of responses that probe the appreciators' sensitivity to art-historical contexts. In addition to linking existent dependent variables (e.g., preference; perception of pictorial composition) to sensitivity to art-historical contexts, this framework calls for the use of new dependent measures that reflect the two modes of art appreciation that have been neglected by empirical aesthetics. For example, researchers may assess the amount of causal reasoning depending on different attributes of artworks. In the next section, we argue for a similarly contextualist approach in our analysis of the artistic manipulation of processing fluency.

5. Artistic understanding and art-historical manipulations of fluency

The aim of this section is to discuss how an existing psychological theory, the processing fluency theory of aesthetic pleasure (Reber et al. 2004a), can be adapted in order to meet the requirements of the psycho-historical framework. This theory focuses on the positivity of fluency and views disfluency as a source of negative affect. As we shall see, however, disfluency can elicit inferences about the artwork and a more analytical style of processing in appreciators who adopt the design stance and acquire art-historical understanding.

The term *processing fluency* (or fluency) refers to the subjective ease with which a mental operation is performed (Reber et al. 2004b). Kinds of fluency vary as a function of types of mental operations (Alter & Oppenheimer 2009; Winkielman et al. 2003), such as perception (perceptual fluency) or operations concerned with conceptual content and semantic knowledge (conceptual fluency).[8]

There are at least three determinants of fluency relevant to studying the basic exposure to artworks. First, fluency is a typical outcome of the perception of visual properties such as symmetry or contrast (Arnheim 1956/1974; Reber et al. 2004a). Second, repeated exposure to artworks increases the ease with which they can be perceived (Cutting 2003). Third, implicit acquisition of prototypes or grammars results in increased fluency (Kinder et al. 2003; Winkielman et al. 2006) and in affective preference (Gordon & Holyoak 1983; Winkielman et al. 2006; Zizak & Reber 2004). An example from art is style, because artworks have recurring regularities that familiarize the audience with an artist's work through implicit learning (sect. 3.1).

According to the psycho-historical framework, a work of art is an artifact designed to elicit specific mental states in its appreciators by means of basic exposure, adoption of the design stance, and artistic understanding. In this respect, like rhetoric (Danto 1981; Fodor 1993), works of art can be directive (Gombrich 1990; Lopes 2004; 2010)

Table 1. *The artistic manipulation of high fluency and disfluency*

Function of high fluency	Function of disfluency	Examples of disfluency (details in the text)
Expression or representation of		*Artists and movements*
Order; organization	Chaos; disorder; disorganization	Turner
Harmony; accord; balance	Struggle; disharmony; imbalance	Delacroix; Rubens
Calmness; inertia	Movement; energy	Boccioni, Marinetti
Familiarity; normalcy	Alienation; strangeness	Dada, Surrealism
Certainty; control	Uncertainty	Immendorff
Predictability; determinism	Chance; indeterminacy	Cage
Meaningfulness; teleology	Absurdity; meaninglessness	Baselitz; Beckett
Prompting of		*Artists*
Identification of content; identification with characters in imaginings	Analytical thinking; alienation; meta-representation	Shklovsky; Brecht
Attention to salient, well-known, traceable attributes	Attention to nonsalient, neglected, culturally valued attributes	Malevich; Mondrian; Giacometti

because they are aimed at affecting or partially controlling the appreciator's mind and action. For example, artworks causally affect the appreciators' emotional and cognitive states when attended. Thus, as this characteristic should transfer to phenomena related to fluency, it is plausible that artists use works of art to manipulate fluency for the elicitation of target experiences or states. For example, artists may aim to cause processing disfluency in order to prevent automatic identification of the content of a work, or they may aim to elicit thoughts about issues that are culturally significant in their art-historical context.

5.1. Disfluency as expressive means

Artists may manipulate the ease of processing of their works to strategically express emotions (Robinson 2004; 2005) or design pictorial content (Lopes 1996) and consequently direct the appreciators' attention at such content (Carroll 2002; Eaton 2000). Table 1 illustrates this hypothesis with examples of contrasts between opposed categories of content. The upper panel gives a nonexhaustive list of examples of types of content that may be expressed or represented by high fluency and disfluency. Roughly, the examples are ordered on a continuum from formal attributes (perceptual fluency) to conceptual attributes (conceptual fluency).

Fluent processing might be a possible outcome of an artwork embodying classical ideals of beauty, such as the ones favored and propagated by art historian Johann Joachim Winckelmann (1756/1987; 1972): order, harmony, simplicity, and calmness. Although it appears difficult to find cases where artists or art theorists explicitly conceived of high fluency as a means to express artistic content, this would be feasible in principle. In contrast, there are documented instances where disfluency is used to express artistic content, or at least to accentuate the cognitive effects inherent in the appreciation of the content of an artwork. These cases include, for example, the expression of disorder (e.g., Turner, see Clark 1961, p. 143), struggle (e.g., Delacroix and Rubens, see Mras 1966), or speed and violence as in Boccioni's Futurist

paintings and sculptures (Antliff 2000; Boccioni 1914/1977; Petrie 1974). In the *Manifesto of Futurism*, Marinetti defines the disfluent aims of Futurism by means of an attack of Classicist ideals: "Up to now literature has exalted a pensive immobility, ecstasy, and sleep. We intend to exalt aggressive action, a feverish insomnia, the racer's stride, the mortal leap, the punch and the slap" (Marinetti 1909).

Research on the response to consumer products suggests that disfluency may also signal novelty (Cho & Schwarz 2006). In art, paintings that lack familiarity may express content related to alienation and strangeness, as in the expression of content in Dada (Hauser 1951, p. 935) and in the surrealist movement (Breton 2008). Artworks may be designed to express uncertainty (e.g., Immerdorff, see Görner 1997), indeterminacy (e.g., in music; Cage 1961/1973; Gann 2010), meaninglessness (e.g., Baselitz; Geldzahler 1994; Reber 2008), and absurdity of a situation (e.g. Beckett 1954; Esslin 1961; Richter 1998).

The few examples outlined above indicate the existence of artworks that elicit disfluent processes because they have features that are difficult to comprehend. According to the fluency theory of aesthetic pleasure (Reber 2012; Reber et al. 2004a), disfluency should elicit negative affect. However, this prediction misses the point elucidated by contextualism and the psycho-historical approach, for disfluency may result in the adoption *of the design stance* by the appreciators, who may thereby question the meaning of disfluency in order to gain in artistic understanding. This use of the design stance may have two consequences: First, transitions between fluent processing and disfluency, and vice versa, could, in addition to biasing affect, serve as a cue or guide to inferences, as illustrated by fluency effects on judgments of effort (Song & Schwarz 2008a) and judgments of conceptual coherence (Topolinski & Strack 2009). Second, adoption of the design stance could lead appreciators to become proficient with art-historical contexts and conceptual content of disfluent works. Proficiency with the conceptual content of perceptually disfluent artworks may yield aesthetic pleasure because proficiency yields high conceptual fluency that could override the difficulty

of identifying representational or expressive elements. Evidence supporting this hypothesis has been reported by Belke, Leder, Strobach, and Carbon (2010).

Fluency, however, may be misattributed to any meaningful conceptual dimension. For example, an appreciator may look at a painting and conclude that the lack of clarity in the depiction of a scene represents movement, failing to notice that the artist intended in fact to represent alienation by means of disfluency. This appreciator misattributes disfluency to movement. Given the potential for misattribution, how can an audience know which content might be expressed by disfluency in a particular artwork? The psycho-historical framework addresses this puzzle by positing that appreciators adopting the design stance need to acquire proficiency with the relevant art-historical context for adequately deciphering artistic function.

5.2. Disfluency as a means to provoke elaboration

Easy processing signals that the interaction between person and environment is going smoothly, and no extra attention is needed to monitor the situation (Winkielman et al. 2003). Difficult processing may signal an ongoing problem that requires a person's attention and may elicit analytical thinking. Dewey (1910), for example, proposed that the starting point of each act of reflective thinking is a difficulty (see also Stanovich 2009 on decoupling and the reflective mind). Contemporary artists might have a similar intuition when they believe that "if a work is to provoke serious thought, it must be ugly, disturbing, difficult to look at" (Lopes 2005, p. 131). Studies by Alter et al. (2007) and Song and Schwarz (2008b) indeed found that disfluency "makes people think" in that it elicits analytical processing.

In the case of art appreciation, perceivers of a work may initiate reflexive elaboration and trigger the design stance if they encounter difficulties in deciphering the content or function of the work (see Table 1). This hypothesis can be tested empirically. For example, one could test whether participants are more likely to adopt the design stance (by asking about the history of an artwork or the intention of an artist) when they are engaging with a work that is difficult rather than easy to process. Such a prediction could be related to Brecht's literary theory. Drawing from Shklovsky (1917/1965), Brecht theorized this sort of effect as *alienation effect* (*Verfremdungseffekt*). In Brechtian drama, the primary function of this alienation effect is not to express content, but to prevent automatic identification with the depicted characters and prompt the audience to reflect about the depicted events and the art-historical context. To achieve this alienation effect, an artist has to turn "the object of which one is to be made aware, to which one's attention is to be drawn, from something ordinary, familiar, immediately accessible, into something peculiar, striking and unexpected" (Brecht 1964, p. 143). However, this disfluency does not render the piece as a whole difficult to understand, as Brecht stated at another place: "When your work is complete, it must look light, easy. [...] You mustn't leave out the difficulties, but must collect them and make them come easy through your work. For the only worthwhile kind of ease is that which is a victory of effort" (Brecht 1964, p. 174).

Furthermore, artists may elicit disfluency in the perception of salient attributes in order to direct the audience's attention to the presence of less salient, but culturally valuable attributes (Dutton 1974; Eaton 2000). Consider, for example, the works by Alberto Giacometti. His sculptural depictions of human figures lack most of the cues that help identify a three-dimensional object as a human body, such as contours, proportions, smooth surfaces, and prototypical colors. Despite the absence of such cues, the perceiver can still recognize that the sculptures depict human figures (Sartre 1965, p. 191) because the rudimentary topology of human anatomy is preserved. Giacometti's sculptures can be conceived of as strategically designed to direct the public's attention to such essential topological features as a result of adopting the design stance. Similarly, abstract artists like Mondrian or Malevich introduced geometrical forms, in which the depiction of familiar objects progressively vanished. This move made such artworks disfluent for an audience accustomed to representational art, but it can be viewed as a strategy to disrupt thoughtless appreciation and direct attention to the interest of specific nonrepresentational compositions (Malevich 1959).

In sum, works eliciting disfluency are used to interrupt the audience's thoughtless appreciation of a work and makes the audience pay attention to and inquire about nonsalient but culturally valuable attributes in art-historical contexts. Such an aesthetic inquiry is likely to promote artistic understanding because of its connection to the artistic design stance. As a result, the perceptual difficulty caused by alienation turns into conceptual ease because of psycho-historical proficiency with relevant attributes revealed by the artwork and knowledge of the art-historical context.

6. Conclusion

We began with an analysis of the antagonism between the psychological and historical approaches. In their research, psychologists and neuroscientists neglected the appreciators' sensitivity to art-historical contexts. This oversight led historicists to disregard psychological research on art appreciation because, in their opinion, psychological accounts failed to contribute to a scientific exploration of art. In this context, we argued that research should be conducted within a psycho-historical framework for the science of art appreciation in order to unify the two dominant traditions in art theory. We propose to start from a framework that apprehends artworks as artifacts appreciated by means of three modes of art appreciation. A series of examples demonstrate that theory and research methods in psychology and neuroscience can be adapted to the psycho-historical framework. Psycho-historical theories of art can integrate inquiries into art in the humanities with the cognitive and social sciences of art, leading to refinement of testable hypotheses. In sum, research within the psycho-historical framework can help interdisciplinary scholars build a still hypothetical science of art.

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NOTES

1. The term *appreciator* refers to the person who is making the appreciation, regardless of whether this person is the artist or the member of an audience. If we focus on one of these categories, we will use either *artist* or *audience*. *The artist* may either refer to a single person or to a collective of artists.

2. The appreciator's *sensitivity* to an art-historical context is the fact that some of the appreciator's mental processes involved in some mode of art appreciation are *responsive to* or *track* information relative to this art-historical context. For more on epistemic sensitivity, see, for example, Azzouni (2004), Nozick (1981), and Sosa (2007).

3. At first sight, the theory of the evolution of artistic taste by Colin Martindale (1990) seems to consider both history and psychology, explaining changes in artistic styles by the effect of habituation. However, instead of proposing a theory within the psycho-historical framework, Martindale's approach can best be classified as an example of pro-naturalistic historicism (Popper 1957/1976), which tries to explain trends in history by means of a theory of historical change that predicts future trends. Martindale underlines this claim with his book's subtitle, "The predictability of artistic change" and claims – in line with other universalist approaches – that art history does not play a significant role in art appreciation. Popper (1962; 1957/1976) rejected prophetic philosophies of history on the ground that historical trends depend on historical events that cannot be predicted by science. Beyond exceptions to the predicted trend in Martindale's data, Popper's argument undermines Martindale's prophetic empirical aesthetics in principle. In contrast to Martindale's theory, the psycho-historical framework does not aim at predicting long-term historical trends and appeals to art history to find accurate aesthetic variables in the investigation of art appreciation.

4. Such basic processes are involved in phenomena studied in evolutionary accounts of art appreciation. For example, appreciators' immediate preferences might exhibit universal aesthetic biases, such as preferences for savanna-like landscapes (Dutton 2009, Ch. 1; Kaplan 1992) or symmetry in faces (Rhodes 2006). If these evolutionary accounts are correct, such universal biases would be normally manifested in the mode of basic exposure.

5. If the audience is willing to do so: see Gendler (2000) on the phenomenon of *imaginative resistance*, the unwillingness to imagine events that contradict a person's moral convictions.

6. Jenefer Robinson (1979; 2004; 2005) combined the psychology of emotions with a theory of artistic expression that incorporates aspects of the historical nature of artworks. She provides conditions for defining the expression of an emotion in an artwork (2005, p. 270) that can be transposed into those of the psycho-historical framework. For example, she argues that, as a result of the articulation and elucidation of an emotion in the work, appreciators can become sensitive to the intended emotion and bring it to consciousness. This condition alludes to processes that we think are guided by the design stance and lead to artistic understanding.

7. This point does not conflict with the fact that some reassessments of authorship do not lead to dramatic reassessments of artistic value, such as in the music of the eighteenth century – where erroneous ascriptions were frequent (Cudworth 1954), most notoriously for the works of Giuseppe and Giovanni Battista Sammartini (Mishkin 1959). According to the psycho-historical framework, these changes of ascriptions did not result in a marked reevaluation of the work because they did not result in a marked change in the relationship of the works to their stylistic and art-historical context.

8. Although Smith and Smith (2006) used the term *aesthetic fluency* to roughly denote what we call *proficiency* with an art-historical context, we will use *fluency* to denote processing ease.

Open Peer Commentary

Neuroaesthetics: Range and restrictions

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Abstract: Bullot & Reber (B&R) should be commended for highlighting tensions between scientific aesthetics and art history. The question of how each tradition can learn from the other is timely. While I am sympathetic to their views, their diagnosis of the problem appears exaggerated and their solution partial. They underestimate the reach of scientific aesthetics while failing to identify its inherent restrictions.

Bullot & Reber (B&R) outline "decisive" objections to scientific aesthetics in developing the idea that contextual knowledge is "essential" to art appreciation. Nothing about their argument implies that universal responses are inessential to art appreciation. The decisive objections simply posit that there is more to art appreciation than ahistorical considerations, but not that ahistorical considerations are unimportant. This asymmetry of emphasis has consequences for what follows. Their solution to the problem of divergent traditions is that scientists should include historical and cultural variables in designing their studies. A more complete solution would also consider the extent to which art historians and cultural theorists might incorporate scientific knowledge and methods in testing their hypotheses (e.g., Onians 2008).

In their critique of scientific aesthetics, B&R do not distinguish between disciplinary limits of practice from those limits that arise in principle. Here, I focus on neuroaesthetics as the "radical" offshoot of scientific aesthetics (Chatterjee 2011a). These are early days in the discipline as the proper target of inquiry and appropriate methods are being worked out (Chatterjee 2012). For a neuroscientist, art appreciation comprises neural instantiations of a critical triad of mental faculties: sensations, emotions, and meaning (Chatterjee 2011b). Sensations are the processing of sensory attributes of artworks, such as line or color or shape. Emotions are feelings evoked by an artwork, often pleasure, but by no means restricted to this one positive emotion. Meaning refers to our understanding of and the memories evoked by an image.

Neuroaesthetics joins the tradition of empirical aesthetics started by Fechner in the nineteenth century (Fechner 1876). This tradition typically investigates the sensation-emotion axis (Chatterjee 2004) that is ahistorical and taps into common responses to art etched in our brains. Such studies fall within the level of analysis that B&R call "basic exposure" to art.

Meaning can also be ahistorical. Cognitive scientists distinguish this kind of meaning, semantic memory, from meaning tethered in time, episodic memory. People without training in the arts typically prefer representational over abstract art (Pihko et al. 2011). Here, recognizable objects in a painting engage the viewer. Neuroscience has something to say about how we recognize objects, places, and faces (Binder et al. 2009). When art depicts objects, places, or faces, we know something about the brain's response to such artworks. These neural responses are part of the biology of art appreciation of representational paintings.

B&R correctly observe that historical meaning and its interactions with the sensation-emotion axis are less often subject to scientific scrutiny. The contributions of historical meaning are features of the "design stance" and "art understanding" in B&R's taxonomy. However, they underestimate scientists' awareness that cultural knowledge and expertise influence art appreciation

(Hekkert & van Wieringen 1996; Leder et al. 2004). For example, differences in the approach to art by experts and nonexperts have been within the purview of scientific aesthetics (Nodine et al. 1993).

Duchamps' urinal and Warhol's *Brillo Boxes* vividly demonstrate that sensory features of an object are not enough to evaluate or even recognize an object as art. Background historical knowledge can transform mundane objects into artworks. Recent examples from neuroaesthetics show how background knowledge can be incorporated in experiments probing art appreciation. These studies also reveal inherent limits of scientific aesthetics.

In one study (Kirk et al. 2009a), participants found identical abstract art-like stimuli more attractive when labeled as museum pieces than as computer generated. This preference was reflected in greater neural activity within reward circuits: the medial orbito-frontal cortex and the ventro-medial prefrontal cortex. Thinking the images were museum pieces also produced more activity in the entorhinal cortex presumably important when accessing memory. This study draws its motivation from a larger line of neuroscience research examining the influence of cognition on valuation (e.g., McClure et al. 2004). In a different study, Weismann and Ishai (2010) scanned participants looking at Braque and Picasso cubist paintings. Half of the participants that were given 30 minutes of training in information about Cubism and practiced recognizing objects in such imagery. When looking at cubist paintings, these participants had more activity in the intraparietal sulcus and parahippocampal gyrus than did untrained participants. A short training session had an influence on their appreciation of paintings that could be neurally recorded. Kirk and colleagues (Kirk et al. 2009b) compared the neural response of architecture students to other students as they looked at pictures of buildings and faces. The architecture students had more neural activity in the hippocampus in response to buildings than to faces. Pictures of buildings presumably activated their store of architectural knowledge. When looking at buildings, they also had more neural activity than the other students in the medial orbito-frontal cortex, as well as in the anterior cingulate. Their expertise modulated neural responses in reward circuits. By contrast, both sets of students had more neural activity in the nucleus accumbens for attractive faces and buildings. This core pleasure center recorded enjoyment of objects independent of background knowledge.

These studies demonstrate that neuroscientists can and have designed studies with varying degrees of historical information as independent variables in probing art appreciation. Certainly, much more needs to be done. These studies also reveal domains of art appreciation in which experimental aesthetics remains silent (Chatterjee 2011b). Scientific studies can investigate the influence of historical meaning on appreciation of artwork. They cannot analyze historical meaning itself embedded in the artwork. If one believes that a critical level of analysis in art appreciation is understanding the unique information contained in individual works, the way a piece of art responds to its place in time, and is embedded in its local culture, then experimental science will be found wanting. Experiments, by design, draw general inferences from many examples of artworks. Scrutinizing layered historical meanings of an individual work of art is too fine-grained a level of analysis to be resolved by the lens of scientific experimental methods.

Artists' intentions and artwork meanings: Some complications

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Abstract: Artists' intentions are among the primary data retrieved by art appreciators. However, artistic creation is not always deliberate; artists sometimes fail in their intentions; artists' achievements depend on artworld roles, not only intentions; factors external to the artist contribute to artwork meaning; artworks stand apart from their creators; and interpretation need not be exclusively concerned with recovering intended meaning.

I agree with the authors of "The artful mind meets art history" both that the empirical study of art appreciation should take account of the relevance of art-appreciators' awareness of an artwork's provenance and that this is methodologically possible. The authors identify artists' intentions as the primary data that appreciators attempt to retrieve from the art-creative context in the process of comprehending artworks. In this commentary, I draw attention to complications and difficulties that attend this view.

1. According to some theories, much of the creative process may be unconscious. If so, artists literally do not know what they do or why they do it. Reference to their avowed intentions then would be irrelevant or misleading. Moreover, even if such theories of the creative process are not universally plausible, as seems likely, at least some acts of artistic creation are probably of this form.

2. It is possible that artists often have appreciation-relevant intentions that fail. Quite likely, they aim to produce very good, unified, powerfully expressive or meaningful works. And frequently they will fall short of this goal, yet need not be aware of doing so.

3. In focusing on artists' intentions, it is easy to overlook the facilitating conditions that make their realization possible. It may be that what the artist can achieve depends in part (but importantly) on the status and authority that go with the role of artist in the informal institutions of the artworld. In that case, understanding what was done by the artist should be as much concerned with how he or she came to occupy the relevant role and with the authority that it establishes as with the particular intentions that crossed the artist's mind in the production of a given work.

4. Many art-contextual features relevant to assessing an artwork lie beyond the mind of the artist. In "The artful mind meets art history", Bullot & Reber (B&R) acknowledge this in the discussion of forgeries, for instance. But it is important to recognize how pervasive and important these nonpersonal factors are. Artworks take on some of their art-appreciable properties in relation to the context of their production, and to a large extent this context is given to and assumed by the artist, rather than being established by him or her. The art historical context includes the works of previous and other artists, established conventions, traditions, genres, styles, and practices, and the state-of-art technologies available for use. Indeed, the art historical context soon connects to much broader social structures, values, and patterns, such as the standing of the arts in the culture, artists' accessibility to audiences, ties between the arts and politics or religion, and so on.

5. Among an artist's intention, we should distinguish categorical intentions – that the work be a tragedy or a satire, for example – from those concerning how the work's content is to be understood. The former are crucial for establishing the identity of the object of interpretation if it is the artist's work we wish to interpret. But the latter might be rightly ignored by the art appreciator. It is a convention of art-interpretative practices that the work stands on its own (Nathan 2006), and perhaps also that evidence of intention beyond what is manifest in the work itself should not be consulted in interpreting the work.

6. Even where it is agreed that interpretation should target the artist's work identified as such, there is debate about the extent to which artists' intentions are relevant to their works' meanings.

Where some (such as Carroll 2000b) see artists' successfully executed intentions as determining their works' interpretative significance, others suggest variously that we interpret the work with reference to the intentions of a hypothetical author rather than the actual one (Levinson 2010), that intended meanings do not exhaust the possibility of work meanings (Stecker 2006), and that we should maximize the work's interpretative interest while respecting its identity (Davies 2006b).

7. In any case, it is not obvious that interpretation must confine itself to the artist's work properly identified as such. A more fanciful approach to the work's interpretation could be no less legitimate. In this case, the interpreter uses the work as the jumping off point for an imaginative exploration that brings in idiosyncratically personal associations and the like. Reference to artist's intentions is largely irrelevant to this kind of freewheeling interpretative endeavor.

The considerations I have listed do not undermine the project of empirical aesthetics as advocated in "The artful mind meets art history," but they do indicate how sophisticated and sensitive that approach needs to be.

The artistic design stance and the interpretation of Paleolithic art

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Abstract: The artistic design stance is an important part of art appreciation, but it remains unclear how it can be applied to artworks for which art historical context is no longer available, such as Ice Age art. We propose that some of the designer's intentions can be gathered noninferentially through direct experience with prehistoric artworks.

The *artistic design stance* allows viewers to infer the complex causal history of artworks, taking into account their art historical context. How can this framework be applied to the earliest surviving artworks from the Pleistocene, including cave paintings, sculptures, and engravings? Prehistoric art poses challenges to Bullot & Reber's (B&R's) notion of artistic design stance, because contextual information on the functions and intentions of these artworks is no longer available. Inferring this information by reasoning about their causal history, formulating hypotheses about their genealogy, and relying on mental state attribution (components of the artistic design stance that B&R identify) is not as unproblematic as they purport.

The widely differing interpretations of so-called Venus figurines by expert archaeologists and art historians over the past century illustrate the difficulties of adopting the artistic design stance for early artworks. Small portable sculptures of women have been found across Upper Paleolithic Europe, from the Dordogne to Siberia, dating between 35,000 and 11,000 years ago. Except for their gender and diminutive size, these objects are diverse, coming in a variety of materials and body shapes. Archaeologists have interpreted them, amongst others, as the Paleolithic equivalent of centerfolds (Guthrie 2005), self-portraits (McDermott 1996), and gifts used in long-distance exchange networks (Gamble 1982). Although not all these interpretations are mutually incompatible, their diversity indicates the difficulty in reaching conclusions on function and intent when art historical context is no longer available. Archaeologists even fail to agree

on whether the figurines were intended as erotic imagery (Guthrie 2005), realistic portraits of women (Nelson 1990), or even grotesques carved with the purpose of scaring intruders away (von Koeningswald 1972).

Some authors (e.g., Lamarque 1999, p. 2) have worried that the lack of art historical context makes early art unintelligible: "If, per impossible, a configuration perceptually indistinguishable from Leonardo's *Virgin and Child with St. Anne* were to be discovered on a Paleolithic cave wall and dated from the time of the animal paintings, we would literally find it unintelligible." Paleolithic art would be unintelligible if the artistic design stance were mainly a mediate activity, that is, a process of inference. However, the artistic design stance also has an immediate component that operates in addition to the mediate causal inferences that B&R describe. As Davies (1997, p. 27) observes, "our acknowledgement of certain items as first art seems to rest on our direct recognition of them as such, not on abstract reasoning." The noninferential part of the artistic design stance is perhaps best illustrated by the observation that young children tend to overattribute design spontaneously – they believe that objects, including mountains and clouds, were made for a purpose (Kelemen 2004). If design attribution were a purely inferential process, young children would not take it as a default stance. In adults, this noninferential component remains important: the observation of an unknown artifact (e.g., a prehistoric tool with unknown function, like a hand axe) spontaneously triggers design attribution, which does not rely solely on explicit inferences about its intended function, identity, maker, and context. In cases like these, where we have no contextual information, this immediate design stance can act as a default.

Lehrer (2006) argues that we gain ineffable and immediate knowledge of an artwork by direct interaction with it. A linguistic description of its content still leaves out something essential of what that work is like: a detailed account of, say, van Gogh's intentions when painting *Starry Night*, based on ego documents and contextual information, still lacks knowledge about some of van Gogh's intentions. This knowledge can only be gained by perceiving the artwork itself (e.g., design intentions evident in the bold color contrasts and the whirling brush strokes). Conversely, even if all information on van Gogh's life, work, and his cultural context were destroyed, we would still know something about these design intentions as long as we have perceptual access to his oeuvre. Similarly, perception of Paleolithic artworks – indirectly through photographic reproductions, or directly by visiting collections and rock art sites – provides observers with immediate knowledge of the design intentions of past artists.

B&R argue that the artistic design stance is a prerequisite for artistic understanding. We believe that noninferential components of the design stance also contribute to artistic understanding, because design features are likely to be constrained by universal and stable properties of human cognition. Given that Paleolithic artists likely had a mind like ours, their noninferential observation of design intentions was similar to ours (De Smedt & De Cruz 2011). Applying this to the Venus figurines, we can note the striking lack of facial features (a few exceptions like Brassempouy notwithstanding). The human visual system is naturally attracted to face-like stimuli, a propensity that is already present at birth (Farroni et al. 2002). Therefore, the lack of facial features is very likely not incidental, but an intended effect. Next to this, because even children from cultures without figurative art (e.g., in Papua New Guinea) can spontaneously draw human-like figures when asked to "draw a man" (Martlew & Connolly 1996), we can infer that, at the very least, the Venus figurines were intended to represent women (though a few have ambiguous sexual characteristics). Also, roughly 50% of the Venus figurines were fashioned from mammoth ivory. A design feature that can be discovered immediately through observation is the sensuous luster of these sculptures, an effect that can also be observed in zoomorphic figurines from the same period. This effect was accomplished by polishing them with hematite, a remarkably

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effective metallic abrasive that is still used to accomplish the same effect by contemporary ivory carvers (White 2005). It seems reasonable to suppose that this lustrous effect was intended by the artists, because mammoth ivory is a material that is difficult to work as a result of its growth rings.

To conclude, the artistic design stance is a complex conglomerate of cognitive processes that involve both mediate and immediate observation. Paying closer attention to its noninferential features can increase artistic understanding, especially for objects for which no art historical context is available.

Fechner revisited: Towards an inclusive approach to aesthetics

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Abstract: Accepting Bullot & Reber's (B&R's) criteria for art appreciation would confine the study of aesthetics to those works for which historical information is available, mainly post–eighteenth-century Western "high art." We reject their contention that "correct" artistic understanding is limited to experts with detailed knowledge or education in art, which implies a narrowly elitist conception of aesthetics. Scientific aesthetics must be broadly inclusive.

Bullot & Reber (B&R) are certainly correct that knowledge of cultural context changes our perception of art, because such knowledge changes our understanding of virtually anything. But we reject their contention that such knowledge is indispensable, because detailed information about artist, patron, meaning, or context is limited or unavailable for most of the world's art. Although art historical knowledge may enhance an aesthetic experience, it is not a necessary condition. Indeed for the vast majority of perceivers, such knowledge is not, and has never been, an essential part of the aesthetic experience. To deny them "true" artistic understanding, or classify their aesthetic experience as "deficient," is unacceptable for at least two reasons.

First, it is often impossible to reconstruct the agent behind an artwork, or the context in which it was produced. From the cave paintings of Lascaux to the cathedral of Notre Dame, the actual artisans, and the varied rationales behind their actions, remain unknown. The same is also true of traditional folk art and applied art, such as patchwork, pottery, mosaics, and so forth. The makers of these "low" arts often remain anonymous and their context of creation vague or unknown. Nonetheless, these "unregarded arts" are fully fledged manifestations of the human drive to create art and often elicit rich aesthetic experiences (Gombrich 1979). The modern distinction between art and craft, and the Romantic conception of artistic expression as individual inspiration and creative novelty, is recent even in Western thought (Kristeller 1952; Shiner 2001) and wholly inapplicable to many other cultures and times. Western representational artwork is unusual in its richly documented written history, but even in the Western canon, attention to authorship and interest in the author's intentions is a recent phenomenon. Hence, B&R's "psycho-historical framework" is inapplicable, even to much of the traditional Western canon, from Egypt to Greece, Rome, and medieval Europe. For the rest of the world's art, knowledge of and interest in such issues is very recent or nonexistent – or even antithetical to accepted artistic or religious principles (e.g., in Islam). From the Alhambra to Machu Picchu, "causal/historical information" is scant, but

nonetheless such masterworks certainly deserve consideration in any future science of art appreciation.

Secondly, if the human aesthetic sense is deeply rooted in our species' biology – as we believe it is – then we must understand aesthetic appreciation in its native form, independent of education or secondary knowledge. A full command of one's native language does not require schooling or literacy, and both rich understanding and skillful production of music are possible without explicit knowledge of musical theory or music-reading ability. Thus, both modern linguistics and musicology have rejected elitist and prescriptivist views of language and music, and both fields today focus on the everyday speaker/listener (Honing 2009; Yule 2006). Equivalently, aesthetic science should take seriously the hypothesis that the aesthetic capacity is a fundamental human cognitive trait. Testing this hypothesis entails the firm rejection of any notion that "true" or "correct" understanding is limited to a select few, or to artworks for which rare ancillary knowledge is available. For most human artworks and traditions, both the creator(s) and the intended audiences lacked formal education or background in art history. Any framework placing such factors at center stage therefore provides an inadequate basis for a future science of aesthetics.

How to proceed? The founder of empirical aesthetics, Gustav Fechner, distinguished two perceptual components: direct and associative (Fechner 1871; Fechner 1876). Fechner restricted empirical aesthetics to the direct component, because of the experimental control it allows. Although it is interesting that "yellow" is associated with cowardice in English culture, but with wisdom and royalty in Chinese culture, we do not believe that such associations are of central importance for the scientific understanding of human perception and appreciation of color. A rich understanding of human color perception requires experimental analysis of color contrast, discrimination and memory (psychology), an understanding of color receptors, color blindness, and comparisons with other species (biology), and cross-cultural experiments like those of Berlin and Kay (1969) (anthropology). Currently, our understanding of such "direct" factors in aesthetic science remains extremely limited. In its absence, worrying about edge cases like Warhol's *Brillo Soap Pads Boxes*, Duchamp's urinal, or Cage's 4′33″ seems myopic at best (Fig. 1).

Fechner proposed three methods for studying aesthetics empirically: choice, production, and real use (Fechner 1876). Only the first has been widely adopted by psychologists, mostly in choice paradigms using simplified artificial stimuli. We concur with B&R that this practice, by itself, is inadequate. But a rich reservoir of human-generated patterns is available, produced in all human cultures to elicit an aesthetic response: nonrepresentational geometrical patterns (Fig. 2). Following Fechner, we argue that such patterns provide an ideal middle ground between representational "fine art" expressing a creative artistic vision, full of associative content, and the artificially simplified stimuli beloved of psychologists. Fechner singled out ornamental art as ideal for studying direct factors such as symmetry, complexity, structural ambiguity, and regularity, with little associative content. With modern software, such patterns provide full experimental control, but still elicit a bona fide aesthetic reaction. For example, we have recently applied Fechner's method of production to tilings using touchscreens, analyzing which structural variants humans spontaneously produce, and comparing them to the patterns participants prefer and to those found in reality (Fig. 2). Humans prefer to make, and perceive, patterns with a high level of symmetry and regularity (direct component). Creativity is also evident: participants often produced different pattern variants for the same tile array (Westphal-Fitch et al. 2012).

In conclusion, we share B&R's dislike of the "two cultures" divide in aesthetics and agree that progress in a science of aesthetics demands collaboration between psychologists, art
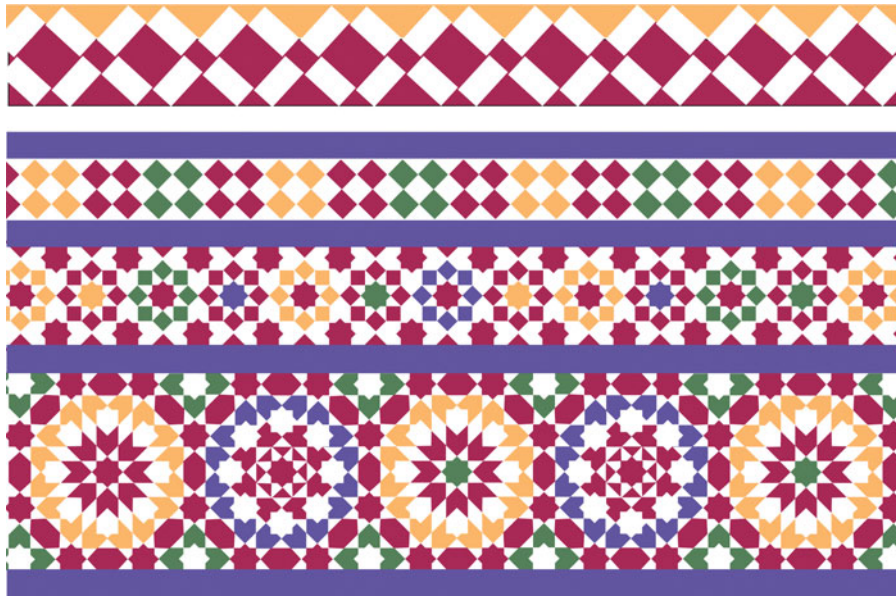
Figure 1 (Fitch & Westphal-Fitch). An example of complex, beautiful nonrepresentational art, illustrated by Nadja Kavcik, based on an Islamic tiling, maker unknown.
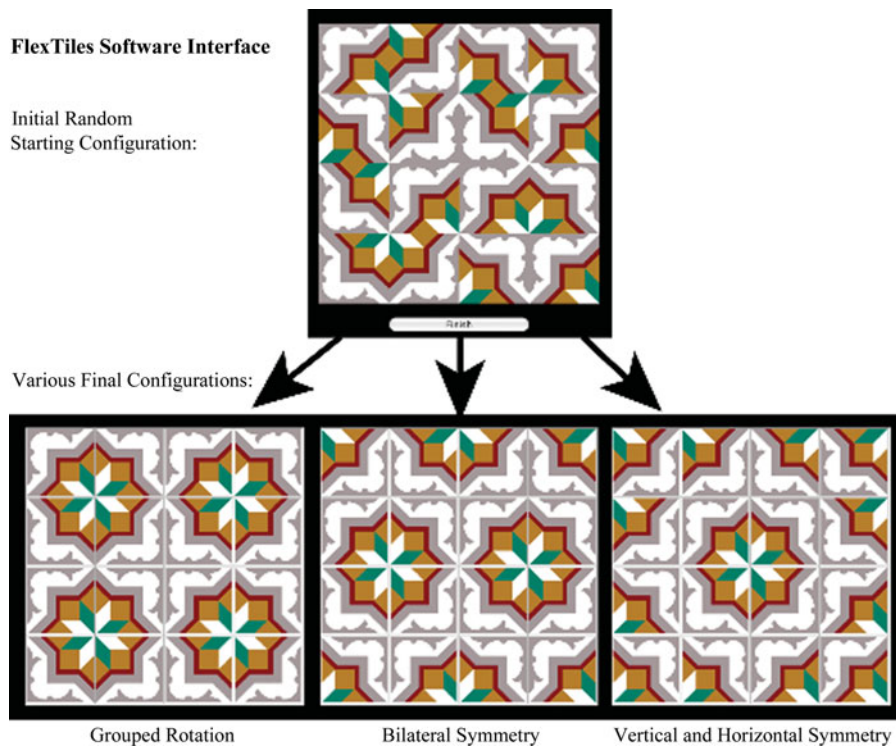

Figure 2 (Fitch & Westphal-Fitch). Schematic illustrating "FlexTiles" software. Participants are presented with a random matrix of tiles on a touch screen. Pressing the tiles rotates them, and participants are told simply to press until they are done. Participants typically create highly ordered, symmetrical patterns, despite no instructions to do so; three example outputs are shown. (from Westphal-Fitch et al. 2012).

historians, and artists. However, we believe that B&R's proposed framework risks unintentionally smuggling the covert elitism of traditional art history and philosophical aesthetics into a future science of art appreciation. Any framework placing historical and cultural information at the heart of aesthetic appreciation will be narrow and Eurocentric from the outset and incapable of addressing the truly deep questions of the human aesthetic capacity rigorously and empirically.

Educating the design stance: Issues of coherence and transgression

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Abstract: Bullot & Reber (B&R) put forth a design stance to fuse psychological and art historical accounts of visual thinking into a single theory. We argue that this aspect of their proposal needs further fine-tuning. Issues of transgression and coherence are necessary to provide stability to the design stance. We advocate looking to Art Education for such fundamentals of picture understanding.

The position from which we judge the stimulating article of Bullot & Reber (B&R) is that psychological aesthetics encompasses investment of human intelligence in art objects, explaining in terms of tendencies why and how viewers engage with a picture tepidly or enthusiastically, or disengage with indifference or antipathy. The visual thinking that becomes culturally sanctioned develops from roots in our biological makeup.

A gap between (a) psychology backed by the authority of biological sciences, and (b) art appreciation informed by art history backed by the authority of philosophical aesthetics, is cleverly bridged by B&R's interpolated "design stance." Exposure primes one for adopting the design stance, which in turn is a necessary condition for art appreciation, with information flowing top-down and bottom-up. We take it that viewers' assumptions are shaped to centre on a plurifunctional conception of pictures, encompassing representation, expressiveness, interest, and beauty. That permits reasoning about whether unattractive scenes inspire good pictures, whether an artist is authoritative about what is being depicted, and what constitutes a good artist: such matters cannot be explained by extension from viewing history ("exposure"). But what are core principles for interweaving psychology and history through the design stance? The ultimate test will be whether the interpolation tessellates culture with the traditional levels of analysis: functional, phylogenetic, causal, and ontogenetic. It is tricky to specify how the design stance works.

Whereas evolutionary psychology and neuropsychology necessarily explicitly constrain themselves to *few and powerful core concepts*, art history presents us with much more variable sets of concepts, resisting reduction to biological core conceptions. B&R (sect 4.2, para. 2 and 3) are clear that theorizing the design stance involves corrective tempering of extension of biological concepts. But biological concepts do have a trick of generating probabilistically correct predictions (sometimes, of course, merely by coincidence!). Take the core conception of aesthetics being automatically tuned by natural scenes. An Art-Educational study by Ruggi and Gilli (2008), organized discussion towards a characterization of "something beautiful" ("bella" is wider than in British English, more like Australian English): *Nature came top in learners' values, pictorial art bottom*. It is not as though Italy were noticeably short of pictorial art exposure. Any formulation of the design stance as a necessary mediator needs to demonstrate its relevance to the question of when core psychological conceptions are or are not responsible for particular predicted outcomes. Sure, "contextual variables moderate the effects of mental processes" (sect. 3.4, para. 1): but that is an anodyne formulation. Presumably some extensions of biological constraints will be rather easily moderated, demoted into "booster rockets" to get pictorial engagement going (Freeman 2011). But which ones?

The admirable move by B&R is to add to the design stance biologically impelled potentially moderating processes, such as inferentially searching for function and intent as emphasized by Paul Bloom. That surpassing of passive viewing enables B&R to suggest a diagnostic for the design stance, characterized as a form of reasoning addressed to reality, with "other typical activities" within the stance incorporating processes vital to persisting engagement with artwork. But here arises a problem with B&R as it stands (see B&R's Fig. 1).

Any candidate mental posture earns the term "stance" when there is some (imperfect) stability and coherence. B&R need a formulation of both. Maybe cross-talk ("binding") between "typical processes" (B&R Fig. 2) promotes internal cohesion? Further, commonalities across "typical processes" are inescapable: we hypothesize that reasoners come to notice commonalities. "Picture" is of course common to each type of design stance mental activity, plus Artist, Viewer, and Scene, a small ontology contracting only six interconnections forming the heart of aesthetic reasoning (Freeman 2004) up to the ill-defined interface between the design stance and art appreciation, where reasoners face art-historical functions and phenomena. B&R propound an example of how contextual information overcomes mistaking an artist's own willed knife-slash for an extraneous act of vandalism. But art appreciation also involves giving due weighting to information on *why* and *how* the act is more than an autovandalistic futile gesture (which, to cannibalize literary-aesthetic terms, confuses showing with telling). Rather than invoking what may be a marginal case of willed transgression, we advocate analyzing centrally important transgressivity, for example, Turner (1983) reporting how learners criticized Derain for slapdash colouring, resisting engagement with Fauvism: presumably the perceived transgressivity affronted the learners' hard-won coherence of values within their design stance. Art Education examples are an underused resource in B&R. So is the computational approach to pictorial challenges, as in Willats (1997; 2005) who presented analyses (which survive subsequent visual-computational advances by Koenderink & van Doorn 2006; Pizlo 2008). Willats (2006) traced appreciation of Klee from design features of our visual system through picture-plane visual thinking to Klee's willed transgressions that only a mature innovative artist could accomplish. Incorporating in a principled way such examples surely would strengthen B&R's agenda. Further strengthening would come from taking cases of guaranteed historical importance. We next cite one that to a culturally alien viewer would certainly be transgressive at the basic-exposure/design-stance interface yet glorious at the design-stance/art-appreciation interface.

From before mediaeval times through the Enlightenment, a drawing device was stylistically adopted, whereby some human figures were depicted with a patch of gold oddly peeping out behind their heads. The golden glow subtly deflects viewing (Leonards et al. 2007). The patch itself often looks like a gold plate. But that construal gives a case of false attachment every time. Gold is culturally glorious, and a gold patch fits a Goodman-type account of sampling (fortunately Goodman is easily partitioned to quarantine his conventionalism). Viewers would be right to think that a sample of glory was presented. The case of the halo is an exercise in identifying how information runs from a picture-perception solution of a visual puzzle (does the patch denote a plate, hole, haze, dimple, hollow?) through the design stance into art appreciation. Would a suitable terrain to test B&R's rapprochement between psychology and art history be classical iconography? That would involve taking a long run up to the current art scene – going for history with a capital *H*.

History and essence in human cognition

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Abstract: Bullot & Reber (B&R) provide compelling evidence that sensitivity to context, history, and design stance are crucial to theories of art appreciation. We ask how these ideas relate to broader aspects of human cognition. Further open questions concern how psychological essentialism contributes to art appreciation and how essentialism regarding created artifacts (such as art) differs from essentialism in other domains.

Bullot & Reber's (B&R's) paper is important for setting forth a historical approach to art appreciation. Their central argument – that context, history, and design stance are critical elements to consider when evaluating art – is supported by psychological research indicating that these elements are foundational. Even young children insist on knowing the origin of a drawing before deciding what it depicts (Bloom & Markson 1998) and will apply the label "drawing," "painting," or "statue" to a decorative object only if the item was intentionally created (Gelman & Bloom 2000). Crucially, then, the visual properties of a work of art are insufficient to determine how it is received, and outwardly identical artworks are judged differently, if their histories differ.

We suggest, however, that B&R understate the relevance of history for human cognition. Much of higher-level thought incorporates historical information: art appreciation, to be sure, but also perception, categorization, economic decision making, emotional responses, and interpersonal judgments. People perceive histories in objects by virtue of domain-specific knowledge (e.g., a dented car implies a prior collision; Leyton 1992). People categorize anomalous animals based on their parentage, not on appearances alone (Gelman & Markman 1986). People determine object value based on ownership (what economists call the "endowment effect," Kahneman et al. 1990) and determine ownership based on object history (who had it first? what exchanges took place? Friedman & Neary 2008; Gelman et al. 2012). People judge that an object is authentic based on its provenance, so that a brush with a beloved individual increases its value (JFK's golf clubs; Frazier et al. 2009; Newman et al. 2011). An item evokes an emotional response based on where it has been. Hence, Hitler's sweater invites disgust, much like a piece of cheese nibbled on by a rat (Nemeroff & Rozin 1994). Judgments of others reflect our assessment of their past, including their reliability (Koenig 2010) and parentage (Gelman & Wellman 1991). The history behind a creator's intention also determines how we classify and use objects (Diesendruck et al. 2003; Kelemen & Carey 2007; Rips 1989). Interestingly, children share all of the intuitions sketched out above, treating ownership, authenticity, disgust, social relationships, object identity, and object function as rooted in history, not only in immediately accessible perceptual cues.

Hence, many of the points B&R make are not limited to cognition about art, art-historical contexts, or the design stance of an artist, but rather are relevant to more general cognition about objects, their historical paths, and the intentions of their creators. Many artworks are representations of things, but those things (Brillo pad boxes, store fronts, landscaping, etc.) are also designed artifacts with their own messages, context, and history. Our point here is that art appreciation is not a special case informed by domain-specific reasoning mechanisms, but rather draws from general mechanisms subserving cognition about a wide variety of objects. Whether we are gazing at a painting, reaching for a pen, purchasing a sweater, or sipping from a coffee mug, historical considerations are central.

We contend that this perspective has rich implications for philosophical debates concerning the origins of knowledge. Whereas an empiricist approach suggests that knowledge derives strictly from outward perceptual qualities that are present in the immediate context, the importance of object history suggests that human representations are not strictly based on outward perceptual features, at any point in development. Instead, nonobvious features are central to how we reason about the world. Further, these nonobvious features are central to the human experience of pleasure

(Bloom 2010) and to beliefs about the nonobvious: supernatural (Hood 2009) as well as scientific (Harris & Koenig 2006; Rosengren et al. 2000).

B&R further suggest that judgments of art are informed by psychological essentialism, which is the implicit assumption that nonobvious, inner qualities can have vast causal implications. We wish to underscore this important point but also push for a more precise understanding of how essentialism links to a notion that is clearly similar but also clearly distinct. A classic example of psychological essentialism involves intuitions about natural kinds, such as tigers, women, or water. The essence of a tiger is thought to be some inner quality that causes tigers to have stripes and grow to be large and ferocious. Essentialism is implicit in people's belief that categories are real, that membership in a category is fixed, that there are sharp boundaries between different categories, that category members have innate potential, that category members share indefinitely many features (perceptual, behavioral, social, biological, biochemical, etc.), and so forth (Gelman 2003). At the same time, the notion of "essence" seems to differ in important ways for biological kinds versus artifacts, including artworks. For biological kinds, the essence is inherent to the individual and causes outward properties. In contrast, for artifacts, the essence is not inherent in the object but rather imposed from an outward source (e.g., it is not in the nature of a block of marble to become a certain statue), and the essence per se does not cause indefinitely many properties.

What then is the relationship between essentialism and art appreciation? B&R suggest that essentialism is a conceptual approach that is responsible for a certain way of viewing art. We propose instead that essentialism emerges from multiple conceptual strands, one of which is a keen attention to object history. Further, an attention to object history underlies both essentialism and art appreciation. Other strands that contribute to essentialism likely have little to do with art appreciation, such as causal determinism.

As with any interesting position, B&R's piece raises questions. Who are the "appreciators" here, and how does their stance emerge? Do art experts have a special perspective, or does this approach apply to the average person? And what of those who are not Western-educated adults? We believe there is good reason to believe that the perspective presented by B&R is quite broad and would apply to children, as well as adults, including those in societies without a tradition of expert art critics, but this remains an exciting question for the future.

Artistic understanding as embodied simulation

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Abstract: Bullot & Reber (B&R) correctly include historical perspectives into the scientific study of art appreciation. But artistic understanding always emerges from embodied simulation processes that incorporate the ongoing dynamics of brains, bodies, and world interactions. There may not be separate modes of artistic understanding, but a continuum of processes that provide imaginative simulations of the artworks we see or hear.

The antagonism between the psychological and historical approaches to artworks is played out when patrons visit art museums. Most museums do not simply hang paintings on the walls or place sculptors in rooms, but offer visitors a variety of information sources about the artists, their personal backgrounds, and historical contexts in which different artworks are created

(e.g., guided tours, audiotapes, catalogues, printed wall statements). Patrons surely learn something from these different sources to assist them in making sense of and appreciating the artworks. On the other hand, some patrons resist all outside information about artists and the historical contexts of their artworks and merely observe each piece, trying to experience what it may mean and what emotions it may evoke. Many of these patrons want direct experience of artworks without all the clutter of biography and history.

Both these approaches to appreciating artworks have unique benefits, as well as downsides, yet also mirror different scholarly perspectives on the study of art (including music, dance, literature, and so on). Bullot & Reber's (B&R's) target article argues for a psycho-historical framework that integrates these differing approaches to art appreciation. They describe three main modes of art appreciation and suggest several hypotheses that may be empirically testable to create a more synergistic and scientifically responsible theory of people's experiences of artworks. There is much to like in B&R's thesis, especially their demand for greater sensitivity to art-historical contexts in a science of art appreciation.

But part of the broader context for a science of art appreciation is the important influence that bodily processes have on people's understanding of human action. Embodied theories of cognition emphasize the degree to which minds are embodied, and distributed across brains, bodies, and world (Gibbs 2006). Most of the empirical work on embodied thought and language has focused on the way bodies, and ongoing bodily activity, shapes people's thinking and speaking about concrete objects and events. A key idea in this movement is that human thought and performance are guided by embodied simulation processes. Under this view, embodied simulation is understood as the "reenactment of perceptual, motor, and introspective states acquired during interactions with world, body, and mind" (Barsalou 2008, p. 618). Hence, just as properly seeing a cup sitting on a table requires us to imagine different bodily actions we may perform on that object, so too with language do we imagine ourselves engaging in actions relevant to the words spoken or read, and with art, we imagine ourselves creating the artworks or engaging with the objects and events perceived in what we see or hear. Simulation processes are not purely mental or neural, but involve and effect many full-bodied kinesthetic experiences.

Much experimental research shows that embodied simulation processes are central to how people conceive of concrete and abstract concepts, as well as interpret different kinds of linguistic meaning, including abstract and metaphorical language such as "grasp the concept," referring to actions that are physically impossible to perform in the real world (Gibbs & Colston 2012). Hence, people imagine themselves physically grasping a metaphorical object (i.e., "the concept"), which enables them to inspect and come to know that object. The brain's "mirror neuron" system helps create simulations, which act as if a person were engaging with the objects and actions being observed in the real world or being referred to in spoken or written language.

Many theories of literary appreciation now highlight the importance of embodied simulation processes during interpretive acts of reading (Oatley 2011). Moreover, the mirror neuron system is recruited when people observe artworks ranging from music (Zatorre et al. 2007) to dance (Cross et al. 2006) to aspects of literary experience (Stephens et al. 2010). Not surprisingly, the more experience an individual has with some artistic domain (e.g., dance or music), the greater the degree of activation in the mirror neuron system (Cross et al. 2006). But even people who are highly experienced at watching dance, yet are not dancers themselves, exhibit heightened degrees of mirror neuron activation when seeing a dance performance. In this manner, having extensive experiences observing artworks enhances our

bodily reactions to these pieces. Several proposals have been advanced to think about aesthetic responses to artworks in terms of the mirror neuron system (Freedberg & Gallese 2007), which partly explain why people often feel so bodily engaged, in different ways with different works of art.

The idea that our experiences of human actions, and the artifacts created by people, including artworks, are rooted in bodily activity is not inconsistent with the psycho-historical approach to art. We may observe artworks and imagine ourselves performing the gestures used to create the art, but this automatic process is constantly shaped by our knowledge of the artist and the historical context in which he or she worked. Each of our past experiences with art, including our knowing the contexts for the production of artworks, enables us to create richer embodied simulations leading to more elaborate, sophisticated understandings of artworks. These understandings are not geared toward inferring a "theory of the artist's mind," but to experience for ourselves, in each of our unique full-bodied way, what it must be like to create a specific artwork. With greater exposure to art, and learning more about the contexts for its creation, people can develop refined "tastes" for artworks, that are, once more, the product of dynamic, embodied simulation processes.

Seeing artistic understanding not as a mental activity alone, but as part of embodied simulation actions, highlights the importance of the body, and the body's history, in our always changing interpretation and appreciation of art. B&R are right, then, to emphasize the need for inclusion of historical factors, of all sorts, in the empirical study of artworks. An embodied simulation view, however, does not claim that there are entirely different modes of artistic appreciation, as suggested by B&R, because there is a continuum, or depth, of simulation experiences that always, to some extent, are shaped by psycho-historical constraints.

Normative and scientific approaches to the understanding and evaluation of art

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Abstract: The *psycho-historical framework* proposes that appreciators' responses to art vary as a function of their sensitivity to its historical dimensions. However, the explanatory power of that framework is limited insofar as it assimilates relevantly different kinds of appreciation and insofar as it eschews a normative account of when a response succeeds in qualifying as an appreciation of art *qua* art.

A scientific approach to art appreciation seeks to uncover general truths about our engagement with art, not just characterizations of particular responses to unique works. Many studies in so-called *empirical aesthetics* and *neuroaesthetics* seem to purchase such generalizations about art at the great explanatory cost of ignoring both its historical dimensions and its radical variability beyond a very narrow range of canonical but hardly representative examples. The welcome development in Bullot & Reber's (B&R's) framework is the recognition that a feature that, arguably, all art does share, *artifactuality* (Davies 1991a), imposes certain requirements of historical awareness on the exercise of art appreciation. However, there are two lacunae in B&R's characterization of the conditions governing artistic appreciation. I will discuss these in turn.

First, the authors must more clearly distinguish among two relevantly different kinds of appreciation – understanding and evaluation – that may vary as a function of appreciators' sensitivity to art-historical contexts. In some places, B&R refer to understanding and appreciation as distinct, yet equally historically informed, kinds of responses. In other places, they identify understanding as one constituent of appreciation alongside another constituent that is, broadly speaking, evaluative: that which is indicated in, for example, emotional responses and expressions of preference and pleasure. However, understanding and evaluation need to be disentangled and their relations of dependence identified for it to be clear that different studies of artistic appreciation are addressing the same thing. Prima facie, artistic understanding is a *precondition* of artistic evaluation, even if the two approaches proceed simultaneously.

For the identifying operations constitutive of understanding a work (such as recognizing its functions and discerning its meaning and expression) are required for the evaluative appreciation of the work to be made in light of the properties it has *qua* art. Whether, for example, the cheap hardware-store paint used by the abstract expressionist Franz Kline is, as such, a thematic element in his compositions – expressing hostility to the refinement and preciousness of other traditions – or only the medium he happened to employ, is a determination necessarily prior to any evaluation based on that feature of his canvases. Of course, one's ordinary awareness of the genre or category to which a work belongs can often serve as a proxy for such identification. For placing a work within a given category – such as still life, pop art, royal portrait, detective story, and so on – reflects an implicit explanatory commitment to certain kind-specific conventions and regulative ideals having been recognized by the artist in creating the work.

Second, although they eschew the *normative* mode of appreciation that they identify with art criticism and the comparative assessment of art, B&R need some such characterization, as found in Budd (1995), of what kinds of responses, under what conditions, count as competent exercises of appreciation. Such a normative conception is required to distinguish the appreciation of art *qua* art from appreciation of it from artistically irrelevant points of view. According to a normative account of appreciation, an artistic evaluation can be distinguished from a mere liking or preferring by being answerable to reasons. We challenge, revise, and approve of artistic judgments on the basis of reasons that speak to facts about a work of art that ground those judgments, for example, facts about its appearance, effects on suitably qualified audiences, satisfied functions, and relations to other works. Of course, appreciators often cannot cite reasons in support of their responses, but those responses – for example, emotional expressions – may correctly pick up on artistically relevant features of a work that are, in principle, identifiable.

No doubt, different theories of artistic value propose competing accounts of what considerations are relevant in judging art *qua* art. However, not just anything goes. That a work has great monetary value or is preferred by others in one's social milieu are not, in themselves, appropriate reasons supporting an artistic evaluation. Without a normative account specifying the proper conditions under which artistic appreciation is exemplified, the psycho-historical framework may count spurious forms of appreciation as genuine. Such spurious appreciation is made especially vivid in the demonstration that subjects tend to attribute a higher valuation to works that they are more familiar with (Cutting 2006) but the appreciation of art in light of features irrelevant to artistic value is widely exhibited. Kruger et al. (2004) provide evidence that appreciators use an effort heuristic to rate the quality of artworks. This, as B&R note, reflects the design stance that is requisite for artistic appreciation. However, that sensitivity to effort is mistaken or distorting in response to many works, such as the appropriation art of Sherrie Levine or Richard Prince, for which effort in the physical

or creative sense is neither evident nor intended to be. Likewise, pleasure felt before a work is often a good guide to its artistic or aesthetic value (hence its use as a measure of appreciation); however, it can often instantiate a failure of proper response. For some works of art (such as the disgusting and rebarbative performances of the Vienna Actionists) may be designed to cause one a feeling of distress, without any compensatory pleasure. Moreover, in the case of many works, such as conceptual art and art that aims for cognitive or moral enlightenment, it may be a mistake to assume that their artistic value is always or only a hedonic dimension intrinsic to our experience of them. The merits of such works may not be appropriately characterized in an experiential sense (Gilmore 2011).

B&R may propose that a robust adoption of the design stance in the above cases would guide appreciators toward discerning the appropriate bases for their evaluations. However, just because that stance might show that a work of art realizes some sought-after value or satisfies some intended function does not entail that it should be evaluated for that value or function. No scientific account of artistic appreciation can do without a normative conception of when a response to a work of art is properly grounded in features of the work that merit that response.

Integrating holism and reductionism in the science of art perception

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Abstract: The contextualist claim that universalism is irrelevant to the proper study of art can be evaluated by examining an analogous question in neuroscience. Taking the reductionist-holist debate in visual neuroscience as a model, we see that the analog of orthodox contextualism is untenable, whereas integrated approaches have proven highly effective. Given the connection between art and vision, unified approaches are likewise more germane to the scientific study of art.

Vision science – a field with obvious importance for the study of art – has engaged in debate between reductionists and holists over recent decades, wherein the former camp advocates the study of reduced and isolated visual stimuli such as bars and gratings, while the latter group advocates the study of naturalistic stimuli, such as natural scenes, that encompass many stimulus dimensions and replicate characteristic aspects of the natural world (Felsen & Dan 2005; Pinto et al. 2008; Simoncelli & Olshausen 2001). This debate parallels the universalist-contextualist debate that animates Bullot and Reber's (B&R's) article, for indeed their contextualism is a variant of holism, albeit an especially radical one.

A number of features of the debate in vision science are illustrative. First, few if any scientists dismiss the viewpoint of the opposing side, as B&R do in relation to universalism. Reductionists have shown limitations in some holistic thinking, but have generally done so without rejecting it outright. Reductionists' chief complaint is that in using fully natural stimuli, we lose the ability to parametrically manipulate them – which is a problem also faced by the zealous contextualism of B&R. However, even ardent reductionists accept that the ultimate test of their theories is to see how they fare in natural settings (Rust & Movshon 2005).

But although holists have proven that reduced stimuli can lead to incomplete models of the visual system (Olshausen & Field

2004; 2005), they nevertheless accept fundamental reductionist claims. Holists would agree that to suggest that no "correct" knowledge can be gleaned without perfectly elaborated context is to deny that we can, in the vision science analogy, understand or predict *any* dimension of response to natural scenes using reductionist models. This is demonstrably not the case (David & Gallant 2005; David et al. 2004).

Moreover, vision science has managed to synthesize reductionism and holism. This trend and parallel ones in other relevant areas of neuroscience (e.g., Lewicki 2002) should serve as models for the psychological study of art. Rather than divide the field into "ahistorical psychologism" and its converse, historical philosophism, we should seek integrated approaches.

For example, measurement of reduced properties of naturalistic stimuli can grant novel and unexpected insights – with respect to vision and to art. The basic statistical properties of natural scenes such as spatial frequency spectrum characteristics have been shown to be regular, and this regularity influences mammalian vision via evolutionary demands for efficient neural coding (Field 1987; 1994). Regularity exists despite the common impression that natural scenes are limitlessly diverse – indeed, this naïve view went mostly unchallenged until the 1980s. However, we now know that natural scene regularities shape systems including retinal and cortical coding, object segmentation, attention, and so forth (see Geisler 2008).

Examining reduced aspects of art while retaining a degree of naturalism is likewise essential to scientific understanding of this unique and defining human trait. By measuring low-level statistical properties in samples of world artwork from many cultures and time periods, we find that art also has regularities. In particular, nearly all paintings, like natural scenes, show scale invariant (1/f) spatial statistics (Graham & Field 2007; 2008; Redies et al. 2007) – again, despite apparent heterogeneity. This means artist output is constrained by evolved aspects of the visual system: images lacking such regularities (e.g., very blurry images, or random, white noise images) are difficult for the system to process, because of its evolved coding strategies. Such images are in a way imperceptible. No artist or movement would last long making only, for example, white noise images, because they would be indistinguishable – even though there are far more possible white noise images than there are particles in the universe (Graham & Field 2009). Thus, certain types of art are a priori unlikely to be made or appreciated. Such fundamental knowledge is revealed without reference to historical context, but does derive from the study of basic, shared properties in natural exemplars and – crucially – from consideration of their relation to the brain.

Moreover, if we defer to historical context – to the exclusion of reductionist empiricism – we can come to mistaken conclusions. Consider Jackson Pollock: we know from historical documentation that Pollock's paintings were created using drip techniques that employed significant randomness. Indeed, what made his art so avant-garde – even compared to earlier automatist art – was precisely this randomness (Chave 1999). Though Pollock retained a degree of deliberate design, the randomness of his art is today seen as essential to the appreciation of his work, as B&R note. Thus, taking the stance of historical philosophism, we might conclude that such paintings prove our visual system can appreciate random patterns so long as we comprehend the appropriate context.

However, when we examine Pollock independently of "causal data" and historical context, and instead test his work with respect to basic properties relevant to human vision, we see that in fact Pollock's paintings are not truly – or even approximately – random. They show robust scale invariant spatial statistics, which are mostly indistinguishable from those of natural scenes, representational art, and nonrepresentational art (Graham & Field 2008). Pollock thus shares fundamental properties with other art styles, which are in turn shaped by visual coding. We can even suppose that if they were truly random, his paintings would not have been appreciated – neither in his time nor ours. This gives us a rather different perspective on the appreciation of Pollock's work.

B&R's arguments can be challenged on their own philosophical terms as well: for example, which experts are we to trust with regard to "correct" context, and when do we declare such stories unassailable? Rigid contextualism invariably leads to revisionism: because the "relevant facts" change with greater perspective – consider that Pollock was dismissed as an unserious showboat in his time by serious critics and artists – we often cannot appreciate context until we have created mythology, which is surely anathema to B&R's demand for historical accuracy.

B&R's strain of utopian philosophy is of little relevance in the empirical sciences. Yet accounting for naturalism is surely warranted – in the scientific study of art, as in vision science. The solution in both fields is to integrate holistic and reductionist approaches.

Memories of Art

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Abstract: Although the art-historical context of a work of art is important to our appreciation of it, it is our knowledge of that history that plays causal roles in producing the experience itself. This knowledge is in the form of memories, both semantic memories about the historical circumstances, but also episodic memories concerning our personal connections with an artwork. We also create representations of minds in order to understand the emotions that artworks express.

Bullot & Reber (B&R) have brought several important features of art under the umbrella of their approach, most notably the history of art itself. Their framework has several resources for capturing the appreciation of art and is expandable to take in further aspects as they are understood. In this response, I will make several suggestions toward the improvement and expansion of the theory.

It is odd to think of the viewer as somehow recovering the history of an object from the object itself, as the authors do, except in certain specialized senses. We frequently have knowledge about the art-historical context of a work prior to exposure to it. It is this knowledge that plays important roles in our appreciation of art, rather than the historical events themselves. The history taught to students of art, for example, plays vital causal roles in how they go on to create and perceive artworks. Certain aspects of art's history are exaggerated to make them entertaining and memorable. Many of the most famous stories of artistic creation are at the very least embellished, or even spun from whole cloth, but their purpose is motivational, not merely instructional.

Theory requires both the actual historical context and the remembered historical context. We need to know what the artists of a certain movement thought the history of art was, in order to understand their work. We also need to understand how this knowledge comes into play in creating and understanding art. How exactly is the history of art encoded in the memories of those who know it? How are the right portions of that memory brought up in a given context? How do these memories participate in the creation, augmentation, and continuation of aesthetic experience? We also need to speak of the history of art itself. When mistakes are made about the history of art, we need to have a concept of the actual history in order to make sense of that. We also need it in order to make sense of one account being more correct than another.

Not all of our memories of the history of art are neutrally stored as impersonal semantic memories. Some of them are memories of personal experiences involving the artwork and are stored among our episodic memories. There is need for caution here; several fallacies lurk. In the right context, a blurry memory from having heard a piece of music long ago can be mistaken for an aesthetic

response to it, or both memory and response can happen in a tangled mélange. Worse, someone might mistake a positive association with an artwork for a positive aesthetic response to it. A man likes a certain song merely because it was playing when he first danced with his future wife. The positive role of memory here is that it allows us to progressively enrich and mature our aesthetic experience of a work. Lovers of art revisit their favorite works, slowly altering or augmenting their understanding of them each time. We know that memories evolve over time rather than remaining frozen, like videotapes. This evolution can make eyewitness testimony unreliable, but it is welcomed by the art appreciator. Without memory of some sort, our aesthetic taste cannot mature. We cannot move beyond the songs we liked as children. Just as artists move on to new styles, their viewers move with them, partly by having the same sets of experiences with the old style, which prepared them to receive the new style. The accumulation and continued use of art-historical knowledge is a vital part of living a life enhanced by art. In other places, B&R describe something closer to procedural memory, for example where they speak about listeners implicitly learning how to perceive higher-level properties of music, such as the relationship between a theme and its variations, through repeated listening.

Another vital knowledge resource we bring to artworks is our empathic ability, but empathy in a deeper sense than B&R describe. We not only understand intentions behind artworks, but we also create full-blown simulations of human minds in order to understand them. Music expresses emotions, of course, but whose? Perhaps those of a hypothetical persona (Levinson 1996b; Robinson 2005); someone who underwent a series of emotional experiences expressed by the music. We don't merely understand isolated mental states; we employ representations of an entire mind (Hirstein 2010).

The most obvious and strong aesthetic experiences do seem to involve fluency, but this practice is deviated from so frequently that fluency alone is not enough of the story, as B&R seem to recognize. There are several interesting ways in which fluency and disfluency have been combined in single artworks. The blues, for example, can establish a background that is perceived fluently, because it is familiar, repetitive, and so forth, on top of which the instrumentalists, especially the lead guitarist, are free to experiment with disfluencies (within careful limits). Visual art can use pattern to produce fluent intake, which can then form a background for more original motifs. Fluent processing keeps us in routine mode, but no artist wants her viewer receiving her work like this. Artworks entice us to think, to emote, to remember, and the better ones do all three.

In describing the peak shift effect, Ramachandran and I (1999) were pointing to features of the perception of art that cannot be accounted for by an understanding of art history, but which can be accounted for by an understanding of how the brain reacts to artworks. The peak shift effect can help us understand why a given form produced a stronger aesthetic reaction in a case where no amount of knowledge of the history of art could have predicted that, because the explanation required specific knowledge of the human perceptual/cognitive system. Or, to make the point stronger, the explanation might require knowledge of features of the perceptual system that had not previously made themselves evident in the history of art, so that the use of historical knowledge to predict them would be all but impossible.

Art appreciation and aesthetic feeling as objects of explanation

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Abstract: The target article presents a thought-provoking approach to the relation of neuroscience and art. However, at least two issues pose potential difficulties. The first concerns whether "art appreciation" is a coherent topic for scientific study. The second concerns the degree to which processing fluency can explain aesthetic feeling or may simply be one component of a more complex account.

"Art appreciation" involves at least four distinct sets of concerns. Two are aesthetic. First, there is actual aesthetic response – a person's feeling of aesthetic pleasure in a work. Note that this can change. Thus it is not confined to basic exposure. Second, there is normative aesthetic evaluation – the judgment that a work merits an honorific such as "beautiful" or "sublime." Neither of these entails the other. I may find something aesthetically pleasing but judge it to be kitsch. Conversely, I may recognize that something is aesthetically accomplished but be unmoved by it.

The third and fourth concerns are more institutional. The third is whether something is socially treated as art. The fourth is whether a work should be categorized as art. Both are independent of aesthetic feeling and aesthetic judgment. For example, a work may be understood as normatively artistic if it introduces new stylistic techniques, even if those techniques are used somewhat ineffectively (as in one common view of Edouard Dujardin's interior monologue; see for example Beja 1992, pp. 66–67).

The point of this analysis is twofold. First, it clarifies why art appreciation is "psycho-historical." What we call "art appreciation" involves concerns that are emotional and responsive, hence psychological. It also involves institutional issues that are historical. What is actually taken to be art is a function of history. Moreover, what should be taken as art is in part a function of a given work's relation to previous works (e.g., the way it adds technical devices to those available), hence history. In consequence, an account of art appreciation will need to involve both historical and psychological elements. But that risks making the "psycho-historical" claims banal. Art appreciation may be "psycho-historical" only in the sense that part of art appreciation is psychological and part is historical.

The second point of the preceding analysis is related – and it brings us to the second large issue raised by Bullot and Reber's (B&R's) article, that of explanation. It is important to be clear about the different components of art appreciation, explaining them separately as they are separate components. Of these, aesthetic response is perhaps the most relevant to neuroscience. As Thaut explains, "Theorists in experimental aesthetics" have proposed that aesthetic pleasure increases with complexity "until activation becomes too complex" (2005, p. 22). Apparently going against this trend, B&R discuss aesthetic response in terms of processing fluency. However, if pleasure is a function of processing fluency, there is no clear reason why we continue to pay attention to works that frustrate fluency – or why we do not simply get our aesthetic pleasure from quotidian, readily processed objects initially. Nor is it clear why we tire of works, given that processing fluency should increase in, for example, "over-listening" to music.

Aesthetic pleasure points to reward system involvement. Some music research suggests that reward response may involve successful pattern isolation (see, for example, Vuust & Kringelbach 2010, pp. 256 and 266 on "anticipation/prediction" and reward and p. 263 on "violation of expectancies"; on reconciling "anticipation/prediction" and "violation of expectancies," see Hogan, forthcoming). This should not simply be a matter of processing fluency. Response should be affected by habituation (see LeDoux 1996, p. 138). Hence we might expect the most aesthetically pleasing work to involve some degree of predictability combined with some unpredictability, perhaps including components of each sort. The predictability might then constrain the unpredictability within some specifiable period of sustained attention. Unpredictability need not involve disfluency per se. Indeed, it seems more likely that the recipient of an artwork continually infers partially formed possible outcomes but remains uncertain about the final result, hence exhibiting complex fluency. For

example, in classical Hindustani music, the repeated rhythmic cycle of the drum might provide a component with strict predictability; the vocal or instrumental improvisations would present pattern ambiguities (relative to possible melodic motifs) followed by pattern selection and completion. A larger-scale example may be found in story construction, where readers are continually projecting incomplete versions of both possible and desired outcomes (see Tan 1995).

A full account of aesthetic response would need to address related processes as well, prominently prototype approximation (which B&R link with fluency). There is evidence that increased prototype approximation may enhance aesthetic response to visual phenomena (see Langlois & Roggman 1990, on faces; Martindale & Moore 1988, p. 670, on colors; Whitfield & Slatter 1979, on furniture). It is important that prototypes are not necessarily simple averages, but are often weighted averages, biased toward category differentiation (see Kahneman & Miller 1986, p. 143, on prototypical diet foods). This helps to explain the "peak shift" phenomenon in aesthetic response (Ramachandran 2011). On the other hand, there is evidence that prototype preference is malleable (Hansen & Topolinski 2011). This may indicate that it bears on normative judgment (regarding what people generally would or should prefer) rather than the test subject's own aesthetic response.

It may also be necessary to take into account other emotion/motivation systems (e.g., story emotions in literature). For example, we might expect attachment to be important to aesthetic feeling for developmental and evolutionary reasons. Attachment bonds appear critical for our earliest aesthetic response to persons (e.g., Mom) and objects (e.g., teddy). In keeping with this, there is some evidence of caudate involvement in aesthetic response (see Nadal et al. 2008, p. 388), as well as attachment (see Arsalidou et al. 2010, pp. 47 and 50), though Vartanian and Goel (2004) interpret caudate involvement in aesthetic preference as reward-based.

We would also expect to find at least two processing components – relatively spontaneous emotional response (largely subcortical) and modulatory (cortical) response – that interact to produce aesthetic feeling. (Modulation might enter, for example, in disturbing one's initial pleasure in a forgery.) These would, in turn, be subject to individual differences in encoding sensitivity, prototype categorization (e.g., regarding style), activation of emotional memories, and so forth. (On some variables in emotion processing, see Hogan 2011, pp. 40–75.) These complications add elements of variability that are not simply a matter of history or culture, but education, biography, or even mood, hence extending B&R's psycho-historical program.

Extending the psycho-historical framework to understand artistic production

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Abstract: We discuss how the psycho-historical framework can be profitably applied to artistic production, facilitating a synthesis of perception-based and knowledge-based perspectives on realistic observational drawing. We note that artists' technical knowledge itself constitutes a major component of an artwork's historical context, and that links between artistic practice and psychological theory may yet yield conclusions in line with universalist perspectives.

A key feature of Bullot and Reber's (B&R's) psycho-historical framework is that art appreciation is influenced both by basic perceptual processing of visual information and the appreciator's knowledge of the historical context in which the artwork emerged. We applaud this interdisciplinary effort. Here, we further suggest that this aspect of the psycho-historical framework can be profitably extended to understanding artistic *production*, by facilitating a parallel synthesis of historically independent (or even antagonistic) perspectives on that issue.

Consider realistic observational drawing, a complex skill that involves visually perceiving an object or scene and manually transcribing aspects of the object or scene onto a surface, with the goal of creating a recognizable depiction. Over the last several decades, researchers have explored the psychological factors undergirding individual variability in realistic drawing ability with increasing intensity and sophistication. B&R's perception/knowledge distinction echoes how different camps of researchers have approached individual differences in representational drawing ability, with some emphasizing basic perceptual processing and others emphasizing higher-order cognition and the knowledge-driven selection of relevant visual information.

Empirical research on the perception side is intellectually descended from the so-called "innocent eye" hypothesis, whereby the perceptual constancies that facilitate everyday perception act to inhibit accurate perception of viewpoint-dependent or transient visual information that is essential for accurate rendering. In this view, drawing skill is regarded as mainly the result of a capacity to suppress such perceptual constancies in order to accurately perceive the to-be-drawn stimulus.

Despite some empirical support for the importance of early perception and the deleterious impact of strong shape or size constancy on accurate drawing (e.g., Cohen & Jones 2008; Mitchell et al. 2005), there are reasons to believe that this explanation is incomplete. First, it mainly addresses why most people are poor at drawing, rather than how artists excel at it. Second, it fails to address logical inconsistencies of purely bottom-up perceptual mechanisms that are related to the inverse problem in vision (Gombrich 1960). Third, while empirical evidence shows that non-artists are less able to overcome perceptual constancies than trained artists, even artists can only partially suppress them; indeed, artists show far greater size estimation errors (and hence size constancy effects) as a result of depth cues in a display, compared to non-artists' baseline error performance in a display lacking depth cues (Ostrofsky et al. 2012).

In contrast to the predominantly perception-based account of drawing skill, our lab has focused on the role of the selection of relevant visual information driven by artists' domain-specific knowledge, which is acquired through intensive training. We regard artists' advantages in drawing as stemming from multiple stages of visual attention, rather than mainly from early perception (Ostrofsky & Kozbelt 2011). Specifically, artists' domain-specific knowledge of the structure of common objects and methods of depiction in particular artistic media functions to harness and selectively focus attention on aspects of objects that are crucial for recognition, while deemphasizing less important visual information. We have tested the importance of selection using tasks where participants can use only a small number of line segments to depict a complex object like a face, finding that artists produce renderings that are judged as more accurate, compared to those created by non-artists (Kozbelt et al. 2010). This result reinforces the importance of artists' domain-specific knowledge and higher-order attentional and cognitive processes for understanding skilled drawing – in contrast to accounts emphasizing only early stages of perception, in which knowledge is regarded mainly as interfering with performance.

This integrative perspective is strongly influenced by art historian E.H. Gombrich, a significant figure in B&R's target article, and in our view a scholar whose work represents a prescient and exemplary manifestation of the psycho-historical approach. This

is particularly true in his application of psychological schemata for understanding many developments within art history. A Gombrich-spirited approach, informed by contemporary psychological research, can readily be assimilated into B&R's proposed framework and applied to artistic production.

Consider the problem of understanding the history of realism, one of Gombrich's own research foci. The problems facing someone wishing to create a convincing representational depiction of the visible world are legion and can only be solved incrementally by the accumulation of organized, specialized knowledge. Artistic realism has a history precisely for this reason: artists gradually acquire (and then pass on to later generations of artists) knowledge of various depictive heuristics, which serve the goal of creating increasingly more convincing renderings.

We believe that Gombrich's account of realism makes significant contact with B&R's psycho-historical model, because artists' technical knowledge itself constitutes a major component (if not the only component) of the historical context of the emergence of artworks. Because artists' schemata evolve over time, to understand how a particular image was created, historical knowledge of the methods of artistic production, together with the depictive possibilities of different artistic media (e.g., dry-point etching can achieve effects that thick charcoal cannot, and vice versa), is critical. This analogy suggests that artistic production, like artistic appreciation, can only be fully understood through a strong historical lens.

However, we note that this historically informed psychological approach also has the potential to yield a new generation of universalist claims. Because artists creating realistic depictions must solve many of the same problems as the visual system generally (Kozbelt & Seeley 2007), it is likely that many depictive heuristics developed throughout art history tap into fundamental aspects of visual processing. For example, compared to non-artists, artists spontaneously deploy more nonaccidental properties of objects, like vertices, in their renderings (Ostrofsky et al. 2012), which aid identification of depicted objects along the lines of some cognitive theories of object recognition (e.g., Biederman 1987). Over the long term, a richly developed psycho-historical approach might accumulate numerous such convergences between artistic practice and psychological theory, in line with universalist proposals. This remains an open question – one that is probably best tackled by empirically integrating psychological and historical accounts in the near term, as suggested by B&R.

Acknowledging the diversity of aesthetic experiences: Effects of style, meaning, and context

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Abstract: Art can be experienced in numerous ways, ranging from sensory pleasure to elaborated ways of finding meaning (Leder et al. 2004). However, rather ignored by Bullot & Reber (B&R), in empirical aesthetics several lines of research have studied how knowledge of artistic style, descriptive and elaborate information, expertise, and context all affect aesthetic experiences from art. Limiting aesthetics to rather rare experiences unnecessarily narrows the scope of a science of art.

Bullot & Reber (B&R) propose to close the "divide between the sciences and the humanities" (sect. 1.2, last paragraph). Achieving

this goal would undoubtedly open new perspectives for interdisciplinary cooperation and would be an important step regarding a comprehensive theory of art appreciation. As presented here, however, the psycho-historical approach is encumbered with some serious problems that need to be addressed.

First, the authors claim that the historical, hermeneutic art sciences somehow aim to explain art appreciation. Rather, according to my experience, the sciences of art history primarily aim to explain what art is, and they study artworks, not responses to them. Art historians, hence, study the historical conditions of art and thereby provide the knowledge that B&R believe enables what they regard as artistic appreciation. Interestingly, their description of "deciphering the causal history" (sect. 3.2.), referring to the nineteenth century art historian Morelli, alludes to highly specialized skills of a kind that in my experience only art historians attain. The processes involved in reconstructing the historical origins and contexts of artworks are typically very complex, requiring extensive knowledge, which is out of reach for most nonexperts. Thus, the psycho-historical framework seems to overestimate the likelihood with which *artistic appreciation*, as conceived by the authors, actually takes place. It probably is, in fact, a very restricted and specialized way of approaching artworks. If psychological studies were restricted only to those situations where art was perceived in such a "properly artistic appreciation-stance," many kinds of art appreciation would be excluded, leaving only a small subclass of possible aesthetic experiences (Leder et al. 2004).

However, in real life – and in studies of experimental aesthetics – most people's appreciation of works of art is supplemented by some form of additional information (Belke et al. 2006). Artworks in galleries and museums are presented with titles, the artist's name, and perhaps some explanatory information regarding style, biography, and so on. Psychologically, there is nothing wrong or poor about using such kinds of information. It might be true that such information is not related with a very sophisticated artistic perspective, but it is nonetheless provided by the art experts who are responsible for the way artworks are presented.

Second, if the role of art-specific information and context are accepted as relevant aspects of an *artistic appreciation*, then the authors have omitted a large corpus of existing research focusing on such components, and which is surely in accordance with their psycho-historical approach. For example, Cupchik (1992) referred to the processes of assigning meaning (also see Millis & Larson 2008), and Leder et al. (2004) postulated a stage of cognitive mastering, in which interpretation and assigning meaning are crucial and claimed that "with expertise, the artwork, its historical importance, or the knowledge about the artist also become the content of the aesthetic object" (Leder et al. 2004, p. 497). All of these approaches – including B&R's psycho-historical approach – argue that perceivers' processing can depend on knowledge. In fact, the effects of expertise and knowledge, as well as the effects of context, which are key elements of B&R's conception of artistic appreciation, have been the focus of a considerable number of empirical studies in the past. B&R, however, have neglected many of these. For example, level of expertise has been shown to mediate the influence of style – as a historically bounded means of production (Cupchik 1992) – on aesthetic appreciation (Augustin & Leder 2006). Explicitly informing participants how the artworks were made can modulate the influence of style (Belke et al. 2006). The role of meaning in aesthetic appreciation has also been examined, for example, by experimentally manipulating titles that provided descriptive or elaborative information (Millis 2001; Leder et al. 2006). Also knowledge and level of understanding affects art appreciation of different kinds of art (Leder et al. 2012). The effects of context have also been the focus of much research in the realm of experimental aesthetics and even neuroaesthetics (Cupchik et al. 2009; Kirk et al. 2009).

Finally, the idea of an art that as an artifact is informing about a historical context is itself a historically very recent invention, eventually emerging during the eighteenth century (see Shiner, 2001). What today is called the fine arts is a result of social changes in the eighteenth century. This modern notion of fine arts appeared hand in hand with the notion that artworks represented individual virtuosity and even genius. This goes even beyond B&R's claim that art represents certain historical states, because in the modern art system, artworks are valued because they represent highly idiosyncratic aspects of creation. The way an artist draws – or in Fontana's case cuts – a line depends on his mood, level of sleep, concentration, and so on. The psycho-historical approach, hence, risks becoming trapped in an increasingly idiosyncratic model, in which the subjective, personal state of the artist needs to be considered as important as any other historical context. The core of this problem lies in B&R's unnecessarily normative pretense that art is only truly appreciated in the *artistic understanding* mode. A view that could even widen the gap between the "two cultures" by making the empirical study of aesthetics more difficult, if not impossible, because of this idiosyncrasy. However, even avoiding the burden of idiosyncrasy, the contextual approach still remains delicate because art contexts probably always are ambiguous.

To conclude, it is worth remembering how Kreitler and Kreitler framed their 1972 book on art and psychology: "The enormous diversity of meanings attributed as a rule to one and the same work of art by different individuals and in various historical periods also demonstrates that not even on the level of the general meaning of the product of art is a correspondence to be expected between the artist's possible intention and the spectator's interpretation" (p. 5). Thus, for a comprehensive theory of art appreciation, empirical and historical sciences will have to conduct innovative, and often interdisciplinary, research programmes.

Causal history, actual and apparent

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Abstract: Attention is drawn to the distinction between the actual (or factual) and the apparent (or ostensible) causal history of a work of art, and how the authors' recommendation "to assume the design stance" in the name of understanding works of art blurs that distinction, thus inadvertently reinforcing the hoary idea, against which the authors otherwise rightly battle, that what one needs to properly appreciate an artwork can be found in even suitably framed observation of the work alone.

Bullot & Reber (B&R) propose a reorientation of work in psychology of art that will make such work more sensitive to the role played by knowledge of history, culture, and intentions in our recognition of artworks as artworks and in our interpretive grasp and qualitative evaluation of artworks. The authors make a good case that what they call a "psycho-historical framework" for a cognitive science of art will be more fruitful for that nascent science than a purely neuropsychological one, and may serve to make the results of experiments designed within that framework more interesting, more valid, and more relevant to the actual practice of art makers, interpreters, and appreciators.

That said, I have some reservations about certain aspects of the psycho-historical framework that the authors propose empirical researchers on the arts take on board. I focus here on my main reservation, concerning how the authors conceive the notion of the *causal-historical information* that a work embodies and how they deploy the notion of a work's *causal history*.

The authors claim that appreciators perceiving a work of art are "exposed" to causal-historical information that it contains (sect. 2.4). But is that quite so? First, is such information really *present* in the work, rather than just plausibly *attributed* to it? Second, even if such information is present, is it really *perceived* by appreciators rather than just *inferred*? I think not. What instead seems true is that the work as open to observation makes some hypotheses or conjectures about the originating contexts and generative actions of the work *more plausible* than others, not that its observable features assessed from a design stance *transparently indicate* those contexts and actions. In other words, one generally needs *independent* access to facts about origin and generation in order to appreciate a work of art correctly, for sometimes the most likely inference to or explanation for why a work appears as it does is *not* the causally or historically correct one. The authors' emphasis on "adopting the design stance" in appreciating art threatens to obscure this.

"We thus propose that … appreciators adopt the artistic design stance when they use inferences … to process causal-historical information carried by artworks and discover facts about past art-historical contexts" (sect. 3.2, para. 5). This assumes that causal history can be reliably inferred from what the authors call the causal-historical *information* carried by artworks, but which I would describe rather as causal-historical *traces* left in artworks, from which true causal history is *not* infallibly extractable. The authors claim that adopting the design stance enables appreciators "to address basic questions about the history of the work, such as authorship attribution, dating, influence, provenance …" (sect. 3.2.2) insisting that "appreciators need to decipher the causal history of the work, often by means of theory-based reasoning" (sect. 3.2.2). Once more, this seems to discount the necessity, for correct artistic appreciation, of determining *actual* causal history by appeal to sources outside of the art object as perceptually available, even to conceptually informed observation. Adoption of something like the design stance, though it clearly has a role to play in the interpretation of artworks, cannot substitute for independent ascertaining of facts about a work's provenance and the processes involved in its creation. Despite what the authors maintain, it is hence *not* the case that art-historical knowledge can be reliably "acquired as an outcome of the design stance" (sect. 3.3, para. 1).

The basic point is most easily made through a concrete example. (What follows is a modification of an example given in Walton 2008.) Think first of a classic Jackson Pollock drip painting, made by Pollock's signature technique of paint spraying by brush while moving around a canvas that is lying on the floor. It is normally thought, with some justice, that the action by which the painting was produced is perceivable in the painting itself. Now, consider a second painting, whether by Pollock or someone else, which aims to reproduce exactly the look of the first, but by meticulously applying paint to canvas using an assortment of eyedroppers. And suppose that that aim is achieved, so that the two canvases are perceptually indiscernible. Should we say that the action by which that painting was produced is perceivable in the resulting painting, and if so, what action? And if an action of paint spraying by brush is evident in the first painting, then why is it not evident in the second?

The ostensible causal history of both paintings is that they are the result of paint spraying by brush. And that is the action we are *right* to see in the first painting, and which we *will* see in it, given knowledge of Pollock's working methods. Yet that is *not* the action we are right to see in the second painting, but rather an action of eyedroppering designed to simulate paint spraying. These two paintings are manifestly different artistically, but for that to enter into our appreciation of them the actual causal history of the presented object must be ascertained. Ostensible causal history, which is all that "adopting the design stance" will deliver, thus derails proper understanding in this case.

What this shows in effect is that causal *appearances* are not yet causal *information*. For appearances can be deceptive, allowing for causal history to be simulated. Hence appreciation can be misled if relying solely on appearances and plausible conjectures from such appearances.

Consider as another example the "slash" paintings of Lucio Fontana. With such works it is indeed hard to imagine a causal history other than the one that so strongly suggests itself to the eye, given one's knowledge of the properties of stretched canvas and the capabilities of the Stanley knife. So let us grant for the sake of argument that one can know, just by looking at the object, if perhaps not with certainty, that the canvas was cut with such an implement. But can one know, just on the basis of observation, that Fontana cut the felt *himself*, rather than, for example, *commissioning* it to be cut by a tailor, or finding it *already* so cut in the discard heap of some fellow artist's studio? I claim not, and yet such knowledge of the actual process of creation, of the actual causal history of the object before one, invariably makes an artistic and appreciative difference.

The authors posit three stages of art appreciation: *basic exposure*, involving registering of observable features; *artistic design stance*, involving interpretation of causal information carried by the work; and *artistic understanding*, derived from knowledge of the art-historical context of generation (sect. 3). In light of the foregoing discussion, however, it is unclear that these stages separate out quite so neatly as the authors claim. In particular, it looks as if one may need to be already at stage three in order to succeed in the activity central to stage two.

Mindful art

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Abstract: Bullot & Reber (B&R) begin asking if the study of the mind's inner life can provide a foundation for a science of art. Clearly there are many epistemological problems involved in the study of the cognitive and affective basis of art appreciation. I argue that context is key. I also propose that as long as the "mind's life" continues to be perceived as an "inner" intracranial phenomenon, little progress can be made. Mind and art are one.

Is psychology relevant to art and aesthetics? The question about the effects the arts have on us remains puzzling, like the fuzzy logic of the question "What is art?" from which it actually emanates. I believe it is fair to say that any declaration that psychology is irrelevant to art is as mistaken as the belief that there can be such a thing as a psychological or neural account of art proper. Bullot & Reber (B&R) set out to revisit this dilemma proposing *a psycho-historical framework* as a means to reconcile this long-standing debate. I welcome the integrative spirit of their proposal. I certainly think it marks a productive starting point if one wants to tackle some of the hard issues involved at the interface between the study of mind and the study of art. Still, I have some worries that I will try to flesh out very briefly in this comment.

My first worry concerns the metaphysical barriers between an "internal" and an "external" domain and the concomitant internalist representational ideal of cognition and art to which B&R's analysis submits. My worry stems from my contention that the cognitive life of art is a strictly relational phenomenon that can only be studied by collapsing the boundaries between what is on the "inside" and what is on the "outside" (Malafouris 2011). My second worry concerns the underlying epistemological foundation

upon which B&R's view of an integrative and contextualised science of art is grounded. This worry reflects my uneasiness with the common use of the term *science of* art. For what is a *science of* art? What is it that we aim for in seeking to construct a science (psychological, neuroscientific, or psycho-historical) of art appreciation? Usually by science of art we mean the approach to the study of art, which is, broadly speaking, objective, replicable, and testable. The way to accomplish that is through quantification, measuring, generalisation, experimentation, scaling, and decomposition. Hence the problem: the more committed you are to the scientific principles of your approach, the more distant you become from what makes your subject matter important for what it is, that is, art rather than science.

My worry, in other words, is that inherent to the very idea of a "scientific" approach to art is an emphasis to reductionist analysis that often threatens to lose sight of what makes art unique and distinctive in the first place. I don't mean to say that art is more of a conceptual and less of an empirical problem. What I mean instead, is that art is irreducible to the logic of either conceptual or empirical problems. Put it simply, too much respect to science often means disrespect to art and vice versa. How can there be a science of art then? I suggest that one way to answer that question which can be relevant and meaningful to the problem of art is to transform the *science of* art into something that can be described, instead, as a *science for* or *through* art. In the latter case, the question is no longer one about how the sciences of mind can be used to explain art away; it is instead a question of how the sciences of mind can be used to enrich, complement, and engage art. This view opens the possibility for a synergy of a very different "symmetrical" kind. That is, a synergy aiming at rethinking the concept of art and through that also rethinking the whereabouts and meaning of the concept of mind.

B&R rightly recognise that no artificially designed art-stimuli and de-contextualised participants are sufficient to study art appreciation. But does their *psycho-historical framework* allow for a true reconciliation of the domains of mind and art? Does their model grapple with the historical, cultural, critical, and intentional complexity inherent in art appreciation? B&R propose that sensitivity to art-historical contexts is the necessary additional requirement for productive experimental research on art appreciation. In particular, B&R identify three modes of appreciation: *basic exposure* to an artwork, the *artistic design stance*, and *artistic understanding*. But what is it that these modes of appreciation tell us specifically about the question "*What does art do*?"

Although their integrative proposal goes some way to resolve those issues, it remains incomplete. In particular, I see two problems with B&R's account of the "how" and "why" of art appreciation. For one thing, the three main types of psychological responses that they recognise conflate many different dimensions that often represent a mixture of discrete and continuous events operating at different levels and timescales. They also leave out several affective and cultural dimensions of great value. Moreover, they offer little space for phenomenological description and anthropological comparative analysis. Recognisably, these shortcomings might act as a stimulus for future research; so they need not be perceived as a major problem. More important to clarify, however, is the meaning of "context" relevant to the different psychological responses identified in their article. B&R's emphasis on how contextual variables moderate the effects of mental processes responsible for appreciators' responses to artworks successfully demonstrates why using works of art as stimuli is not sufficient to study art. Still, in their view, it appears as if "context" is something that can be eventually translated and potentially reduced to a series of mental processes situated inside the head of the individual. But surely, the meaning, and thus importance, of "context" in "contextual analysis," implies much more than merely a new set of "inputs" for an internally processed art appreciation program situated in the

brain. The "context," I argue, does much more: it provides the relational environment and regulates the dynamics that makes art appreciation possible. The "context" does more than influencing form "outside" how the agent makes sense of the artwork; it is instead an integral part of the cognitive ecology (Hutchins 2010; Ingold 2010; Malafouris 2010; 2013) of art consciousness. Although B&R claim to place context at centre stage, in reality it remains on the margins of the supposed central question that asks how art works. The marriage of psychology with context that B&R propose needs more than they seem able to offer here. I argue that investigating art appreciation as a form of situated embodied interaction is central to understanding art. Finding ways to penetrate the constitutive intertwining of the mind (brain and body) with art, in context, holds the key for the success of B&R's *psycho-historical framework*.

"The anti-developmental, the anti-narrative, the anti-historical": Mondrian as a paradigmatic artist for empirical aesthetics

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Abstract: In addition to general criticisms of scientific studies on empirical aesthetics, Bullot & Reber (B&R) particularly criticise two "representative studies" that manipulated paintings by Mondrian, those studies seemingly, "fail[ing] to consider the predictions suggested by a contextualist approach to the appreciation of imbalance" (sect. 4.2, para.2). Those criticisms are unjustified, both within the approaches of empirical aesthetics and the historical context and aims of Mondrian's work.

Bullot & Reber (B&R) are concerned with developing what their title says is a "science of art appreciation." That is commendable, art appreciation being a complex skill that might well develop like other skills, through the Dreyfus's five stages of "novice," "advanced beginner," "competent," "proficient," and "expert." B&R's a priori levels of "basic," "artistic design stance" and "artistic understanding" might not surprise art historians or connoisseurs, but could, with more construct definition, become useful research tools.

A problem for B&R is "mission creep," their science of *art appreciation* rapidly incorporating "science of art," "empirical aesthetics," "art appraisal," "artistic understanding," "appreciation of art works," and "aesthetic and artistic universals." If historians notoriously are "lumpers" and "splitters," B&R are lumpers, as when they say, "research in the psychology of art does not essentially differ from neuroaesthetics" (sect. 1.1, para. 2), a statement unlikely to be subscribed to by many in empirical aesthetics, particularly those disagreeing with the methods and theories of, say, Zeki or Ramachandran. Theologically, B&R's all-encompassing psycho-historical framework gives the impression of being a universal route to salvation, with absence of contextualism identified as mortal sin. B&R's severe psycho-historical scrutiny and methodological lumping then seems to result in the entire scientific literature on art being weighed in the balance and found wanting. The inquisitorial tone shows particularly in footnote 3, when Martindale is revealed not as a true psycho-historical contextualist, but instead as a "pro-naturalistic historicist," and hence a deviationist and a heretic.

B&R particularly criticise two papers, "representative of empirical aesthetics" (sect. 4.2). It was flattering to be an author of one of them (McManus et al. 1993), despite the perceived deep flaws. Along with Locher et al. (2005), our paper sinned in, "fail[ing] to consider the predictions suggested by a

contextualist approach to the appreciation of imbalance" (sect. 4.2, para. 2). Dogma is then proclaimed magisterially, with the doctrine, "experiments on art appreciation should…probe the appreciators' sensitivity to art-historical contexts" (sect. 4.2, para. 5).

Dissecting apart the precise offenses is not easy, particularly as neither paper specifically concerned itself with "art appreciation" per se. Curiously, B&R describe little of the papers' methods, only their bibliography revealing that both analyse paintings by Mondrian. Our paper asked, "to what extent are the placings of the elements of a Mondrian painting merely arbitrary, and how much can they be seen as the optimisation of a compositional problem…with their particular placing been seen as aesthetically more successful than a range of similar but different placings?" Is that not a legitimate question for aesthetics? Our conclusion that, "the result supports what most sensitive viewers of [Mondrian's] paintings have long known: that the pictures are not random configurations of lines," we hoped might have some general interest. That we "present[ed] artworks as 'stimuli' " (sect. 1.1, para. 2) was not presumably problematic, as serious art historians do the same thing (Engelbrecht et al. 2010), and elsewhere Reber (2012, p. 229) approvingly cites Plumhoff and Schirillo's (2009) study that also manipulated Mondrian's. Our study also did consider, "participants' sensitivity to art-historical contexts" (sect. 4.2, para. 1) by including controls and art students, the latter presumably having greater knowledge of art appreciation (albeit the two groups performed similarly [Cheema 1989]). None of our participants had PhDs in Mondrian studies, but presumably B&R could not have intended that as a criterion for "sensitivity." Although B&R correctly state, "the dependent variable [was]…the participants' preferred work" (sect. 4.2, para. 2), they wrongly infer that participants chose the image, "that apparently had the more balanced composition" (sect. 4.2, para. 2). The word "balance" actually occurs but once, in our literature review, and nowhere in the participant instructions.

B&R's major complaint is that McManus et al. "fail to consider the predictions suggested by a contextualist approach to the appreciation of imbalance" (sect. 4.2, para. 2), adding that, "violation of balance can enhance judged preference if imbalance fits the context [an artwork] is supposed to convey" (sect. 4.2, para. 3). It is a curious criticism as, paradoxically, it ignores the art-historical literature on Mondrian and his painterly aims.

Mondrian's paintings, described as "so spare that they seem almost to defy interpretation," "[offer] art historians precious little opportunity to display their detective skills by ferreting out…artistic inspirations and thematic sources" (Blotkamp 1994) (p. 9). Indeed the critic Rosalind Krauss saw Mondrian and other modernist grid painters whose styles changed little in their mature years, as a "paradigm or model for the antidevelopmental, the antinarrative, *the antihistorical*" (Krauss 1979, p. 64; my emphasis).

As for what Mondrian was doing, there is no shred of evidence of a concern with *violation* of balance. In the "totalizing philosophy" of his writings, the art historian Christopher Green describes how "Mondrian turned painting into a field of force" (Green 2012, p. 20), neo-plastic art aiming to bring the multiple components into an equilibrium, a mutual equivalence. Green therefore talks of "a *particularly well balanced* compositional type," of Mondrian, "working once more to achieve *equilibrium,*" and of "economy, precision and *balance*" resulting from "[Mondrian's] pursuit of '*dynamic equilibrium*'" (Green & Wright 2012, pp. 92, 144; my emphases). In consequence, Mondrian's working techniques, akin to modern optimisation techniques, involved continual small adjustments to his paintings (Cooper & Spronk 2001; Rowell 1971).

Our participants, I admit, were not sophisticated viewers of Mondrian. Consider, though, one of Mondrian's first viewers who wrote, "the paintings were entirely new to me & I did not understand them on this first [viewing], and indeed only partially understood them on my second [viewing] a year later." That was

the painter Ben Nicholson visiting the Rue du Départ studio in 1934 and 1935. As for theory, Nicholson said, "I could not be bothered to read Mondrian's theories.…What I got from him – and it was a great deal – I got *direct from the experience of his painting*" (Green 2012, p. 26; my emphasis).

Sophistication and background knowledge are not prerequisites for viewing artworks, not least as even sophisticated viewers are unsophisticated when first viewing an artwork. Art history should of course inform scientific research (and maybe even vice versa), but B&R's blanket criticisms of these "representative studies" are surely unjustified.

The duality of art: Body and soul

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Abstract: Bullot & Reber (B&R) make a strong case for the role of causal reasoning in the appreciation of artwork. Although I agree that an artistic design stance is important for art appreciation, I suggest that it is a subset of a more general framework for evaluating artworks as the causal extensions of individuals, which includes inferences about the creator's mind, as well as more physical notions of essence.

To date, the psychological study of art appreciation has primarily focused on the perceptual or aesthetic aspects of viewing and creating artwork. The target article by Bullot & Reber (B&R) seeks to expand the nature of this inquiry by highlighting the various ways in which art appreciation may readily incorporate aspects of causal reasoning (i.e., information about how an artwork came into being), as well as relevant historical information that situates the artwork within a broader context. Their theoretical framework helps to build important and potentially fruitful links to other areas of psychology and beyond. Here, I focus on one particular aspect of their theory in an effort to broaden the discussion surrounding the role of causal reasoning in the evaluation of artwork.

B&R suggest that one of the primary ways in which causal attributions impact our appreciation of artwork is through assessments of intentionality. In short, this "artistic design stance" views artwork as the unique product of intentional action and therefore takes into account inferences about the intentions and mental state of the creator. Indeed, there is empirical support for the notion that evaluations of mental states play a key role in people's naïve theories about artwork (Bloom & Markson 1998; Newman & Bloom 2012: Olson & Shaw 2011). For example, when labeling drawings, children as young as 3 to 4 years old will prioritize the artist's intentions over the drawing's appearance (Bloom & Markson 1998). Similarly, inferences about mental states are central to how people distinguish between original artworks and perfect duplicates (Newman & Bloom 2012). For example, in one experiment we presented participants with two very similar landscape paintings. In one condition, participants were told that one artist painted the landscape first, whereas another artist decided to make a very similar painting after seeing the original. In another condition, participants read that the two artists each painted the same scene without knowledge of the other – the similar paintings happened merely as a coincidence. Participants were quite sensitive to the mental states of the artists, reporting that an intentional copy should be worth substantially less than the original, whereas the two coincidental duplicates should be equivalent in value.

This result is consistent with B&R's theorizing, as well as others' (Dutton 2003; 2009), who have suggested that static artwork is evaluated as the end point of an artistic performance, and thus, our appreciation of an artwork is related to our intuitions about the processes that gave rise to its existence. However, one can ask about the precise form that such an appreciation might take. For example, one view might be that, "Artworks are the causal extensions of intentional actions." In contrast, a slightly different view might be that, "Artworks are the causal extensions of human agents." The key difference is the extent to which these accounts emphasize intentionality per se or, instead, a connection to agents more generally.

Consistent with this latter view, in other studies we find that, in addition to the role of intentions, people tend to place a special value on the degree of physical contact that an artist had with an artwork (Newman & Bloom 2012). For example, lay participants judged an authorized reproduction made by the artist's assistant to be substantially less valuable than a reproduction made by the artist himself, a pattern that does not extend to comparable nonartistic artifacts. Similarly, holding constant the total amount of effort required to make an artwork, participants judged an artwork that had a great deal of physical contact with the artist to be more valuable than an identical artwork that had less physical contact, a pattern that also does not extend to nonartistic artifacts of comparable value.

Such patterns are consistent with a belief in contagion, which is the notion that through physical contact, objects can acquire a special quality or essence (e.g., Frazer 1890; Mauss 1902, Rozin & Nemeroff 2002). Belief in contagion and the transfer of essence has been supported by a wide variety of studies. For example, in the negative domain, people report that they would be unwilling to wear a sweater that was touched by Adolph Hitler (Nemeroff & Rozin 1994). Conversely, contact with positive individuals appears to increase an item's appeal. Ordinary objects increase in value if they had physical contact with well-liked celebrities (Newman et al. 2011), and people are more likely to purchase a product if it was touched by an attractive person of the opposite sex (Argo et al. 2008). This contagion account extends naturally to art. For example, an original Picasso may be valuable because Picasso actually touched it, whereas the forgery has not been touched by Picasso and therefore would not contain any of his special essence.

One way to integrate both the importance of intentionality (or, design stance) and the importance of physical contact (i.e., contagion) is to suggest that when people evaluate artworks as the causal extensions of agents, they do so in terms of essentialism. Given a large body of work on intuitive notions of mind-body dualism (see Bloom 2004), evaluations of essence may therefore include evaluating artwork both as an extension of the artist's *mind* (evaluations of the creator's intentions and mental states), as well as an extension of the artist's *body* (which includes evaluations of the degree of physical connection between the artist and the artwork).

Hence, although factors such as the artist's intentions, mental states, and so forth, are important to art appreciation, it may be that an artistic design stance is a subset of a more general framework whereby artworks are evaluated as the causal extensions of human agents, including both mental and physical notions of essence. Such a conceptualization may serve to broaden the definition of essence in the context of art appreciation and may provide a useful framework for future research examining the role of causal reasoning in the evaluation of artwork.

Distinguishing intention and function in art appreciation

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Abstract: We applaud Bullot & Reber's (B&R's) attempt to encompass the function of artworks within their psycho-historical model of art appreciation. However, we suggest that in order to fully realize this aim, they require a clearer distinction between an artist's intentions toward an artwork and its proper functions. We also show how such a distinction improves the internal coherence of their model.

Bullot & Reber's (B&R's) model of art appreciation aims to improve on previous models by doing justice to the role of art-historical context. One of the factors that B&R ostensibly include in that context is function. The "psycho-historical framework," they write, "requires that … a work of art is an artifact that has historical functions" (sect. 2.1, para. 2). We applaud their attempt to encompass the function of artworks within their model, but suggest that they must go further in this regard.

In our book *Functional Beauty* (Parsons & Carlson 2008), we attempted to analyze the notion of artwork function. The term "function" has several senses. Sometimes talk of function F is merely a way of saying that something is doing F (this chair is functioning as a stool) or was intended to do F (What is the function of the chair you put against the door?). But these casual uses do not capture the main and central sense of the term, that of *having the function F*. For an object can perform F, or be intended to perform F, without having F as its function. This is the case in the examples just mentioned: although a chair can serve as a stool or be used in an effort to bar a door, chairs really have the function of allowing people to sit, and not these other things. Hence, to analyze the function of art, one must focus on these *proper functions*, rather than looser uses of the term.

Following an account developed by Beth Preston (1998) and others, we held that proper functions must be analyzed in terms of artwork's causal histories. Specifically, an artwork has F as its proper function just in case it belongs to a type that has achieved selective success in the marketplace as a result of performing F. On this account, functions are historical, but, importantly, the relevant causal history occurs at the social level – the artist's intention that his artwork perform F is neither necessary nor sufficient for F to be its proper function (Parsons & Carlson 2008, pp. 63–84).

At one point, B&R maintain that they follow our account of artwork functions (sect. 2.2). But there is an important difference in our approaches. We focused on proper functions, but on B&R's "historical approach to artifact functions" artist intentions, as well as social-level processes, can give rise to functions (sect. 2.2, para. 4) And in their subsequent discussion of function, the focus is entirely on "functions" arising from artist intentions.

For example, in discussion of the second mode of appreciation, that involving the design stance, they write that "Humans adopt the design stance when they reason about artifacts and their functions" (sect. 3.2, para. 4). In design stance appreciation, however, the focus is squarely on interpreting the "intentions of the artist" (sect. 3.2, para. 5), implying that the functions being reasoned about are not proper functions but merely effects intended by the artist. This comes out in B&R's remark that work by Keleman and Carey "suggests that artifact categorization is sensitive to the original function intended by the designer of an artifact" (sect. 3.2, para. 3). Function also comes into play in the model's third mode of appreciation, artistic understanding: "Appreciators have artistic understanding of a work," they write, "if art-historical knowledge acquired as an outcome of the design stance provides them with an ability to explain the…functions of the work" (sect. 3.3, para. 1). But B&R do not indicate that

the functions involved differ from the intention-based "functions" figuring in design-stance appreciation.

Hence, B&R's model, as described, does not accord a substantive role to proper functions. However, it seems to us that it should. One reason is simply that if "function," as it figures in the model, is reducible to "what the artist intended the work to do," then their model simply does not encompass the function of Art, in the main and central sense of that term. For, as mentioned above, this sense cannot be explicated in terms of the individual intentions of designers or makers. Hence, if B&R's model aspires to bring function into the art-historical context, as we agree it should, it must distinguish proper functions from artist intentions and accord the former a clear role.

A second reason for doing this is that, as mentioned, B&R take function to be involved in artistic understanding. However, if this is to be so, then the functions at issue cannot be equivalent merely to what the artist intended to do. For the fundamental distinction between art-historical understanding and design stance appreciation, as we understand it, is that the former necessarily involves an appeal to relevant context beyond those factors accessible to, and causally salient for, the artist. If function is involved in art-historical understanding, then it ought to pertain to something that can lie outside of the artist's own conceptions and intentions. Proper function, as we analyze it, is just such an element, for the broader causal history of his artwork type is something the artist might well be ignorant of, or unconcerned with. Hence, the internal coherence of the B&R model would be strengthened by distinguishing proper function from artistic intention, and according it a clear place.

This would have another effect as well. It is perhaps safe to say that every artwork was intended, by its creator, to do something or other. But we cannot similarly say that every artwork has a proper function, for only works belonging to an established type, subjected over time to the process of marketplace selection, are candidates for possessing proper functions. Some artworks, failing to belong to such type, might have no proper function (Parsons & Carlson 2008, pp. 223–227). Whether a work has a proper function is a matter of the specific nature of its causal history and its ties to established types, which are matters for empirical inquiry within art history and perhaps other disciplines. If the appreciation of art involves its function, such inquiry must also be an important part of the art-historical context.

Exposure, experience, and intention recognition: Take it from the bottom

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Abstract: The psycho-historical account implies two ways of construing the relation of basic exposure to the artistic design stance and artistic understanding. One is empirically dubious and the other does not fit well with the account. The assumption that combining psychology with history requires identifying actual intentions is undermined by the artistic design stance.

The psycho-historical account of art appreciation raises two related issues: how basic exposure is related to art historical knowledge in the process of interpretation; and whether understanding art requires tracking the actual intentions of the artist.

1. Basic exposure and art historical knowledge. Understanding art is often a matter of grasping representational content. It is unclear how that is to be construed on the psycho-historical model. On the one hand, the direction of the causal arrows in the flowchart (B&R Fig. 1) and the heavy emphasis on reasoning and inference suggest a sequence: Basic exposure provides visual input into an interpretive process in which the viewer then uses historical knowledge to reason about the meaning of the work. But that way of blending perceptual psychology and history is less novel and less integrative than what Bullot & Reber (B&R) suggest, and it is threatened by evidence for perceptual plasticity in early vision. On the other hand, the authors acknowledge top-down effects. They suggest that knowledge of art history can influence basic exposure from the first encounter with a work. But that possibility seems inconsistent with two important aspects of the psycho-historical approach:

a. It undercuts the argument from indiscernibility that is used to motivate the appeal to history (i.e., two physically identical paintings can have different meanings because they have different causal etiologies). If knowledge depends on beliefs, and beliefs can affect early vision, then physically identical works will be perceived differently under the influence of different beliefs (cf. Dutton 2000; Wollheim 1993). This will be so, even if the beliefs are false. Perceiving two physically identical works differently and holding the beliefs that differentiate them with conviction, appreciators will have neither the incentive nor the need to search for actual historical knowledge. Nor can the need for historical knowledge be said to be driven by level of perceptual fluency. There is no reason to think that false beliefs inevitably cause dysfluency.

b. If basic exposure is modulated by beliefs, then there may be problems with the idea that artistic devices cause an experience by manipulating processing fluency. The point of strategic manipulations would seem to be to inhibit a reasoned response that depends on the perceiver's existing beliefs, because such a response could override the intended effects of the artist's technique.

Hence, the psycho-historical model faces a dilemma: a strict sequence of processing stages is empirically dubious; yet the possibility that even basic exposure might be knowledge- and theory-dependent does not fit well with other aspects of the account.

One way to avoid the dilemma is to adopt a more interactive theory of vision according to which the processing fluency that enters into experience in basic exposure is partly a function of characteristic or habitual ways of deploying neural systems or subsystems. These interactions ground a richer mode of experience at the basic level than the psycho-historical account allows, in part because they are affected by past encounters with works of art encoded as episodic memories. In that case, the contexts in which paintings are seen may serve to differentiate physically identical images. Yet, as subpersonal neurological habits, the viewer's own basic perceptual strategies are also more susceptible to manipulation by artistic strategies that challenge them than entrenched and conscious beliefs would be (cf. Rollins 2011).

2. The intentions of the artist. The second problem is that the psycho-historical approach tends to conflate the question of how art is typically understood with the issue of how it *should* be appreciated; that is, how appreciation works when viewers get things right. This is apparent when the authors emphasize that the outcome of the artistic design stance is an increase in "proficiency," where that means identifying the intentions of the actual artist (or other relevant agents).

Rejecting the argument by Fodor (1993) and others that art should be understood by positing hypothetical or virtual intentions, B&R claim that such a process is likely to lead to mistakes in artistic understanding. But that leads to the question of *why* plausible accounts of hypothetical intentions that do not track actual intentions should be viewed as mistaken, and it does not fit well with the authors' construal of the artistic design stance.

Among other things, that stance is modeled on Dennett's (1987) notion of an intentional stance, and to that extent, the intentions that are ascribed will be *useful fictions*. Of course, that may imply only that what are posited are mental states of the actual artist, which are warranted on instrumental grounds, just as all mental state attributions are.

When combined, however, with the idea that intentions are ascribed on the psycho-historical account through inference to the best explanation, this construal of the artistic design stance opens the door to cases in which the best explanation runs counter to what is known about what the actual author had in mind. Given the importance of experience on the psycho-historical account, adopting such an explanation could be justified on the grounds that experience is thereby enriched. Moreover, B&R argue that mindreading abilities are involved in identifying intentions. But as proponents of both versions of mindreading (as applying a theory of mind or as simulation) often point out, this ability may be best construed in terms of positing hypothetical intentions, *based on beliefs about the actual historical context* in which the work was produced. It is not necessary to claim that the experience of art tracks actual intentions to provide a role for historical knowledge.

Nonetheless, as B&R suggest, a work of art contains visible traces of actions performed by the actual artist, and understanding causal etiologies in terms of those plays a fundamental role in our experience of art. That fact can be accommodated, while appealing to hypothetical intentions in adopting the artistic design stance, by distinguishing between *categorial* and *semantic* intentions. Categorial intentions are about the status of the artifact as an artwork, which is in a certain style. Semantic intentions concern the meaning or content of the work (cf. Levinson 1996b; Rollins 2004). The former are those of the actual artist. The latter are hypothetical posits. Properly construed, identifying categorial intentions does not require mindreading and thus is not vulnerable to the argument that the intentions are best construed as hypothetical. Rather, categorial intentions are embodied in artistic devices that cause a distinctive mode of response, which is defined in terms of the engagement of neuropsychological resources at the level of subpersonal processing habits. The distinction between categorial and semantic intentions is compatible with the "hierarchical" model of B&R. At the same time, it does not imply that combining psychology with history (at various levels in the processing hierarchy) requires tracking actual intentions across the board.

Context, causality, and appreciation

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Abstract: I applaud and elaborate on the contextualism at the heart of Bullot & Reber's (B&R's) theory, challenge two aspects of the appreciative structure they posit (the causal reasoning that allegedly underlies the design stance and the segregation of the component stages), suggest that expert and novice appreciators operate differently, and question the degree to which B&R's final theory is open to empirical investigation.

I applaud Bullot & Reber's (B&R's) decision to foreground the "doppelganger" examples of Arthur Danto (Brillo boxes, red squares) and Dennis Dutton (on forgery) in their opening brief for contextualist accounts of appreciation. These examples

present cases in which context differentiates between a work of art and a mere real thing, between different but perceptually indistinguishable works of art, and between a work of art and a persuasive forgery. I suggest that Frank Sibley (1959) also belongs in this pantheon. His paper "Aesthetic Concepts" identifies another locus where context helps determine essential aspects of a work. Aesthetic properties are contestable; many theorists hold that they supervene on lower-level perceptual, historical, and structural properties. In this sense, aesthetic properties too are context-dependent. In "Categories of Art" (1970), Kendall Walton argues that the apparent properties possessed by works of art vary according to the category in which those works are placed. He then raises the key normative question – to what category is each work properly assigned? – and suggests several criteria that need not align. So appreciators face the further challenge of determining appropriate categorization.

B&R's psycho-historical account presents appreciation as a three-stage process, with each stage a necessary condition for the one that follows. The stages are individuated in part by the different modes of reasoning in place (B&R, Fig. 2). I have questions about the partition of these stages, as well as about the characterization of the design stance. Purportedly this middle mode of appreciation develops as appreciators infer causal explanations for features noted via basic exposure. An implicit metaphor in place throughout the paper characterizes works of art as "containers" for causal information. B&R speak of "causal and historical information *carried by* an artwork" (sect. 2.3, para. 1; my emphasis) and note that "It is often possible to retrieve from an artwork its connection to antecedent events" (sect. 2.3, para. 3). They offer the analogy of tree rings to explain these causal inferences (sect. 2.3).

This account seems misleading in its suggestion that retrieval is a simple matter; it might also encourage a fruitless search for laws of taste. Although the proffered example of Lucio Fontana slashing his canvas (sect. 2.3, para. 3) offers a straightforward causal tale, there is a wide range of countervailing cases. The authors cite Dominic Lopes's (2005) discussion of Rembrandt's painting *Belshazzar's Feast* as an example of design stance detection. Building on Lopes, these claims might be gleaned from the work: Rembrandt knew Hebrew, he believed Biblical figures dressed like seventeenth-century Dutchmen, and he was influenced by the Caravaggisti (Lopes 2005, p. 134). Unlike the tree ring case, no simple and direct algorithm leads from the painting to these conclusions. The first two are likely false, although establishing influence requires first ruling out chance correlation. In general, a work of art might be as it is because of conventions in place at the time of its creation, because of inherent limitations of the medium, because the artist wanted to subvert audience expectations, because the artist failed to realize his or her intentions. Few of these circumstances can be read off the work like growth data from the rings of a tree. Artists have complex and multifarious ties to the artworld in which they are situated, and the aesthetically relevant features of their works are likely to be overdetermined in ways that complicate the search for causal explanation.

I have additional concerns about how the three modes of appreciation are distinguished from one another. B&R introduce their model with the claim that appreciators process work information "in at least three distinct ways" (sect. 3, para. 1). Basic exposure recruits our ordinary perceptual capacities, causal reasoning informs the design stance, and theory-based reasoning generates artistic understanding. But this partition is soon breached. B&R note that appreciators often use theory-based reasoning to decipher causal history (sect. 3.2.2) and later concede that the postulated stages need not proceed sequentially (sect. 3.4, para. 3). If we jettison the idea that the output of one stage becomes input for the next and accept some commonly held views – that perception is theory-laden, that causal explanation requires some type of lawlike underpinning – then intermingling seems inevitable. Moreover, attention to the nature of expertise

further fractures the architectonic, as experts possess vast background and theoretical information that they cannot easily shed. Once theory-based reasoning can permeate the design stance, it is unclear what remains to be accomplished in stage 3 beyond formulating and defending summary evaluations. Finally, although B&R seem to support an intentionalist account of appreciation, they also endorse a conflicting biologically based notion of proper function (sect. 2.2, para. 2) that eschews intention and looks instead to precursors' cultural or market success. This clearly broadens and redirects the search for context.

In section 3.4 (para.1), B&R state that empirical testability is a crucial consequence of their model. But what sort of experimentation can seek and validate art historical context? Past preference studies that B&R cite do not seem to be fine-grained enough to probe this information, although currently fashionable fMRI research seems more suited to distinguish hot versus cold moments in appreciation than to mark historical and contextual components. B&R's observation of "the greater importance experts give to historical contexts in art appraisal compared to novices" (sect. 2.4, para. 2) hints that an old-fashioned staple of psychological research – reaction time studies – might be profitably recycled here. However, their later remark that "experts might have an ability to summon historical information very rapidly by means of fast recognition" (sect. 3.4, para. 3) undercuts this suggestion. Experimental design is complicated not only by the divide between amateurs and experts, but also by the fact that acknowledged experts cannot appropriately hold forth about just any work. Suitability requirements need to be in place. I have argued elsewhere (Ross 2012) that experts ought only to judge works of *types* in which they are capable of taking an interest. I conclude that even after my worries about B&R's psycho-historical framework have been quieted, considerable artfulness will be required to design effective empirical tests of their theory.

A bridge too far: From basic exposure to understanding in artistic experience

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Abstract: In the context of a broad welcome to Bullot & Reber's (B&R's) proposals concerning the incorporation of contextual awareness into the study of the psychology of art appreciation, I raise two concerns. First, the proposal makes no allowance for degrees of relevance of contextual awareness to appreciation. Second, the authors assume that "basic exposure" and "artistic understanding" can be maintained as separate phases or modes, but this may be more problematic than anticipated.

The various disciplines engaged in studying the human mind necessarily differ, for obvious reasons, with respect to their methodologies. What is less commonly observed is that their aims also differ. For although psychology, philosophy, and cognitive and neuroscience all target the host of our thoughts and mental processes, and employ tools that draw on different traditions, what is considered an actual result can also vary greatly from case to case. Whereas psychology uses empirical techniques to divide kinds of experiences into distinct phases or elements and thereby explicate the phenomenon under scrutiny, philosophy tends to emphasize the analysis of conceptual relations or the ways in which distinctive aspects of an experience are connected in order to shed light on that phenomenon, and indeed establish

whether it justifies such scrutiny in the first place. The outcome is not merely the exercise of different methods, but a difference at the level of the points of reference against which success is measured, resulting in an independent and discrete philosophical commitment to what actually constitutes progress.

One of the main virtues of Bullot & Reber's (B&R's) article is that it sets out to overcome some of these discrepancies. Perhaps most importantly, it takes seriously a charge levelled at scientific studies of art experience and tries to incorporate an aspect the absence of which has hitherto impoverished many empirical accounts, namely the "appreciators' sensitivity to particular art-historical contexts" (sect. 1.2, para. 1). The authors' main claim is that art-historical contexts leave causal information in every art, which can be examined empirically. The "processing of this information…includes at least three distinct modes" (para. 1): (1) *basic exposure*; (2) the *artistic design stance*; (3) *artistic understanding*. Crucially, by building an historical aspect into the very material subjected to scientific inquiry, the authors point to one way in which distinct methodologies may not necessarily exclude the possibility of a common aim.

Overall, this is a right-minded project. The task at hand is considerable yet important. If interdisciplinary work is to have a future, researchers need to forge new avenues for exchanging knowledge and ideas. For this reason, B&R's work should be widely welcomed. Nonetheless, I would like to raise two concerns for the current proposal. First, there is an issue of generalisation. Our authors make a bold step from a position where no credence whatsoever is given to historical context to one whereby such context is *always highly* relevant. But can we really assume that all artworks require us to take contextual information into account in exactly the same way? After all, in the sense targeted by B&R, appropriate appreciation of Klein's blue canvases seem to call for more background knowledge than, say, Canova's neo-classical marble sculptures, and so adherence to specific artistic traditions might influence the precise extent to which context plays a role in appreciation. Similar differences might apply across art forms. Many might argue that the appreciation of music requires less contextual knowledge than, say, literature. Certainly, it seems likely that the degree to which awareness of context influences appreciation is best understood in terms of a scale, according to which contextual information is understood to play a greater or lesser role in influencing our appreciation of works of art.

A more serious concern relates to the authors' construal of the relation between the three phases, particularly that between (1) and (3). On this line, *basic exposure* is "the set of mental processes triggered by perceptual exploration of an artwork without knowledge about its causal history and art-historical context" (sect. 3.1, para. 1) and *artistic understanding* is what we attain if we gain the "ability to explain the artistic status or functions of the work" (sect. 3.3, para. 1). This kind of understanding takes two main forms: the *normative mode*, which "aims to identify and evaluate the artistic merits [and value] of a work" (sect. 3.3, para. 2), and the *scientific mode,* which aims "to explain art appreciation with the [scientific] methods and approaches" (sect. 3.3, para. 2). Centrally, the occurrence of (1) is a necessary condition for the occurrence of (2), which, in turn, is a necessary condition for the occurrence of (3). The order of these phases is irreversible and serves as the very foundation for appropriate appreciation.

My main worry about this characterisation has to do with the causal nature of the relation between *basic exposure* and *artistic understanding* and the manner in which achieving the *artistic design stance* serves as a transitional requirement. Can we really separate (1) and (3) in this way, and is positing an intermediate phase absolutely necessary? An alternative approach might argue that the very point of training our artistic sensibilities is, generally, for the boundaries delimiting these three phases to become more fluid and, more specifically, for (1) to be influenced by previous experiences of (3) in such a way that the two become both practically and theoretically indistinguishable. On this view, a

well-trained eye cannot be said to begin his/her artistic experience by a purely ahistorical perception constituted by the "attentional tracking" of "shape, colors, tones, duration," the "basic syntactic and semantic processing of symbols," and the "automatic elicitation of emotions" (sect. 3.1.2). Instead, (1) is fundamentally informed by (3) to such an extent that even attempting to recreate that kind of bare perceptual representation would be incredibly difficult, if not impossible. This is not the point that gaining experience speeds up the appreciative process to such a degree as to render the three phases phenomenologically indistinguishable (for, as B&R concede, "experts might have an ability to summon historical information very rapidly by means of fast recognition of task-relevant patterns," sect. 3.4, para. 3). Rather, it is the claim that once we have gained a certain practice or skill in these matters, it is not even possible to retain a principled distinction between (1) and (3). If we adhere to this picture, the proposed schema might best conceived as a helpful tool in explaining how we learn to appreciate art embedded in an historical context rather than as an invariable model underlying all appropriate art appreciation.

I should stress that these the two concerns outlined here should be understood in the context of a warm if provisional welcome to B&R's proposals, and that I do not consider the problems raised necessarily to be insurmountable. Analytic philosophers no less than psychologists have found incorporating the contextual dimension of art problematic, and the model proposed could certainly constitute a step in the right direction for both disciplines.

Aesthetic meanings and aesthetic emotions: How historical and intentional knowledge expand aesthetic experience

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Abstract: This comment proposes that Bullot & Reber's (B&R's) emphasis on historical and intentional knowledge expands the range of emotions that can be properly viewed as aesthetic states. Many feelings, such as anger, contempt, shame, confusion, and pride, come about through complex aesthetic meanings, which integrate conceptual knowledge, beliefs about the work and the artist's intentions, and the perceiver's goals and values.

Bullot & Reber (B&R) have a noble goal: integrating the science of aesthetic experience with art historical approaches. As someone with a deep interest in aesthetic science, I agree that empirical research on the arts has an ambivalent relationship with art history and philosophical aesthetics, which emphasize history, purpose, culture, context, and intention. I would go further, in fact, and suggest that aesthetic science has an ambivalent relationship with art itself. The field's history shows a curious preoccupation with non-art and art-ish research materials (Silvia 2012). The figures who inspired a science of art – notably Fechner (1876) and Berlyne (1971) – did surprisingly little work with actual art, and much of what we know about aesthetic experience comes from studies of color chips, stock photography, and randomly generated shapes, polygons, patterns, and tones. Such studies are probably exceptions in modern work, but the field does assume that decontextualized studies of non-art can illuminate how aesthetic experience works.

But if studying non-art could illuminate aesthetics, then aesthetic science would merely be a quirky branch of applied visual

and auditory cognition. B&R provide the groundwork for a genuinely aesthetic approach to aesthetic science, one that recognizes concepts such as history, context, and intention as inherent to aesthetic meaning rather than extraneous variables to be controlled for or randomized away. I would suggest that their approach affords even deeper implications: it expands the kinds of feelings that qualify as aesthetic emotions because some states only come about from people's historical and intentional knowledge.

To understand why their approach affords a broader range of feelings, one should consider the impoverished meaning of "appreciation" and "experience" in most models of aesthetics – art history and philosophy included. Appreciating and experiencing art, for the most part, are thought to be mild pleasant experiences, the sort of low-intensity states that are idealized by Western cultures that value emotional control and positive experience. Mild pleasure and displeasure can come from low-level cognitive and perceptual processes that need no higher-order meanings (Palmer et al. 2012; Reber 2012), so decontextualized theories explain such states well. But many fascinating aesthetic emotions go beyond mere liking, and these emotions entail *aesthetic meaning*, the higher-order understanding of a work that requires the constructs emphasized by B&R: knowledge about a work's historical background, conceptual art knowledge, beliefs about the artist's intention and purpose, and appraisals of how these all relate to one's own values, beliefs, and commitments.

Take, for example, negative emotions like anger, contempt, and disgust (Silvia 2009). Getting angry at art requires beliefs about what the artist was trying to communicate (Silvia & Brown 2007). When people believe that an artist created the work to trespass intentionally against their values and to offend people like them – consider Andres Serrano's notorious *Piss Christ* and its many defacements – they get mad, as the history of blasphemous and controversial art shows. The thematic meanings of trespass and contamination that are central to these emotions combine and require historical, cultural, and self-knowledge. Without an understanding of another's intention and how it relates to one's beliefs and values, hostile aesthetic feelings are impossible.

As another example, consider the complex emotion of pride. People commonly feel pride when they or someone they see as an ingroup member intentionally does something commendable. One sees aesthetic pride in action when artworks become symbols of group identity – all self-respecting hippies read *Trout Fishing in America* – and when groups hold communal celebrations, such as local festivals to celebrate distinguished writers, artists, and musicians. These groups can be art-historical groups (e.g., the New York School of poets), cultural or national groups, geographical groups (e.g., regional artistic traditions), or any other kind. Pride hence integrates historical and biographical information about an artist and a work, appraisals of a work's value, and self-knowledge (Silvia 2009).

If we agree that considering history and intention expands the family of aesthetic feelings, what kind of theory can explain these feelings? I have suggested that appraisal theories of emotion provide a robust framework for thinking about aesthetic experiences (Silvia 2005b; 2009; 2012). An appraisal approach, with its emphasis on what people know, value, and believe (Ellsworth & Scherer 2003), is congenial to the integrative historical analysis proposed by Bullot and Reber. If emotions come from people's appraisals of how events in the world involve the self, then the self's knowledge and beliefs are fundamental to how people experience the arts.

I suspect that an appraisal approach is probably more fertile than the processing fluency approach advocated by B&R. I respect what the processing fluency approach seeks to do: like many of psychology's elegant theories, it seeks to explain a lot with a little, and it can accomplish much more than a skeptic would expect. At the same time, it is a model with one predictor variable – degree of fluency. Although many things are inputs for fluency, there is nevertheless only one variable available to explain a diverse range of aesthetic experiences. Appraisal theories

presume a wide range of emotions and are probably more complicated than they need to be, so they seem better positioned for a pluralistic approach to aesthetic feelings. But theories evolve, and I'm curious to see where the processing fluency model goes.

Contextual information processing of brain in art appreciation

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Abstract: A psycho-historical framework for the science of art appreciation will be an experimental discipline that may shed new light on the highest capacities of the human brain, yielding new scientific ways to talk about the art appreciation. The recent findings of the contextual information processing in the human brain make the concept of the art-historical context clear for empirical experimentation.

Authors Bullot & Reber (B&R) have proposed a key conceptual scheme of the scientific approach to art appreciation, that is, the art-historical context in three modes of art appreciation of basic exposure, design stance, and artistic understanding. Akin to philosophers, psychologists and neuroscientists have been wary to acknowledge the importance of knowledge of or sensitivity to art-historical context in art appreciation. Because of the provisional nature of our current knowledge, the present synthesis entails necessary simplifications. However, given the psycho-historical framework proposed by B&R, bridging the gap between initial exploration and programmatic experimentation will be most efficient if researchers of art appreciation attend to and integrate contemporary neuroscientific researches on the processing of contextual information.

Art appreciation relies on the generation of meaning from artworks, such as visual patterns, with reference to various contexts, which may result from the processing of contextual information via interactions between memory and perception. What is the meaning-related brain activity and how is the contextual information processed in brain to generate meanings? To answer these questions, we carried out an fMRI study (Ejima et al. 2007) in which subjects were asked to name each of visual stimuli (Rorschach inkblots, arrangements of geometric shapes, and face-like patterns) covertly as many as possible while regional blood oxygen-action level-dependent (BOLD) contrast was measured using fMRI: subjects were asked to think "what this might be" and to name covertly each stimulus as many items as possible. As a control experiment, fMRI measurements were carried out during passive viewing of the stimuli: subjects were instructed to concentrate on fixating on the central part of the stimulus and not to think about the visual stimuli. Our study identified bilateral regions in the prefrontal cortex (PFC) as the meaning-related brain activity: These included bilateral prefrontal activation in the cortical areas lining the inferior frontal sulcus, middle frontal gyrus (BA46/8), inferior frontal gyrus (BA44/45), and foci of activity within the orbitofrontal cortex (BA11). During passive viewing, activation was not observed in the regions of the prefrontal cortex, although extensive activation was observed in cortical regions in the parietal, temporal, occipito-ventral, and occipital cortices in both the naming-task and passive-viewing conditions. We also found that the meaning-related PFC activation strongly depended on the ambiguity and/or stimulus characteristics of the visual patterns. Our

study indicates that activation of cortical regions in the PFC may be crucial for the appreciation of artworks.

It has been well established that the PFC is involved in problem solving and reasoning. Therefore, our findings provide direct empirical evidence for B&R's claim that appreciators of artworks may process the information about contexts through three modes of art appreciation, each of which elicits typical mental activities of reasoning: processing of sensory/feature contexts in basic exposure, causal reasoning in design stance, and theory-based reasoning in artistic understanding. We observed the foci of activity within the orbitofrontal cortex during appreciation of visual patterns. These cortical regions may be involved in emotion (Bechara et al. 2002), which is assumed to be triggered by the epistemic processes of reasoning about art-historical contexts in the hypothetical model proposed by B&R. Furthermore, we found that extensive regions of the dorsolateral PFC were activated during appreciating visual patterns. The mechanisms of these cortical regions may underlie the hierarchical structure in art-appreciation behavior, proposed by B&R, taking account of hierarchically organized function of the dorsolateral PFC (Botvinick 2008; Koechlin & Summerfield 2007).

With regard to the functional properties of the dorsolateral PFC, Koechlin and Summerfield (2007) have proposed a model of prefrontal executive function, in which cognitive control operates according to three nested levels of control processes implemented from posterior to polar prefrontal regions, with control signals owing to events that occurred in the more and more distant past arising from successively more anterior cortical regions. At the apex of the hierarchy, most rostral parts of the lateral prefrontal cortex subserve in the arbitration among several past cue for cognitive judgment/action selection. The anterior dorsolateral PFC regions vary with episodic control, whereby a discrete past event defines a new set of rules of cognitive judgment/action selection. The posterior dorsolateral PFC varies with contextual control, whereby immediate environment provides a contextual signal to guide cognitive judgment/ action selection. The hypothesized brain mechanisms, processing contexts, in the PFC may share common properties among the processing of context in cognition and social cognition, including art appreciation. Contextual frames, including art-historical contexts, are presumably built up through real-world experiences whereby particular scenarios are experienced and subsequently influence how we perceive and predict artworks.

Contexts may also operate as nodes by which common events are organized in memory, generating semantic knowledge. Recent imaging and inactivation studies indicate that the PFC plays a crucial role during remote memory recall (reviewed by Frankland & Bontempi 2005): Initially memories are encoded in hippocampal-cortical networks (recent memory); as the memory matures connections between cortical modules are strengthened, allowing the memory to function independently of the hippocampus and with remote memories becoming more semantic in nature. At the later time point, the PFC is assumed to play an integrative role via reciprocal connections with the sensory, motor, and limbic cortices. The expanded networks could reflect a process that might underlie the generation of semantic knowledge. From this, one can argue that the recall of remote memories of art-historical context/knowledge may be predominantly associated with activation of regions in the PFC.

These findings support B&R's claim of the importance of art-historical contexts in art appreciation and will enable a multi-levels-of-analysis approach to understanding the processing of the art-historical contexts in three modes of art appreciation, in terms of the functional organization of the PFC, when perceivers share and make inference about the states of artworks in art history. B&R have proposed an empirically defensible assumption, allowing us to utilize information derived from brain science to highlight the fundamental sources of aesthetic experiences in humans.

Bridging two worlds that care about art: Psychological and historical approaches to art appreciation

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Abstract: Art appreciation often involves contemplation beyond immediate perceptual experience. However, there are challenges to incorporating such processes into a comprehensive theory of art appreciation. Can appreciation be captured in the responses to individual artworks? Can all forms of contemplation be defined? What properties of artworks trigger contemplation? We argue that such questions are fundamental to a psycho-historical framework for the science of art appreciation, and we suggest research that may assist in refining this framework.

Bullot & Reber (B&R) draw attention to a striking gap in the psychology of art: its failure to account for the role of historical and causal information in the appreciation of artworks. In this welcome contribution, they argue that art-historical contexts, which include artists' intentions, historical events, and social conditions, leave traces in artworks that can be consciously examined and reverse-engineered or that trigger processes associated with historical and causal reasoning. They outline a framework that incorporates these processes and identify fluency theory as an illustration of how the framework might be explored. In this commentary, a psychologist (WFT) and an art-historian (MA) discuss the utility of the framework and its potential for increasing dialogue between researchers in the two disciplines. We also comment on fluency theory as a possible extension and implementation of this framework.

B&R lament the lack of constructive dialogue between scholars of historical and psychological approaches to art and imply that psychologists and historicists disagree about the nature of art. In our experience, however, practitioners in the two areas operate at different levels of analysis and rarely evaluate theories that encompass both disciplines. The proposed framework invites increased dialogue between disciplines, but it is not clear that such interaction will replace a status quo that is polarized. The present authors conduct research with distinct aims and methods of adducing evidence. Aside from intellectual curiosity, we have little reason to interact on a scholarly level in order to conduct our research.

Does appreciation concern individual artworks? Not in our disciplines, which comprise individuals who appreciate art. The psychology of art is a branch of psychology that investigates mental phenomena such as memory, perceptual organization, attention, and emotion. Because psychologists are concerned with mental phenomena, they rarely focus on individual artworks. Instead, artworks provide stimuli for pursuing the goal of understanding mental processes. Similarly, most art historians do not restrict their activity to the examination of individual artworks but are concerned with broader questions. The examination of artworks is not an end in itself but a vehicle for understanding social, political, and historical issues. Increasingly, art historians do not restrict their investigations to high art – the focus of the target article – but consider a wider range of evidence collectively known as visual studies. What of non-academic appreciators? Appreciation beyond basic exposure often extends beyond individual artworks to satisfy other human aims – social goals, a sense of identity, spiritual aims, political motivations, or investment.

Most art historians are skeptical of theories that claim to be independent of cultural and historical influence. Ahistoric theories

exhibit one of the most fundamental errors of reasoning in the field: the use of induction based on historically situated data to infer universal principles that transcend time and place. The psycho-historical framework allows that historical conditions can influence the forms that causal reasoning can take, but it nonetheless posits a universal inclination to adopt a design stance in some form. Many art historians would contend that the tendency to employ historical reasoning when engaging with artworks reflects conventions associated with specific historical and cultural contexts and are unlikely to be connected to art appreciation across all individuals, societies, cultures and historic periods.

To address this concern, Bullot and Reber B&R can expand the scope of the design stance to include any ideas that help to explain an artwork. This possibility highlights a conspicuous trade-off between conceptual precision and explanatory scope. Such a broad definition accounts for variability in the forms of causal reasoning exhibited by different people across cultures and historical contexts. However, it is unlikely that any one mental process can capture such a wide range of responses. As a hypothetical process, the concept of a design stance lacks precision. What kinds of historical or psychological data would count as evidence against such an expansive hypothesis?

Consider an individual who listens to Schoenberg's serialized music but cannot perceive or represent structural attributes such as tone rows and their transformations. She is incapable of appreciating the work at the level of basic exposure. Out of frustration (disfluency), she adopts an appreciation strategy based on conceiving the music as a soundtrack to an imaginary film. Using this strategy, she finds the music more accessible and rewarding. Her appreciation is characterized by an inability to perceive structures intended by the composer (basic exposure) and the recruitment of causal reasoning that is personal and imaginative (design stance). The strategy is also successful.

The example illustrates the need for elaboration of the design stance. First, such a strategy subverts the reverse engineering goals modeled by the framework. The listener is aware that the strategy is fanciful yet makes no attempt to extract genuine causal information because her strategy is effective. Indeed, such a strategy may be far more effective than acquiring knowledge about how Schoenberg composed the music using a revolutionary post-tonal strategy. Second, her path to appreciation moves through the modes of appreciation in a direction opposite to that implied in the psycho-historical model. Figures 1 and 2 in the target article illustrate unidirectional arrows that reflect a hierarchy of understanding, with basic exposure referring to elementary forms of appreciation, and the design stance associated with greater levels of skill, exemplified in scholars such as art historians. For serialized music, however, learning historical facts may confer trivial benefits in comparison with those of learning to appreciate structural aspects of serialized music. Conversely, in John Cage's silent piece 4′33″, no amount of expertise can lead to increased appreciation at the level of basic exposure. That level is compositionally absent: appreciation at the level of design stance is primary.

An intriguing implication is that the relative weighting of basic exposure and the design stance depends on the nature of an artwork. Schoenberg's serialized music encourages adoption of the design stance because it is largely inaccessible; familiar music with pleasant harmonies is readily appreciated at the level of basic exposure with no need to resort to a design stance. Such differences in emphasis are captured by fluency theory. Artworks that are not easily processed at the level of basic exposure (disfluent artworks) induce contemplation about the reasons for this disfluency – adoption of the design stance. Hence, exposure to serialized music should give rise to a sensation of disfluency that, in turn, triggers a process of causal reasoning. Another plausible prediction, however, is that disfluency induces a wide range of responses, including withdrawal, indifference, imaginative thinking (e.g., hearing music as a soundtrack), and free association. All such responses are instances of causal reasoning

broadly construed, but they are unlikely to reflect a unitary mental process.

It would be useful to clarify the connection between fluency and expectation. More than 50 years ago, Meyer (1956) proposed that violations to expectations trigger arousal responses followed by an appraisal process, and his theory bears considerable resemblance to fluency theory. Could disfluency be a symptom of the violation of expectations that arise from internalizing persistent regularities in our environment?

A basic prediction of the psycho-historical framework is that gallery viewers exposed to historically informed "audio guides" should experience greater levels of satisfaction than those exposed to narratives or musical soundtracks that are equally engaging but unrelated to the causal and historical conditions that gave rise to the artworks. Evaluating such predictions may prove fruitful in the development of the psycho-historical framework and related proposals (Bloom 2010). Such research may also be valuable for galleries hoping to enhance the experiences of their patrons, regardless of whether such effects reflect historically specific, culturally specific, or universal processes of appreciation.

Questioning the necessity of the aesthetic modes

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Abstract: I question both the necessity and the sufficiency of Bullot & Reber's (B&R's) aesthetic modes. I argue that they have not shown how the aesthetic modes are truly "aesthetic" – how they concern our experience of artworks as opposed to other kinds of experiences or why the modes are individually necessary for one. I suggest the causal dependence of the modes should be modified.

One of the most striking charges against experimental and neuroaesthetics is that, despite claims to the contrary, these fields cannot genuinely explain the nature of aesthetic experience (Noë 2011). Bullot & Reber (B&R) attempt to avert this alleged difficulty by uniting the "two cultures" of science and art history. They take pains to describe an art-historical context that is sufficient for explaining the distinctive aspects of artistic appreciation (sect. 2, para. 1).

My comments raise questions concerning the very notion of "artistic appreciation," a concept I believe is inadequately defined in the psycho-historical account. Specifically, the authors illustrate three "modes of aesthetic appreciation": basic exposure, design stance, and artistic understanding (sect. 3). The modes account for a wide range of our aesthetic experiences of artworks, including our perceptual, emotional, historical, and causal reasoning (B&R, Fig. 2). Importantly, the latter two modes are causally and necessarily dependent on the previous – the design stance depends on basic exposure and artistic understanding depends on design stance.

My worry is that none of these modes are individually necessary for artistic appreciation, and together they are insufficient for it. First, I believe that we can appreciate works of art without any of the particular modes playing a role in that experience. The causal/dependent nature of the modes is particularly important here. For example, the basis of basic exposure is perceptual representation and attentional tracking of observable features of the work (sect. 3, Fig. 2). The notion of "perceptual representation" is vague as currently stated. It is unclear in what way we must perceive an artwork in order for appreciation to take place. Can we

appreciate artworks that we have seen in the past or only seen in a text or online? What about artworks that we know quite a bit about through various social interactions but have never directly perceived – as with films or novels? If perceptual representation of the kind the authors describe is *necessary* for appreciation, then we must deny that we appreciate artworks in these cases or modify the view to accommodate them.

Here is the puzzle as I see it. If we need basic exposure to an artwork in order for our appreciation to get off the ground, then denying its necessity should affect the other two modes that causally depend on it. But is this really the case? I think that one can appreciate an artwork in terms of its causal or art-historical context without ever directly perceiving it, as with art history students who never directly encounter a work of art they study. Relatedly, I also deny that sensitivity to art-historical context is necessary for artistic appreciation. B&R cite Jerry Fodor, who makes a similar point to mine (Fodor 1993). The authors' dismissal of Fodor's claims is too hasty. While I agree that sensitivity to art-historical context will make for greater or more intellectual appreciation, surely one can significantly appreciate a work without knowledge of the author, style, or social context in which it was created. It may be possible to appreciate an artwork without taking the design stance at all – without engaging in mind-reading practices, causal reasoning, or contemplation of the work's creation.

My second concern is that the three modes may be insufficient for artistic appreciation. Obviously, other factors not mentioned here might be involved in artistic appreciation; I think B&R would be happy to grant this claim. However, I would also argue that it is unclear what makes these modes distinctive artistically. In other words, the modes do not show what it means to undergo an aesthetic experience (i.e., an experience of an artwork) versus any other type of experience. This is the same charge made against experimental and neuroaesthetic theories mentioned above: they do not tell us anything uniquely interesting about aesthetic experiences (see Onians 2008; Ramachandran & Hirstein 1999; Zeki 1999).

Consider indiscernibles such as those in Arthur Danto's gallery of red squares, some of which are artworks and some of which are not. Indiscernibles seem to require an art-historical context for *identification* as artworks. But what makes our appreciation of them an *aesthetic* experience rather than merely the ordinary contemplation of an everyday object? One possible answer that Danto suggests is that knowledge of art theory will actively shape our further experiences with the work beyond (Danto 1981).

So far, so good for B&R's theory. The problem is that the authors never make it clear the way in which the modes need to be activated in our experiences with artworks. Must we *consciously* take the design stance in order to aesthetically experience the red square or any artwork? Must we *reflect* on our knowledge of art history or theory in order for our experience to be an artistic one? If the answer to these questions is "yes," then we have strong criteria for what makes artistic experiences different from ordinary ones: the conscious reflection and engagement with the aesthetic and art-historical features of a work. However, this also seems like an overly robust notion of artistic appreciation. Consciously and deliberately engaging in causal or historical features of an artwork seems like an extra step of artistic appreciation, not a necessary one – something we may do on occasion, but certainly not something we *must* do with each work we encounter. On the other hand, if we deny that conscious or deliberate contemplation of an artwork is required for artistic appreciation, then it is less clear what makes these experiences aesthetic to begin with. We would passively perceive, respond to, or otherwise engage with a work in much the same way we do with any ordinary object.

B&R may need to adjust their discussion of the aesthetic modes in order to overcome the worries I present here. My second point may simply require further explanation concerning the nature of our aesthetic experiences. The first point, however, seems more problematic. If I am right that none of the modes are necessary

for aesthetic appreciation, then the authors may wish to reconsider the strict causal/dependent aspect of their theory.

Psychological and neural responses to art embody viewer and artwork histories

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Abstract: The research programs of empirical aesthetics and neuroaesthetics have reflected deep concerns about viewers' sensitivities to artworks' historical contexts by investigating the impact of two factors on art perception: viewers' developmental (and educational) histories and the contextual histories of artworks. These considerations are consistent with data demonstrating that art perception is underwritten by dynamically reconfigured and evolutionarily adapted neural and psychological mechanisms.

Bullot & Reber (B&R) have made the provocative argument that as programs of research, empirical aesthetics and neuroaesthetics have neglected viewers' sensitivities to artworks' historical contexts. Therefore, these fields have failed as scientific explorations of art appreciation. In contrast, we argue that empirical studies of the psychology and neurology of art have made substantial contributions to our understanding of art appreciation precisely because work in both domains reflects deep concerns about viewers' sensitivities to artworks' historical contexts. To support our argument, we review pertinent research on two central themes and close by addressing our current understanding of how the mind and/or brain perceives art.

The first central theme involves an acknowledgment that every time a subject generates a response (e.g., beauty judgment or preference rating) to an artwork in a psychological study of art, the response reflects not only the proximal cognitive and emotional processes that underlie it, but also their distal developmental (including educational) histories. For example, when a subject with expertise in the visual arts makes a judgment of beauty in relation to a stimulus, his/her developmental history is embodied in that response. In fact, precisely because expertise (in art training and/or viewing) has been shown to be a strong determinant of art perception (Hekkert & van Wieringen 1996b; see also work on expertise and musical judgment by Müller et al. 2010), it has been incorporated as a key variable in major contemporary theories of aesthetic judgment (e.g., Leder et al. 2004) and creativity (Kaufman & Baer 2012). Essentially, empirical studies of aesthetic judgment must either explicitly control level(s) of expertise or include it as a variable of interest into the design of the study. The same is true when neuroscientists study brain activation in relation to viewing stimuli in the scanner: activation in any given system in relation to ratings is modulated by the developmental history of the viewer. As such, studies must explicitly address the level of expertise and/or art training in their sample, for example by selecting "naïve" viewers' exclusively – (e.g., Munar et al. 2012). In this sense, it is understood that psychological and neural responses to art by definition embody the developmental histories *of their viewers*, including their differential interactions with stimulus features.

The second central theme – and perhaps an issue more germane to B&R's thesis – involves an acknowledgment that psychological and neural responses to art also embody the perceived histories of their *target stimuli*. For example, there is

good evidence to demonstrate that title information about the sources of paintings influences viewers' responses (Leder et al. 2006). Complementing this behavioral evidence, there is now neuroscientific evidence to demonstrate that such source information also influences subjects' neural responses to artworks. For example, Kirk et al. (2009) presented subjects in the fMRI scanner with artworks that were randomly labeled as being either sourced from a gallery or computer generated. As expected, aesthetic ratings were significantly higher for stimuli believed to be sourced from a gallery. Critically, this contextual manipulation moderated activity in the medial orbitofrontal and prefrontal cortex. These data demonstrate that psychological and neural responses are sensitive to the manipulations of the histories *of their target stimuli*.

At a more general level, B&R are quite correct in noting that empirical aesthetics and neuroaesthetics seek to discover and establish universal laws – linking systematic variations in features of artworks to systematic variations in our psychological and neural responses to them (Martindale 1990). This effort has shown that the ways in which we respond to artworks is built on much of the same cognitive and neural architecture that defines our interactions with non-artworks. For example, regions in the medial orbitofrontal cortex that respond to beauty in faces also respond to beauty in paintings and music (Ishizu & Zeki 2012). Likewise, regions in the fusiform gyrus that respond to beauty in faces respond to preference for artworks (Vartanian & Goel 2004). Evolutionarily, this makes sense: why evolve a completely separate, specialized "module" for art perception when existing brain systems can be co-opted and dynamically reconfigured to compute our responses to artworks? This realization is highly relevant to the way in which researchers in empirical aesthetics and neuroaesthetics consider historical context *as perceived by art historians* in their studies of art appreciation. Namely, historical context as perceived by art historians is only part of a multilayered cascade of responses, and its contribution likely not greater than the contribution of dynamically reconfigured and evolutionarily-adapted neural and psychological mechanisms.

Extended artistic appreciation

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Abstract: I propose that in at least some cases, objects of artistic appreciation are best thought of not simply as causes of artistic appreciation, but as parts of the cognitive machinery that drives aesthetic appreciation. In effect, this is to say that aesthetic appreciation operates via extended cognitive systems.

Bullot & Reber's (B&R's) advocacy of a psycho-historical approach to art appreciation and the determinate form of such an approach that they propose are both welcome additions to the intersection of aesthetics and cognitive science. In this commentary, I consider how we might think about the objects of artistic appreciation themselves and their relationship to the cognitive systems that underpin our capacities for artistic appreciation.

In particular, I propose that in at least some cases, objects of artistic appreciation are best thought of not simply as causes of artistic appreciation, but as parts of the cognitive machinery that drives aesthetic appreciation. In effect, this is to say that the cognitive systems that physically realize our capacities for aesthetic appreciation, at least some times, are not physically contained within the boundary of the individual artistic appreciator. Here

aesthetic appreciation operates via extended cognitive systems (Wilson 2004).

I follow Bullot & Reber (B&R) in considering objects of artistic appreciation inclusively with respect to genre and style. They include pieces of visual art, dance, and theatrical performances and the creation, performance, and improvisation of music; they include such objects of aesthetic appreciation created or performed in culturally specific and individually idiosyncratic ways. Such objects are artifacts, and as objects of artistic appreciation, they are *cognitive* artifacts in that their appreciation is mediated in virtue of their having been created via some kind of cognitive agency.

Within the cognitive sciences, the term *cognitive artifacts* is typically used interchangeably with *cognitive tools* or *cognitive technologies* (Hutchins 1999; Norman 1993). Such terms refer to products of technology that either augment human cognitive capacities (e.g., external storage systems) or replace or improve some existing cognitive system in part or in whole (e.g., cochlear implants). Like the artifacts that are objects of artistic appreciation, the artifacts that are cognitive tools should also be thought of broadly, including not simply particular devices or pieces of technology, but also large-scale cultural innovations, such as the invention of particular symbol systems (e.g., arithmetical systems), as well as human spoken and written languages (Clark 2008).

One way to see objects of artistic appreciation as playing something more than a mere causal role in the cognitive processes that mediate artistic appreciation is to entertain the idea that the two senses of "cognitive artifact" are related in a particular way. That is, suppose that we think of objects of artistic appreciation themselves as technologies of cognition. Then it becomes relatively easy to view them as playing not simply a causal role in the process of artistic appreciation, but a physically constitutive role in the relevant cognitive system. And since they are not located within the physical boundary of the individual cognizer, the resultant systems are extended cognitive systems.

This supposition plays such an explanatory role because some cognitive tools are plausibly considered as physical constituents of more powerful cognitive systems. Such cognitive tools become sufficiently functionally integral to a cognizer that she comes to acquire a capacity-augmented, extended cognitive system. For example, the 256-symbol board that the bonobo Kanzi learned to use (Savage-Rumbaugh 1994) both to articulate and express at times complicated desires and beliefs is a cognitive tool that became functionally integral to Kanzi in just this way. The resultant cognitive system includes Kanzi's symbol board as a physical constituent, and thus is an extended cognitive system.

Andy Clark and I (Wilson & Clark 2009) have argued that extended cognitive systems vary in at least two dimensions: their durability (one-off, temporary, and permanent) and the nature of the augmenting cognitive resource (natural, social, and cultural). The introduction of these dimensions aimed to shift debate over the extended mind thesis from one demanding a "yes" or "no" answer to a generic form of that thesis to one that explores a range of forms of extended cognitive systems. Systems that are viewed as paradigmatic in debates over extended cognition tend to involve relatively permanent augmentations incorporating resources that are cultural in nature. But a cognizer's utilization of natural or social resources even relatively temporarily can also produce extended cognitive systems. With both of these points in mind, I return more specifically to B&R's psycho-historical approach to artistic appreciation.

B&R distinguish between three modes of artistic appreciation: an appreciator's exposure to the work of art, the causal reasoning she engages in applying a design stance, and resultant knowledge-based artistic understanding. The type of rich and ongoing interactions with particular, human-created artistic representations characteristic of expertise or a deeper understanding of a work of art approximates the parameters that correspond to paradigmatic extended cognitive systems. In such cases, further exposure

to the work of art may serve as a causal input to cognitive systems responsible for artistic appreciation. But those systems are already extended, having come literally to physically incorporate cultural resources themselves not contained within the boundary of the individual cognizer.

This is not to say that, as in cases in which the reliance on cognitive tools stops short of expertise, when artistic appreciation is more casual, uncertain, or passing in nature, it does not draw on extended cognitive systems in each of the three modes that B&R identify. My chief question for them is whether they view this introduction of the extended mind thesis as one they find useful for further articulation of their psycho-historical approach.

Authors' Response

A psycho-historical research program for the integrative science of art

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Abstract: Critics of the target article objected to our account of art appreciators' sensitivity to art-historical contexts and functions, the relations among the modes of artistic appreciation, and the weaknesses of aesthetic science. To rebut these objections and justify our program, we argue that the current neglect of sensitivity to art-historical contexts persists as a result of a pervasive aesthetic–artistic confound; we further specify our claim that basic exposure and the design stance are necessary conditions of artistic understanding; and we explain why many experimental studies do not belong to a psycho-historical science of art.

We thank the commentators for the unique opportunity to respond to commentaries and defend, revise, and extend our proposal. The commentators concur that it is timely to combine psychological and historical theories of art to overcome the controversies that divide the "two cultures" (Slingerland & Collard 2011; Snow 1959). We will argue that the outcome of this unprecedented collective effort is the outline of a novel psycho-historical research program for an *integrative science of the arts* (hereafter *science of art*). Our program provides a problem-solving strategy and both core and auxiliary hypotheses for research on the arts across different disciplines.

At the center of our program for the science of art is an acknowledgement of the need for a core of psycho-historical principles. Psycho-historical principles are empirical hypotheses that describe and explain interactions that tie historical individuals or categories with the mentality of cognitive agents. Despite the fact that commentators identify contentious issues, many support the core of the psycho-historical program. Importantly, no commentator has argued against the benefit of combining psychological and historical theories of art. This support for the program

connects scholars working in fields as varied as art history, literary studies, cognitive archaeology, neuroscience, philosophy, and psychology.

In this Response, we roughly follow the sections of the target article (Table R1). We address commentaries on the foundations of the integrative science of art (sect. R1); the nature of art-historical works and contexts (sect. R2); the modes and mechanisms of art appreciation (sect. R3); psycho-historical empirical research (sect. R4); and the proposed extensions of the framework (sect. R5).

R1. The science of art and aesthetics

Following Shimamura and Palmer (2012), we will use *aesthetic science* to refer to the field that encompasses empirical aesthetics (Berlyne 1971; Fechner 1876), neuroaesthetics (Ramachandran 2011; Skov & Vartanian 2009; Zeki 1999), and the non-historicist part of philosophical aesthetics. Aesthetic science has promoted universalist explanations of aesthetic responses. This science is traditionally aimed at investigating so-called "hedonic" responses (Shimamura 2012, p. 4) and universal preferences for properties traditionally described as "aesthetic," such as attractiveness, balance, beauty, or harmony. In contrast to aesthetic science, our program seeks to develop a *science of art* understood as a rigorous theory of the arts that integrates empirical contributions from the biological, cognitive, and social sciences along with history and the humanities. Beyond empirical and neurobiological aesthetics, researchers in experimental philosophy (Knobe & Nichols 2008) and a variety of fields in social sciences may contribute to empirical research in the science of art as we conceived it.

Chatterjee, **Fitch & Westphal-Fitch**, **Graham**, **Leder**, **McManus**, and **Vartanian & Kaufman**, along with others in empirical aesthetics or neuroaesthetics, identify *aesthetic science* with the *science of art*. In contrast, the psycho-historical program entails that contemporary aesthetic science qualifies neither as an integrative science of art *qua* art nor as a science of artistic appreciation. At least two reasons support this claim. First, aesthetic science does not account for the historical origin of artistic categories and artistic functions. Second, it does not explain artists' and other appreciators' sensitivity to art-historical contexts and categories (premise 2, sect. 1.2 of the target article). Our assessment concords with positions defended by Bloom (1996a; 2010); Carroll (2000a; 2001); Davies (1991b; 2006b; 2012); **Gelman, Meyer**, & **Noles (Gelman et al.)**; **Gilmore**; **Hogan**; **Levinson**; **Parsons & Carlson**; and **Silvia**.

The psycho-historical program hypothesizes that the artistic domain ("the artistic") is not identical to the aesthetic domain ("the aesthetic"), though they may sometimes overlap. This distinction between the aesthetic and the artistic is defended by several contributions to philosophy of art (Carroll 2001; Danto 1981; 2003; Davies 2006b; 2012). Furthermore, the distinction is in the spirit of those works in anthropology, economy, history, or sociology that attribute functions to works of art that reach beyond the aesthetic because these functions pertain to economic, political, religious, ritual, and symbolic realms.

Table R1. *A psycho-historical research program for the science of art*

No.	Topics	Commentaries
R1.	The science of art and aesthetics	Chatterjee; Fitch & Westphal-Fitch; Gelman, Meyer, & Noles; Gilmore; Graham; Hogan; Leder; Levinson; McManus; Parsons & Carlson; Silvia; Vartanian & Kaufman
R1.1	Misled by the aesthetic–artistic confound	Gilmore; Leder; Silvia; Vartanian & Kaufman
R1.2	Sensitive to historical conceptions of the arts	Gilmore; De Smedt & De Cruz; Fitch and Westphal-Fitch; Hogan; Leder; Levinson; Thompson & Antliff
R2.	Art-historical works and contexts	
R2.1	Singular art histories amenable to scientific explanation	Chatterjee; Davies; Gelman, Meyer, & Noles; Graham; Newman; Thompson & Antliff
R2.2	Embodied or extended cognitive systems	Gibbs; Hirstein; Leder; Malafouris; Rollins; Wilson
R2.3	Traces of intentions or inheritors of functions	Davies; De Smedt & De Cruz; Fitch & Westphal-Fitch; Levinson; Parsons & Carlson; Rollins; Ross; Tullmann
R3.	Art appreciation	Hogan; Tullmann
R3.1	Basic exposure	Hirstein; Rollins; Ross; Schellekens; Thompson & Antliff; Tullmann
R3.2	Artistic design stance	De Smedt & De Cruz; Fitch & Westphal-Fitch; Gelman, Meyer, & Noles; Ross; Schellekens; Thompson & Antliff
R3.3	Artistic understanding	Gilmore; Leder
R3.4	Mental and brain processes	Freeman & Allen; Hogan; Silvia; Takahashi & Ejima; Thompson & Antliff
R4.	Psycho-historical empirical research	
R4.1	Dependent variables	Gilmore; Ross
R4.2	Independent variables	Chatterjee; Gilmore; Leder; Silvia; Vartanian & Kaufman
R4.3	Misled by ahistorical universalism	McManus; Graham
R5.	Expanding the psycho-historical program	Freeman & Allen; Gelman, Meyer, & Noles; Gibbs; Hogan; Kozbelt & Ostrofsky; Malafouris; Newman; Wilson
R6.	Conclusion	

R1.1. Misled by the aesthetic–artistic confound

Theories that neglect the distinction between the aesthetic and the artistic stem from what we propose to term the *aesthetic–artistic confound*, which is a theoretical assertion that identifies the aesthetic domain with the artistic domain, or at least significantly obscures their differences. Views that promote the aesthetic–artistic confound are expressed in numerous contributions to philosophical aesthetics (Beardsley 1958/1981; 1983; Kant 1793/2000; Stolnitz 1960) and aesthetic science (Dissanayake 1992; Jacobsen 2006; Leder et al. 2004; Locher 2012; Ramachandran 2011; Skov & Vartanian 2009); see also **Leder** and **Vartanian & Kaufman**. Even one of us (Reber) could not free himself from the seductive appeal of this confound (Reber 2008; 2012).

A philosophical view derived from the aesthetic–artistic confound is the *aesthetic theory of art* (Osborne 1981; Tolhurst 1984), which asserts that the chief function of art is to induce aesthetic experience (for a critique of this theory, see Carroll 1986; 2001).

The prevalence of this confound in psychology is illustrated by the fact that the journal of the *International Association for Empirical Aesthetics* is titled *Empirical Studies of the Arts*. Likewise, many researchers take for granted that *neuroaesthetics* is an adequate term to denote research on the neural bases of art appreciation, or that the term *aesthetic science* is acceptable to describe the scientific study of art (Shimamura 2012).

Silvia was puzzled by the fact that "aesthetic science has an ambivalent relationship with art itself." However, this "ambivalent relationship" is only puzzling if one takes for granted the seductive but misleading aesthetic–artistic confound. Likewise, Currie (2004), **Gilmore**, Hyman (2006; 2010), and Noë (2011) have criticized aesthetic science on the contextualist ground that this science neglects the arts and their singular histories. Their criticisms echo earlier assessments (Dickie 1964; Munro 1951, pp. 178–80). Such disputes would not arise if researchers could agree on how to demarcate the science of art from aesthetic science.

R1.2. Sensitive to historical conceptions of the arts

The psycho-historical research program defends a contextualist foundation for the science of art, which is currently missing in aesthetic science. In response to our critique of aesthetic science, **Chatterjee** claims that "artistic meaning" can "be ahistorical." In our opinion, asserting that artistic meaning can be ahistorical is problematic because it invites or legitimizes disregarding of the art appreciator's sensitivity to art-historical contexts (see **Gilmore**; **Hogan**; **Levinson**). In contrast to ahistorical views, our aim is to argue that the science of art needs to take into account art-historical phenomena studied in social sciences and the humanities – such as art-historical categories and cultural learning (Richerson & Boyd 2005; Sterelny 2012) – to avoid the pitfalls of radical forms of anti-contextualism.

Consider the varieties of art-historical categories. Agents involved in art-historical contexts and scholars studying these contexts develop different conceptions of the arts (Shiner 2003; Tatarkiewicz 1971). For example, *techne* in Greek (τέχνη, technique), *ars* in Latin, the concept of *liberal arts*, or the *romantic concept of art* are distinct

categories. We agree with **Fitch & Westphal-Fitch**'s and **Leder**'s claim that these different historical categories should not be identified with the modern concept of *fine arts* (Shiner 2003). Art-historical categories like *techne* or *liberal arts* refer to distinct *historical kinds* (Hacking 1995; 1999; 2002; Millikan 1999; 2000). Art-historical names like *Yirrkala bark petitions 1963* (Museum of Australian Democracy) or *Edvard Munch* refer to distinct *historical individuals* (Danto 1966; Strawson 1959). Such historical kinds and individuals are generated by singular causal processes that can often be discovered by means of historical inquiry (see R3.2; and **De Smedt & De Cruz** for a discussion of problematic cases). The psycho-historical program is based on the thought that one of the core tasks of a science of art is to account for the appreciator's sensitivity to such art-historical kinds and individuals. Because the psycho-historical program stresses the variety of art-historical contexts, kinds, and individuals, we disagree with Fitch & Westphal-Fitch's and **Thompson & Antliff**'s claim that our program is irreversibly tied to Western fine arts (see also R3.2).

R2. Art-historical contexts

R2.1. Singular art histories amenable to scientific explanation

Bloom (2010), **Gelman et al.**, and **Newman** agree with our core hypothesis that the cognition of historical individuals and kinds is essential to art appreciation. As illustrated in Figure 1 of the target article and as argued by Newman, art appreciators are often exquisitely sensitive to the fact that works of art are causal extensions of the individual agents who produced them. Such a sensitivity to unique artistic histories is demonstrated by phenomena associated with appreciators' interest in authenticity (Newman & Bloom 2012) and with contagion (Newman et al. 2011). Does art appreciators' interest in the uniqueness of art-historical agency raise a problem for the science of art?

We disagree with **Chatterjee**'s claim that scrutinizing layered historical meanings of an individual artwork is "too fine-grained a level of analysis to be resolved by the lens of scientific experimental methods." Humans routinely rely on the tracking of historical individuals over time to serve the identification of such individuals (Gutheil et al. 2008) and the scientific explanations of their behavior (consider the need to track individual organisms in ecology; see, e.g., Block et al. 2005). Furthermore, there is scientific work on the mental mechanisms engaged in tracking and identifying historical individuals, such as visual tracking (Kahneman et al. 1992; Pylyshyn & Storm 1988), multimodal tracking (Bullot 2009b; Bullot & Droulez 2008), memory systems for self-knowledge (Conway 1990; 2005), face recognition for identification (Gobbini & Haxby 2007), and other mechanisms that track agents' identities (Bullot 2006; Bullot & Rysiew 2007; Gutheil et al. 2008; Rips et al. 2006). Regarding art, the empirical research indicating appreciators' sensitivity to artistic historical individuals by Hood and Bloom (2008), Newman and Bloom (2012), and Gelman et al. (Gelman & Bloom 2000; Gelman et al. 1994; Gelman & Ebeling 1998; Gutheil et al. 2008) qualify as experimental research on the sensitivity to "layered historical meanings" (Chatterjee) of an art-historical individual. Lastly, though it rarely uses

experimental methods and may often lead to historical fallacies (Fischer 1971), research in the historical social sciences and humanities that attempts to explain historical events can be based on rigorous evidence-based reasoning (McCullagh 1984; Shafer 1969/1974; White 1965; Wigmore 1913) and source assessment (Gottschalk 1950/1969; Howell & Prevenier 2001).

In contrast to **Chatterjee**'s skepticism about a science of the sensitivity to historical individuals and unique events, we think that such sensitivity can be explained by theories that combine models of cognitive mechanisms with models of particular historical contexts. How can this integration be achieved? As indicated in Figures 1 and 2 of the target article, the psycho-historical program proposes to apprehend art-historical contexts, artists, works, and the mechanisms of appreciation as *hierarchical* and *nearly decomposable complex systems* – in the senses expounded by Bechtel (2008; Bechtel & Richardson 1993) and Simon (1969/1996). Our program seeks to identify some relations of hierarchical dependence (or *loci* of control) between these complex systems. For example, we hypothesize that the artist's work depends on both an originative art-historical context and a particular sequence of the artist's actions; or that the appreciator's artistic understanding depends both on basic exposure and the design stance.

Graham claims that our "radical" contextualist approach to complex systems is a "variant of holism" that dismisses "the viewpoint of the opposing side" understood as either universalism or reductionism. However, this interpretation misses the fact that the psycho-historical program can incorporate universalistic hypotheses and be locally reductionist. The multilevel and multicomponent structure of complex systems encourages pluralistic analyses of causal structures at different levels of organization (Mitchell 2009). Such complex systems analysis can aim at identifying hierarchies of modular mechanisms whose workings are explained by means of reference to interactions between parts and subparts. This kind of view is remote from the holism criticized by Graham.

This hierarchical analysis of a nearly decomposable complex system can also be used in reply to an objection raised by **Thompson & Antliff**, who admit the lack of interaction between the psychology of art and art history but maintain that "it is not clear that such interaction will replace a status quo that is polarized." According to the psycho-historical program, the psychology of art and art history often have *interdependent* (rather than independent) explanatory objectives because they study the same complex systems. Thus, in principle, an *integrative explanation* that combines psychological and historical descriptions of an artistic complex system will be preferable to explanations that are not integrated.

R2.2. Embodied or extended cognitive systems

Gibbs, **Malafouris**, **Rollins**, and **Wilson** offer commentaries from the standpoint of externalist and embodied theories of cognition and art (see also Brinck 2007; Manzotti 2011; Tribble & Sutton 2011). How does the psycho-historical framework relate to externalist theories of the mind (Clark 2008; Menary 2010; Putnam 1975; Wilson 2004) and theories of embodied cognition (Barsalou 1999; 2008; Gibbs 2006)?

1. We are not aware of works in the externalist tradition that integrate the psychological and historical approaches in the way our program does. For example, when they refer to history, advocates of semantic externalism like Kripke (1980) and Putnam (1981) rely on philosophical conceptions of causal and social history that engage with neither particular models of psychological mechanisms nor actual works by historians. Likewise, the works singled out by **Wilson** on the extended mind thesis (Clark & Chalmers 1998; Wilson & Clark 2009) or Sutton's "historical cognitive science" derived from active externalism (Sutton 2000; 2006; 2008; 2010) have not examined the psycho-historical hypotheses that we propose about art appreciation.

2. Several core hypotheses of the psycho-historical program seem neutral with respect to the alternatives between externalism and internalism. For example, the relevance and truth of our hypotheses on the artistic design stance and artistic understanding do not seem to directly depend on the truth of the externalist theses defended by **Wilson** and **Malafouris**.

3. **Malafouris** claims that our framework is "internalist." But such a claim misses the fact that the psycho-historical framework defends an *historical externalism* that is interpretable as "externalist" in at least two important senses specified in philosophy. First, the framework posits that modes and episodes of art appreciation are relations of *epistemic tracking* in the sense expounded by externalist theories in epistemology (Azzouni 2004; Goldman 1967; 1999; Kornblith 2001; Liebenberg 1990). On this account, a mental episode is an act of artistic appreciation because it tracks (is sensitive to) objective art-historical kinds and individuals (see sect. R1). Furthermore, our program argues that the *classification* of a token mental event as an episode of *artistic* appreciation depends on the identification of determinative relations between the mental episode (e.g., perceptual state, emotion) and historical categories and functions of arts and crafts (e.g., *didjeridu*, *sfumato*, or *serialism*; see sect. R1). Thus, this account is also externalist in a *taxonomical* sense (Wilson 2004, pp. 81–82).

4. Certain auxiliary hypotheses of the psycho-historical program can be developed in the direction of an embodied approach as suggested by **Gibbs** or an approach based on perceptual strategies as proposed by **Rollins**. Embodied cognition (Gibbs) and the theory of perceptual strategies (Rollins 2003a; 2003b; 2004; 2011) provide interesting hypotheses on the appreciator's simulation of the artist's actions during the creation of the artwork (**Hirstein**; Rollins). For example, some implicit processes might bypass explicit forms of the design stance if traces afforded by the artwork enable tracking of the artist's actions by means of basic exposure alone. However, such implicit processes may explain only part of the process of artistic understanding because causal information from the artwork alone is often insufficient, as **Levinson** and **Ross** rightly argue (see sect. R2.3).

5. Our historical externalism is also reflected in our critique of the internalism of contemporary researchers in aesthetic science. The latter seem tempted to argue that episodes of artistic appreciation can be individualized independently of the relations of brain states to art-historical categories and contexts. In contrast to the externalist/ contextualist approach, they may refer to knowledge stored in memory about the art-historical work and context (**Hirstein**). For example, although Leder et al.'s (2004) proposal is one of the most advanced models in the psychological approach, this model follows the traditional internalist methodology that dominates aesthetic science, and it lacks the contextualist and externalist characteristics of the psycho-historical framework. We concede to **Leder** that Leder et al. (2004) "postulated a stage of cognitive mastering, in which interpretation and assigning meaning are crucial." However, Leder et al.'s model does not account for the determinative dependence of art-historical understanding on the appreciator's sensitivity to objective historical individuals, kinds, and contexts. Consequently, the model can account for neither the genealogy of context-specific artistic functions (Parsons & Carlson 2008) nor the appreciators' sensitivity to such functions. For example, although the model could be integrated into the right part of Figure 1 (modes of art appreciation) in the target article, it circumvents the fundamental reference to the art-historical context depicted by the left part of Figure 1.

R2.3. Traces of intentions and inheritors of functions

We agree with **Levinson** that the concept of "causal-historical *traces* left in artworks" – used by Bullot (2009a, pp. 96–97); see also Leyton (1992), Shafer (1969/1974), and Smail (2008) on historical traces – is adequate for analyzing each particular artwork as a causal extension of its maker and originative context (**Newman**). We used the concept of causal traces in prior versions of the manuscript. However, one reviewer's objections about its generality led us to use the term "carrier of causal information."

Levinson argues that we adopt the misleading hypothesis that "causal history can be reliably inferred from what [we] call the causal-historical *information* carried by artworks." Levinson's concern about information would be warranted if we had linked causal information to necessarily true information-driven belief, akin perhaps to Dretske's (1981; 1994) theory of information-driven belief. Yet, this is not the case. We simply use *causal information* to refer to carriers of causal information *qua* appreciator-independent causal *traces*, which are also referred to as *cues*, *indices*, or *marks* in the literature. In fact, we agree with Levinson that causal information carried by the work is not a sufficient source for artistic understanding, and we do not assume that "retrieval is a simple matter" (**Ross**). Nor do we think that traces "transparently indicate" the artist's generative actions (Levinson). Artistic traces may be ascertained by means of multiple defeasible methods and sources that can be incorporated into the design stance. Relatedly, we agree with Levinson that beliefs, feelings, and explanations that result from the adoption of the artistic design stance are not immune to *errors* and *misunderstandings* (sect. 3.3.1), as implied in our connection between the design stance and inference to the best explanation (sect. 3.2).

The psycho-historical framework proposes hypotheses about the work as a causal trace of the artist's agency (sect. 2; **Newman**) and the genealogy of artifact functions (Parsons & Carlson 2008; Preston 1998). **Davies** thinks that we "identify artists' intentions as the primary data that appreciators attempt to retrieve from the art-creative

context in the process of comprehending artworks." But his point overlooks the fact that we acknowledge that works in the arts have a variety of complex *unintended functions* (**Parsons & Carlson**; **Ross**). Nevertheless, we concede to Davies that original intentions were mentioned too often without analysis of their complications. In that respect, Davies usefully lists seven complications faced by any appreciator who wishes to reliably attribute and interpret artistic agency. These complications refer to intentions that are (1) unconscious; (2) failed (see also Ross); (3) facilitated by social status and authority or (4) other factors in art-historical contexts; (5) categorial, as proposed by Levinson (1996b, p. 188–89) and Rollins (2004); (6) contradictorily assessed by actual intentionalism (Carroll 2000b) and hypothetical intentionalism (Levinson 2010); or (7) fancifully disconnected from actual historical intentions (sect. 3.1, R3.1).

Davies' typology of artistic intentions helpfully charts the rugged terrain that appreciators need to explore to track artists' conscious and unconscious agency (Davies 1982; 1996; 2006a). Davies' analysis can be expanded by the psycho-historical program. For example, unconscious intentions may not be directly known by the means of introspection (Carruthers 2009; Wilson 2002). However, if causally efficient, our framework suggests that these intentions could be known indirectly if they leave causal traces in the artist's behavior and work (R2.3). For appreciators can adopt the design stance to retrieve information about these unconscious causes and keep track of the artist's action over time. Appreciation driven by the design stance and essentialist assumptions (**Gelman et al.**; **Newman**) might lead appreciators to posit unconscious drives – as in psycho-analytical interpretations of artistic creation (e.g., Breton 1924/1988, p. 316) – that seek to explain manifest artistic behavior and unconscious agency. Given appreciators' propensity to overattribute intentionality and mentality (Bering 2006; Heider & Simmel 1944), this interpretative process might lead to illusions and artistic misunderstanding (sect. 3.3; **Gilmore**; **Levinson**; **Newman**).

We agree with **Rollins** that the design stance may be "construed in terms of positing hypothetical intentions, *based on beliefs about the actual historical context* in which the work was produced;" see also **Tullmann**. From the standpoint of normative artistic understanding (**Gilmore**; **Ross**), the psycho-historical program implies that accounts of virtual artistic intentions have to be integrated with information from the art-historical context to obtain relevance and plausibility. If such information is not available (see **De Smedt & De Cruz**; **Fitch & Westphal-Fitch**), virtual etiologies or thought experiments (Gendler 2010) may be the only way to achieve a form of understanding that might be richer than basic exposure (sect. R3.2).

Parsons & Carlson elaborate on the difference between artistic intentions and proper functions. According to their account (Parsons & Carlson 2008), the *proper function* of an artwork does not essentially depend on artistic intentions; it "must be analyzed in terms of artwork's causal histories." Specifically, "an artwork has F as its proper function just in case it belongs to a type that has achieved selective success in the marketplace due to performing F" (Parsons & Carlson). In many cases, the artist never envisioned the proper function the artwork gained over time.

Parsons & Carlson's clarification is important because it strengthens artistic contextualism. However, we also focused on intentions as a means of stressing potential commonalities between Bloom's psychological and intentionalist account of artifact categorization (Bloom 1996a; 1998) and Parsons and Carlson's purely philosophical theory of proper functions. Furthermore, despite our endorsement of Parsons and Carlson's proper functions, we are interested in a more encompassing analysis of artistic functions because artworks may have ephemeral, albeit reproduced, effects that might correspond to artistic functions without qualifying as proper functions. For example, and in contrast to **Fitch & Westphal-Fitch**'s charge of elitism, the psycho-historical approach can vindicate the appreciation and understanding of *art brut* ("low art" or "outsider art") by self-taught or naïve art makers whose work has never been institutionalized (Dubuffet 1986). According to Parsons & Carlson, these works cannot be conferred proper artistic functions because they are not socially sanctioned or known as art. According to a more encompassing psycho-historical view, however, works of *art brut* nonetheless have artistic functions of a private type in which the self-taught *art brut* artist performs the functional roles of both artist and audience.

R3. Artistic appreciation

Hogan wonders "whether 'art appreciation' is a coherent topic for scientific study." **Tullmann** argues that the concept of *artistic appreciation* is "inadequately defined in the psycho-historical account." What makes an appreciation an act of *artistic* appreciation? Tullmann develops a discussion where she often substitutes the term "aesthetic" for the term "artistic" in a way that does not clearly distinguish between the aesthetic and the artistic (sect. R1.1). The psycho-historical framework, however, specifies *the artistic* in contrast to *the aesthetic* as a domain defined by actual art-historical kinds and functions (sect. R1.2) and not by phenomenal contents detached from historical kinds and historical categories (R2.2). Consequently, on our account, artistic appreciation can only occur if a work is appreciated as a token of an art-historical kind or function. For example, when the American authorities interpreted a sculpture by Brancusi as a "piece of yellow-colored metal" and not as an artwork (Heinich 1996a; Rowell 1999), although they might have responded to it aesthetically, they did not identify or evaluate it artistically. A working definition of "*artistic* appreciation" has to refer to responses that are sensitive to the fact that the examined work is an artifact belonging to some art-historical or craft-historical kind and context.

R3.1 Basic exposure

Tullmann asks whether basic exposure to the artwork is necessary in order to appreciate the work. Others questioned whether it is necessary for eliciting the design stance (**Rollins**; **Ross**) and subsequently causal "reverse engineering" (**Thompson & Antliff**) or artistic understanding (**Schellekens**). What about an artwork seen in the past (see also **Hirstein**)? Does a friend's testimony about a novel count as basic exposure?

Any exposure to information about the artwork, including poor reproductions or testimonies by friends, could count as rudimentary types of basic exposure. Could one appreciate a work as made by an agent in a particular context if we were unable to access any sorts of information about it? One could not. Thus, minimal basic exposure is a *necessary condition* for any mode of appreciation, and therefore for eliciting the design stance.

In many cases, however, minimal exposure would not be adequate in terms of searching for and finding the accurate causal information about the art-historical context. For example, poor reproductions, indistinct memories, or unreliable testimonies may misguide the artistic design stance, triggering searches for information that lack relevance. In contrast, veridical and rich external representations of artworks – for example, high-resolution visual, audio, and audiovisual depictions, "compliant notational systems" (Goodman 1968), or reliable testimonies (Lackey & Sosa 2006) – and veridical internal representations of artworks (e.g., episodic memories; see **Hirstein**) will facilitate the appreciator's search for accurate causal information when adopting the design stance. Consequently, the availability of veridical representations should facilitate appreciation of the work based on artistic understanding.

Rollins, **Ross**, **Schellekens**, and **Tullmann** criticized the hypothesis of a strictly unidirectional causal relation linking basic exposure to design stance and the latter to artistic understanding. As discussed in the target article, the arrows in Figures 1 and 2 refer to necessary conditions, not temporal order. For example, when a reader knows that she is going to read a novel, she presumably does infer a categorial intention (Levinson 1996; Rollins 2004), eliciting the design stance before basic exposure occurs. Nevertheless, the search for causal information typical for the design stance can only start with basic exposure to information about the artwork, for example by reading a novel. The actual process of appreciation is best captured as a recursive process including feedback loops. A reader may anticipate that she will read a novel and prepares to adopt the design stance. When reading the novel (basic exposure), she looks for relevant causal information that fosters artistic understanding, and artistic understanding subsequently informs further reading. For the sake of simplicity, the psycho-historical framework as depicted in Figure 1 in the target article is unidirectional, refers to the artwork as artifact and its reproductions, and does not consider the reception history. A fuller psycho-historical theory would be recursive, referring to memories (**Hirstein**) and the mechanisms of collective and individual agency that control the reception history of the work.

R3.2 Artistic design stance

Hypotheses about the design stance and essentialism made by developmental psychologists (Bloom 2004; 2010; Gelman 2003) belong to the core of the psycho-historical program (see also **Gelman et al.**). This choice is justified by the fact that these theories – which have been neglected by research in aesthetic science – take into account both philosophical and historical issues that are central to the psycho-historical program.

De Smedt & De Cruz observed that if knowing the art-historical context were necessary for artistic understanding, much early art could not be understood because historical information about earliest artworks from the Pleistocene is missing. We agree that this issue is important. The possibility of insurmountable difficulties or errors in the understanding of some artworks is compatible with our framework (sect. 3.3.1, R2.3). In their interpretation of the design stance, De Smedt & De Cruz propose that "some of the designer's intentions can be gathered non-inferentially through direct experience with prehistoric artworks." Their proposal suggests that causal information in the artwork itself may sometimes suffice to understand the designer's intentions. Although this suggestion is in the spirit of the psycho-historical framework, it faces the challenges raised by **Davies**, **Levinson**, **Ross**, and **Gilmore**. As Levinson and Ross pointed out, it seems unlikely one can transparently track the past from the perception of artwork traces without the support of independently justified beliefs about the art-historical context (sect. R2.3).

Similarly, **Fitch & Westphal-Fitch** claim that it is "often impossible to reconstruct the agent behind an artwork, or the context in which it was produced" and think that our framework "would confine the study of aesthetics to those works for which historical information is available, mainly post-eighteenth century Western 'high art.'" We disagree because our psycho-historical program can be deployed to study folk art and art from non-Western cultures. There has been growing academic interest in the history of oral cultures (Prins 1991), decorative arts and crafts (Craig et al. 1999; Dutton 1993; Green 2007; Vlach 1990), popular music and dance (Bohlman 1988; Buckland 2006; Connell & Gibson 2003), and folk tales (Ògúnjìmí & Na'allah 2005; Rölleke 1991; Yassif 1999; Zipes 2006) in both Western and non-Western cultures. This suggests that Fitch & Westphal-Fitch's claim that "we cannot know the maker of these works" is too strong. Furthermore, even if some of such artworks were unintelligible to a particular audience, the audience of the artist's time and culture – and not just the elites – would have had some form of understanding based on their knowledge of their originative art-historical context, such as the religious, ritual, and political functions of the work (Boyer & Wertsch 2009; Rappaport 1999).

Several commentators (**Fitch & Westphal-Fitch**; **Schellekens**; **Thompson & Antliff)** questioned the degree to which the art-historic context, and therefore the design stance, plays a role for art appreciation. Schellekens asked: "can we really assume that all artworks require us to take contextual information into account in exactly the same way?" Fitch and Westphal-Fitch assigned a minor role to the design stance and emphasized the role of the biological roots of artistic appreciation. We do not object to the hypothesis that there are biological roots of aesthetic preferences and biases, such as preference for symmetry (Jacobsen et al. 2006; Reber 2002; Rhodes 2006), that may explain ornamental functions. Our point is that if eliciting aesthetic preferences pertains to the functions and meanings of a work of art, the appreciator's understanding of these functions is dependent on an examination of the relevant art-historical context and kinds.

R3.3 Artistic understanding

We agree with **Gilmore**'s claim that "understanding and evaluation need to be disentangled and their relations of dependence identified," and that "artistic understanding

is a *precondition* of artistic evaluation, even if the two approaches proceed simultaneously." Commentators differ, however, in the assessment of whether the normative mode of understanding is a necessary ingredient of the psycho-historical framework.

Leder noted that the core of this problem lies in the "unnecessarily normative pretense that art is only truly appreciated in the *artistic understanding* mode." **Gilmore** provides a direct response to Leder. We agree with Gilmore that "a normative conception is required to distinguish the appreciation of art *qua* art from appreciation of it from artistically irrelevant points of view. According to a normative account of appreciation, an artistic evaluation can be distinguished from a mere liking or preferring by being answerable to reasons" (Gilmore; see sect. R1). Leder's opposition to the normative mode originates from the concern that it could widen the gap between the "two cultures" by making the empirical study of the arts more difficult, if not impossible, because of the singular nature of artworks. As discussed in section R2.1, however, scholars can conduct rigorous psycho-historical research on the sensitivity to historical individuals and kinds. Empirical research based on the psycho-historical program is possible (see R4), albeit challenging (**Ross**).

R3.4 Mental and brain processes

In agreement with **Silvia**, we think that the psycho-historical program can be integrated with appraisal theories of emotion (Ellsworth & Scherer 2003; Lambie & Marcel 2002; Lazarus 1991; Silvia 2005a). Mechanisms enabling appraisal of the relationship of the appreciator to art-historical contexts are likely to determine the nature of the appreciator's sensitivity and affective responses to expressive contents (Robinson 2005) or artistic intentions (Rollins 2004; Silvia 2005c). Furthermore, the appraisal of the art-historical context may enable the experience of emotions informed by artistic understanding (sect. 3.3.2).

Likewise, to contribute to a science of art *qua* art, research in neuroscience needs to present models of the brain mechanisms determining the appreciator's sensitivity to the art-historical context. We agree with **Takahashi & Ejima**'s claim that findings on "contextual information processing in the human brain" could enable "empirical experimentation" on the sensitivity to art-historical context. For example, recent hierarchical models of functional organization of the prefrontal cortex (Botvinick 2008) may serve as a framework for developing models of the neural mechanisms implicated in contextual reasoning triggered by the design stance and associated with artistic understanding.

Hogan, **Silvia**, and **Thompson & Antliff** comment on problems regarding fluency and expectation. On Reber's (2012) account, fluency, though influenced by it, differs from expectation because fluency is a phenomenal experience, whereas expectation and prediction are symbolic processes. In addition, surprising fluency is positive, not fluency per se. **Rollins** remarks that there "is no reason to think that false beliefs inevitably cause dysfluency." Reber and Unkelbach (2010) provide a Bayesian analysis of why false beliefs are more likely to cause disfluency than accurate beliefs. Transgressions (**Freeman & Allen**) may be another example of inducement of disfluency leading to alienation effects.

Silvia wrote that the appraisal approach to emotion "is probably more fertile than the processing fluency approach" in research about art appreciation. Although we agree with Silvia's suggestion that the appraisal approach to emotion can be integrated into the psycho-historical program, we do not view the appraisal and fluency approaches as mutually exclusive. Artists manipulate a multitude of mental and brain processes to generate artifacts and categories with art-historical functions. Such processes range from *basic processes* in vision (Zeki 1999), audition (Bullot & Égré 2010; Thompson 2008), or processing fluency (Reber 2012) to *context-sensitive processes* of theory-based reasoning (Murphy & Medin 1985) and emotions (Hogan 2011; Silvia 2005b). In regard to the making of art-historical functions, such processes complement each other.

R4. Psycho-historical empirical research

In this section, we address the commentators' objections to our analysis of the methodological implications of the psycho-historical program for empirical research (sect. 4). We reassess the choice of what scientists in aesthetic science traditionally measure (dependent variables; sect. R4.1) and of the factors they attempt to manipulate in their experiments (independent variables; sect. R4.2). We also illustrate how several commentators remain committed to ahistorical universalism (sect. R4.3).

R4.1 Dependent variables

1. We agree with **Gilmore's** and **Ross'** claim that measuring *liking* for studying appreciation of art *qua* art is misguided. For the choice of liking as a dependent variable tends to neglect the connections between art-appreciative processes and art-historical categories and functions, and thus amounts to committing a far-reaching aesthetic–artistic confound; see also Gilmore (2000; 2011). For example, measuring how much undergraduate students like artworks cannot directly provide clear information about the modes and mechanisms controlling appreciators' sensitivity to art-historical functions. Even asking experts in a category of art whether they like an artwork is pointless if it remains unclear how modulation of liking is controlled by processes sensitive to historical kinds such as the design stance or artistic understanding. Furthermore, many art-historical functions of artifacts, if not all of them (Carroll 2002; Goodman 1968), derive from pictorial or semantic content that demand an interpretation rather than stimuli that trigger pleasure or liking. Therefore, an appreciator's liking is unlikely to indicate the appreciator's sensitivity to categories and functions in an art-historical context. Assessing judgments of liking, quality, or interest without a concomitant assessment of artistic understanding is likely to be irrelevant to the study of art.

Given the prevalent use of liking as a dependent variable, we think with the benefit of hindsight that the criteria used in our target article for identifying studies meeting the criteria of the psycho-historical framework were too lenient.

2. Very few studies on the influence of semantic context (sect. R4.2) measured dependent variables that probed sensitivity to art-historical contexts, such as meaningfulness (Russell 2003), or understanding (Leder et al. 2006).

3. How can the same dependent measure become relevant or irrelevant for measuring art appreciation? Studies by Takahashi (1995) and Smith et al. (2006) illustrate this point. Both used

semantic differential scales as dependent variable. Whereas ratings in Takahashi's study measured the dependence between participants' categorical appreciation and artists' drawing intentions, Smith et al. (2006) have not explained how ratings in their study were sensitive to categories from an art-historical context.

R4.2 Independent variables

Chatterjee, **Leder**, and **Vartanian & Kaufman** directed our attention to studies that they interpret as consistent with our psycho-historical program. Leder argued that our target article "omitted a large corpus of existing research" that would develop psycho-historical hypotheses. The studies can be classified into two categories: (1) inquiries that manipulate the *semantic context* and (2) inquiries that examine the effects of *expertise* (Lindell & Mueller 2011).

1. Most of the studies that manipulate semantic context assess the effects of titles or descriptions on liking of an artwork without connecting this judgment to the cognition of art-historical contexts (Millis 2001; Specht 2010; Temme 1992). However, even if we ignore the problem of liking as a dependent variable and turn to independent variables, many studies that manipulated semantic context did not manipulate art-historical information. For example, they presented metaphorical titles (Millis 2001) and left open the way in which titles related to the art-historical context (Belke et al. 2006; Franklin et al. 1993; Leder et al. 2006).

In another manipulation of semantic context, Kirk et al. (2009b) presented abstract paintings with the labels *gallery* or *computer*, indicating that the paintings belonged to a reputed art museum or were generated by the experimenter with a computer program. Behavioral and brain imaging data indicated higher hedonic value for paintings labeled *gallery*. The study is similar to the thought experiment with Warhol's *Brillo Boxes* analyzed in the target article. However, this study lacks the controls required to determine that the observed effects reflect manipulation of the art-historical categories, and not, for example, effects of monetary appraisal because abstract paintings in a reputed museum presumably cost more than paintings purportedly created by the experimenter (see Plassmann et al. 2008, on effects of monetary value of wine on hedonic value). Future studies would have to ensure that art-historical categories are not confounded with other, less relevant variables.

2. Because experts possess more knowledge about art-historical categories and functions than non-experts, comparing the two groups should provide a means for probing appreciators' sensitivity to art-historical contexts. Does this entail that existing studies of expertise have already implemented a psycho-historical research program? We do not think so. Apart from the fact that most expertise studies assessed hedonic measures (Hekkert & van Wieringen 1990; Kirk et al. 2009a) that may be irrelevant to the art-historical context (sect. R4.1), they pose at least two methodological problems:

First, experts may like some artworks more than others not because of relevant artistic understanding but because they know which artworks have to be liked more if one is to count as an expert and connoisseur (Bourdieu 1979/1987).

Second, experts may like and remember artworks better (see Kirk et al. 2009a for a study on architects) not because

they have become experts, but they may have become experts because they have liked and remembered artworks better from the outset. Experimental manipulation of historical knowledge may prove helpful to adjudicate this alternative (Kruger et al. 2004; Silvia 2005c; see sect. 4.1). In a study by Wiesmann and Ishai (2010), participants who were provided with more expert knowledge about cubism than the control group were better able to recognize the objects depicted by cubist paintings. This study meets the criteria of the psycho-historical framework because it provides the participants with art-historical knowledge and measures the recognition of objects in cubistic artworks, a dependent variable that might be more relevant to assessing sensitivity to an art-historical category than judgments of liking. By means of its manipulation of knowledge and use of non-evaluative variables, this study circumvents the problem that experts may provide responses that have to do with adherence to norms of a social class (Bourdieu 1979/1987), and that an observed outcome may be the cause instead of the effect of expertise.

3. In conclusion, did we omit a large corpus of existing research on art appreciators' sensitivity to art-historical contexts in the target article? From the standpoint of a lenient criterion and a focus on independent variables alone (as we did in the target article), we concede that the target article overlooked a few studies that may meet the criteria of a psycho-historical framework (Russell 2003; Smith et al. 2006; Specht 2010; Temme 1992; Wiesmann & Ishai 2010). These studies manipulate the appreciators' knowledge about the art-historical context in a way similar to the studies taken as examples in the target article (Kruger et al. 2004; Silvia 2005c). In contrast to Takahashi (1995), however, none of these studies manipulated the art-historical context directly.

Let us reiterate, however, that the aim of the target article was to propose an integrative research program and not to review advances in aesthetic science. The psycho-historical program entails that researchers in aesthetic science need to adopt stricter criteria for defining the science of art and overcoming the aesthetic–artistic confound (sect. R1.1; **Gilmore**; **Ross**). From the standpoint of strict criteria, where both the manipulation of the art-historical context and the dependent measure satisfy the criteria of the psycho-historical program, only the studies by Takahashi (1995), Russell (2003), Wiesmann and Ishai (2010), and Newman and Bloom (2012) may qualify as psycho-historical. Therefore, regardless of whether we rely on lenient or strict criteria, we did not omit a large corpus of research.

R4.3 Misled by ahistorical universalism

The methodological commentaries by **McManus** and **Graham** illustrate the pervasiveness of the ahistorical universalism we criticize – see also **Chatterjee** (discussed in R2.1), **Leder** (addressed in R2.2), Locher (2012), and Martindale (1990).

To vindicate his study *a posteriori*, **McManus** argues that Mondrian is an "anti-historical" and "anti-narrative" artist. McManus's commentary provides the kind of information about Mondrian's art-historical context that one would have expected to see discussed in his original article (McManus et al. 1993; cited in sect. 4.2).

McManus' outline seems to justify the thesis that Mondrian could be appreciated without any knowledge of the modernist art-historical context. However, both his thesis and his reliance on Krauss (1979) can be challenged. Arguing that grids in modernist art have a "bivalent" structure and history, Krauss' (1979) analysis responds to historical debates on the context of artistic modernity initiated by Greenberg (1961), Fried (1967/1998), and T. J. Clark (1973; 1982; 2001). Krauss is therefore thoroughly *contextualist* in her attempt to disclose the varied historical and psychological functions of grids in modernist art. Although debatable, her interpretation allows multiple interpretations of Mondrian's grids and does not endorse an aesthetic–artistic confound. In contrast, McManus' thesis that Mondrian's paintings "may encapsulate some universal principle of compositional order which can be detected by subjects" (McManus et al. 1993) suggests the ahistorical view that appreciators have an innate or universal preference for specific types of organizations in grids, regardless of the art-historical context. This kind of statement implies an endorsement of the aesthetic–artistic confound and a neglect of the appreciator's sensitivity to Mondrian's *modernist* art-historical context.

Another example of the assumption of ahistorical universalism is found in **Graham**'s commentary. In contrast to **Gilmore**, **Silvia**, and the psycho-historical program, Graham criticizes holistic methodologies from an ahistorical standpoint. We disagree with Graham's claim that the psycho-historical program entails methodological holism (see sect. R2.1). We think that the research on the non-randomness of Pollock's work he cited is irrelevant to the science of art because it assumes the validity of an ahistorical analysis of artworks. That said, we concede that "measurement of reduced properties of naturalistic stimuli can grant novel and unexpected insights – with respect to vision and to art" (Graham). Again, the point of our argument is that such research needs to offer models of the sensitivity to art-historical individuals, kinds, and contexts in order to contribute to a science of art *qua* art (see sect. R1; Gilmore; **Takahashi & Ejima**). This point is missing in Graham's discussion of artistic randomness.

R5. Expanding the psycho-historical program

Several commentators proposed to extend the psycho-historical program in a variety of ways. Beyond the justified thought that future psycho-historical research should inquire further into examples from art education (**Freeman & Allen**), they proposed to expand or adapt psycho-historical frameworks for explaining the way we keep track of the individual history or biography of agents and objects (**Gelman et al.**; **Hogan)** and states like mood (**Hogan**), extended cognitive systems (**Wilson**), embodied cognition (**Gibbs, Malafouris**), contagion (**Newman**), and art production (**Kozbelt & Ostrofsky**).

Gelman et al. offer important extensions, refinements, and correctives of our account of the relationship of the design stance to essentialism. Their commentary adds a wealth of fascinating evidence to demonstrate the interdependence between essentialist and historical thinking. We agree that "many of the points" we make "are not limited to cognition about art, art-historical contexts, or the design stance of an artist, but rather are relevant to more general cognition about objects, their historical paths, and the intentions of their creators." Bloom's and Gelman's research on psychological essentialism (Bloom 1996a; 1996b; 2010; Gelman 2003; Gelman & Bloom; 2000; 2007; Gelman et al. 1994; Gelman & Wellman 1991; Newman & Bloom 2012; Newman et al. 2011) offers core hypotheses for developing the psycho-historical program for the sciences of the sensitivity to historical individuals and kinds.

Embodiment (**Gibbs**; **Malafouris**), extended cognition (**Wilson**), and contagion (**Newman**) are extensions that could add new mechanisms for implicit processing to the theory-based reasoning underlying the design stance and artistic understanding proposed in the psycho-historical framework.

Kozbelt & Ostrofsky have provided us with the opportunity to mention art production because we originally envisioned a broad psycho-historical framework for a science of art that could integrate production and appreciation (Bullot 2009a). Like the psycho-historical framework for art appreciation, an analogous framework for art production not only extends the scope of empirical research by including variables that measure artistic understanding, but also examines the extent to which the creator of the artwork takes the appreciator's perspective.

The fact that the psycho-historical program proposes significant novel hypotheses about the modes of appreciation and can nonetheless integrate a wide range of proposed extensions demonstrates the power of this program for generating hypotheses on art appreciation and production.

R6. Conclusion

We ended our target article with the hope that our psycho-historical framework would help bridge the gap between the psychological and historical approaches, and hence lead to an integrated science of art appreciation. However, similar antagonisms between a psychological approach and the humanities plague many other academic domains, such as anthropology, education, sociology, or the science of religion. Thus, we end this response with the dream that the psycho-historical program will inspire scholars across disciplines to discover how scientific research in psychology and neuroscience can be fruitfully integrated with historical approaches from the humanities.

References

[The letters "a" and "r" before author's initials stand for target article and response references, respectively]

Aiken, N. E. (1998) *The biological origins of art*. Praeger. [aNJB]
Alter, A. L. & Oppenheimer, D. M. (2009) Uniting the tribes of fluency to form a metacognitive nation. *Personality and Social Psychology Review* 13:219–35. DOI: 10.1177/1088868309341564. [aNJB]

Alter, A. L., Oppenheimer, D. M., Epley, N. & Eyre, R. N. (2007) Overcoming intuition: Metacognitive difficulty activates analytical reasoning. *Journal of Experimental Psychology: General* 136:569–76. DOI: 10.1037/0096-3445.136.4.569. [aNJB]

Anderson, R. C. & Pearson, P. D. (1984) A schema-theoretic view of basic processes in reading comprehension. In: *Handbook of reading research*, ed. R. Barr, M. L. Kamil & P. Mosenthal, pp. 255–91. Longman. [aNJB]

Antliff, M. (2000) The fourth dimension and futurism: A politicized space. *The Art Bulletin* 82(4):720–33. [aNJB]

Argo, J. J., Dahl, D. W. & Morales, A. C. (2008) Positive consumer contagion: Responses to attractive others in retail contexts. *Journal of Consumer Research* 45:690–701. [GEN]

Arnau, F. (1961) *The art of the faker: Three thousand years of deception*. Little, Brown. [aNJB]

Arnheim, R. (1956/1974) *Art and visual perception: A psychology of the creative eye*. University of California Press. [aNJB]

Arnheim, R. (1981) Style as a Gestalt problem. *The Journal of Aesthetics and Art Criticism* 39(3):281–89. [aNJB]

Arnheim, R. (1986) *New essays in the psychology of art*. University of California Press. [aNJB]

Arsalidou, M., Barbeau, E., Bayless, S. & Taylor, M. (2010) Brain responses differ to faces of mothers and fathers. *Brain and Cognition* 74:47–51. [PCH]

Augustin, D. & Leder, H. (2006) Art expertise: A study of concepts and conceptual spaces. *Psychology Science* 48:135–57. [HL]

Azzouni, J. (2004) Theory, observation and scientific realism. *The British Journal for the Philosophy of Science* 55(3):371–92. DOI: 10.1093/bjps/55.3.371. [arNJB]

Baron-Cohen, S. (1995) *Mindblindness*. MIT Press. [aNJB]

Barsalou, L. W. (1999) Perceptual symbol systems. *Behavioral and Brain Sciences* 22 (04):577–660. [rNJB]

Barsalou, L. W. (2008) Grounded cognition. *Annual Review of Psychology* 59 (1):617–45. DOI: 10.1146/annurev.psych.59.103006.093639. [rNJB, RWG]

Bartsch, K. & Wellman, H. J. (1995) *Children talk about the mind*. Oxford University Press. [aNJB]

Baxandall, M. (1985) *Patterns of intention*. Yale University Press. [aNJB]

Beardsley, M. C. (1958/1981) *Aesthetics: Problems in the philosophy of criticism (second edition)*. Hackett Publishing. [arNJB]

Beardsley, M. C. (1983) An aesthetic definition of art. In: *What is art?*, ed. H. M. Curtler, pp. 15–29. Haven. [rNJB]

Bechara, A., Tranel, D. & Damasio, A. R. (2002) The somatic marker hypothesis and decision-making. In: *Handbook of neuropsychology: Frontal lobes,* Vol. 7, 2nd ed., ed. F. Boller & J. Grafman, pp. 117–43. Elsevier. [ST]

Bechtel, W. (2008) *Mental mechanisms: Philosophical perspectives on cognitive neuroscience*. Routledge. [rNJB]

Bechtel, W. & Richardson, R. C. (1993) *Discovering complexity: Decomposition and localization as strategies in scientific research*. Princeton University Press. [rNJB]

Beckett, S. (1954) *Waiting for Godot: A tragicomedy in two acts*. Grove Press. [aNJB]

Beja, M. (1992) *James Joyce: A literary life*. Ohio State University Press. [PCH]

Belke, B., Leder, H. & Augustin, D. (2006) Mastering style. Effects of explicit style-related information, art knowledge and affective state on appreciation of abstract paintings. *Psychology Science* 48:115–35. [rNJB, HL]

Belke, B., Leder, H., Strobach, T. & Carbon, C. C. (2010) Cognitive fluency: High-level processing dynamics in art appreciation. *Psychology of Aesthetics, Creativity, and the Arts* 4:214–22. [aNJB]

Benjamin, W. (1936/2008) The work of art in the age of its technological reproducibility, second version, trans. E. Jephcott, R. Livingstone & H. Eiland. In: *The work of art in the age of its technological reproducibility, and other writings on media*, ed. M. W. Jennings, B. Doherty & T. Y. Levin, pp. 19–55. Harvard University Press. [aNJB]

Bering, J. M. (2006) The folk psychology of souls. *Behavioral and Brain Sciences* 29 (5):453–98. DOI: http://dx.doi.org/10.1017/S0140525X06499106. [rNJB]

Berlin, B. & Kay, P. (1969) *Basic color terms*. University of California Press. [WTF]

Berlyne, D. E. (1971) *Aesthetics and psychobiology*. Meredith. [arNJB, PJS]

Berlyne, D. E., ed. (1974) *Studies in the new experimental aesthetics: Steps toward an objective psychology of aesthetic appreciation*. Hemisphere. [aNJB]

Biederman, I. (1987) Recognition-by-components: A theory of human image understanding. *Psychological Review* 94:115–47. [AK]

Bigand, E. & Poulin-Charronnat, B. (2006) Are we "experienced listeners"? A review of the musical capacities that do not depend on formal musical training. *Cognition* 100:100–30. DOI: 10.1016/j.cognition.2005.11.007. [aNJB]

Binder, J. R., Desai, R. H., Graves, W. W. & Conant, L. L. (2009) Where is the semantic system? A critical review and meta-analysis of 120 functional neuroimaging studies. *Cerebral Cortex* 19(12):2767–96. Available at: http://cercor.oxfordjournals.org/content/19/12/2767.abstract. [AC]

Block, B. A., Teo, S. L. H., Walli, A., Boustany, A. M., Stokesbury, M. J. W., Farwell, C. J. & Williams, T. D. (2005) Electronic tagging and population structure of Atlantic bluefin tuna. *Nature* 434:1121–27. [rNJB]

Bloom, P. (1996a) Intention, history, and artifact concepts. *Cognition* 60:1–29. DOI: 10.1016/0010-0277(95)00699-0. [arNJB]

Bloom, P. (1996b) Possible individuals in language and cognition. *Current Directions in Psychological Science* 5(3):90–94. DOI: 10.1111/1467-8721.ep10772823. [rNJB]

Bloom, P. (1998) Theories of artifact categorization. *Cognition* 66:87–93. DOI: 10.1016/S0010-0277(98)00003-1. [arNJB]

Bloom, P. (2004) *Descartes' baby: How the science of child development explains what makes us human*. Basic Books. [arNJB, GEN]

Bloom, P. (2010) *How pleasure works: The new science of why we like what we like*. Norton. [arNJB, SAG, WFT]

Bloom, P. & Markson, L. (1998) Intention and analogy in children's naming of pictorial representations. *Psychological Science* 9:200–204. [SAG, GEN]

Blotkamp, C. (1994) *Mondrian: The art of destruction*. Reaktion Books. [CM]

Boccioni, U. (1914/1977) *Pittura scultura futuriste: Dinamismo plastico*. Vallechi. [aNJB]

Bohlman, P. V. (1988) *The study of folk music in the modern world*. Indiana University Press. [rNJB]

Botvinick, M. M. (2008) Hierarchical models of behavior and prefrontal function. *Trends in Cognitive Sciences* 12:201–208. [rNJB, ST]

Bourdieu, P. (1979/1987) *Distinction: A social critique of the judgment of taste,* trans. R. Nice. Harvard University Press. [arNJB]

Bourdieu, P. (1992/1996) *Rules of art: Genesis and structure of the literary field,* trans. S. Emanuel. Stanford University Press. [aNJB]

Boyd, R. (1991) Realism, anti-foundationalism and the enthusiasm for natural kinds. *Philosophical Studies* 61:127–48. DOI: 10.1007/bf00385837. [aNJB]

Boyer, P. & Wertsch, J. V. (2009) *Memory in mind and culture*. Cambridge University Press. [rNJB]

Brecht, B. (1964) *Brecht on theatre: The development of an aesthetic,* trans. J. Willett. Methuen. [aNJB]

Bredius, A. (1937) A new Vermeer: Christ and the disciples at Emmaus. *The Burlington Magazine* 71:210–11. [aNJB]

Breton, A. (1924/1988) Manifeste du surréalisme Œuvres complètes, *I*, pp. 310–46. Gallimard. [rNJB]

Breton, A. (2008) Le surréalisme et la peinture [1928–1946/1965]. *Ecrits sur l'art, Œuvres complètes, IV*, pp. 346–846. Gallimard. [aNJB]

Brinck, I. (2007) Situated cognition, dynamic systems, and art: On artistic creativity and aesthetic experience. *Janus Head,* 9(2):407–31. [rNJB]

Buckland, T. J., ed. (2006) *Dancing from past to present: Nation, culture, identities*. University of Wisconsin Press. [rNJB]

Budd, M. (1995) *Values of art: Pictures, poetry and music*. Allen Lane/The Penguin Press. [aNJB, JG]

Bullot, N. J. (2006) The principle of ontological commitment in pre- and postmortem multiple agent tracking. *Behavioral and Brain Sciences* 29:466–68. [rNJB]

Bullot, N. J. (2009a) Material anamnesis and the prompting of aesthetic worlds: The psycho-historical theory of artworks. *Journal of Consciousness Studies* 16(1):85–109. Available at: http://www.ingentaconnect.com/content/imp/jcs/2009/00000016/00000001/art00004. [arNJB]

Bullot, N. J. (2009b) Toward a theory of the empirical tracking of individuals: Cognitive flexibility and the functions of attention in integrated tracking. *Philosophical Psychology* 22(3):353–87. DOI: 10.1080/09515080902969006. [arNJB]

Bullot, N. J. (2011) Attention, information and epistemic perception. In: *Information and living systems: Essays in philosophy of biology*, ed. G. Terzis & R. Arp, pp. 309–52. MIT Press. [aNJB]

Bullot, N. J. & Droulez, J. (2008) Keeping track of invisible individuals while exploring a spatial layout with partial cues: Location-based and deictic direction-based strategies. *Philosophical Psychology* 21(1):15–46. DOI: 10.1080/09515080701840861. [rNJB]

Bullot, N. J. & Égré, P. (2010) Editorial: Objects and sound perception. *Review of Philosophy and Psychology* 1(1):5–17. DOI: 10.1007/s13164-009-0006-3. [rNJB]

Bullot, N. J. & Rysiew, P. (2007) A study in the cognition of individuals' identity: Solving the problem of singular cognition in object and agent tracking. *Consciousness and Cognition* 16(2):276–93. DOI: 10.1016/j.concog.2006.09.006. [rNJB]

Bullough, E. (1957) *Aesthetics: Lectures and essays*. Bowes & Bowes. [aNJB]

Cage, J. (1961/1973) *Silence: Lectures and writings*. Wesleyan University Press. [aNJB]

Carey, S. (1985) *Conceptual change in childhood*. MIT Press. [aNJB]

Carroll, N. (1986) Art and interaction. *The Journal of Aesthetics and Art Criticism* 45 (1):57–68. [rNJB]

Carroll, N. (1999) *Philosophy of art: A contemporary introduction*. Routledge. [aNJB]

Carroll, N. (2000a) Art and the domain of the aesthetic. *The British Journal of Aesthetics* 40(2):191–208. DOI: 10.1093/bjaesthetics/40.2.191. [rNJB]

Carroll, N. (2000b) Interpretation and intention: The debate between hypothetical and actual intentionalism. *Metaphilosophy* 31(1–2), 75–95. DOI: 10.1111/1467-9973.00131. [rNJB, SD]

Carroll, N. (2001) *Beyond aesthetics: Philosophical essays*. Cambridge University Press. [rNJB]

Carroll, N. (2002) Aesthetic experience revisited. *British Journal of Aesthetics* 42 (2):145–68. DOI: 10.1093/bjaesthetics/42.2.145. [arNJB]

Carroll, N. (2004) Art and human nature. *Journal of Aesthetics and Art Criticism* 62 (2):95–107. DOI: 10.1111/j.1540-594X.2004.00143.x. [aNJB]

Carruthers, P. (1992) *Human knowledge and human nature: A new introduction to an ancient debate*. Oxford University Press. [aNJB]

Carruthers, P. (2002) The roots of scientific reasoning: infancy, modularity and the art of tracking. In: *The cognitive basis of science*, ed. P. Carruthers, S. Stich & M. Siegal, pp. 73–95. Cambridge University Press. [aNJB]

Carruthers, P. (2006a) *The architecture of the mind: Massive modularity and the flexibility of thought*. Oxford University Press. [aNJB]

Carruthers, P. (2006b) Why pretend? In: *The architecture of the imagination: New essays on pretence, possibility, and fiction*, ed. S. Nichols, pp. 89–109. Oxford University Press. [aNJB]

Carruthers, P. (2009) Mindreading underlies metacognition. *Behavioral and Brain Sciences* 32(02):164–82. DOI:10.1017/S0140525X09000831. [arNJB]

Chase, W. G. & Simon, H. A. (1973) Perception in chess. *Cognitive Psychology* 4 (1):55–81. DOI: 10.1016/0010-0285(73)90004-2. [aNJB]

Chatterjee, A. (2004) Prospects for a cognitive neuroscience of visual aesthetics. *Bulletin of Psychology and the Arts* 4:55–59. [AC]

Chatterjee, A. (2011a) Neuroaesthetics: A coming of age story. *The Journal of Cognitive Neuroscience* 23(1):53–62. DOI: 10.1162/jocn.2010.21457 [aNJB, AC]

Chatterjee, A. (2011b) Where there be dragons: Finding the edges of neuroaesthetics. *American Society of Neuroaesthetics Newsletter* 31(2):4–6. Available at: http://www.aesthetics-online.org/articles/index.php?articles_id=54. [AC]

Chatterjee, A. (2012) Neuroaesthetics: Growing pains of a new discipline. In: *Aesthetic science: Connecting minds, brains, and experience*, ed. A. Shimamura & S. Palmer, pp. 299–317. Oxford University Press. [AC]

Chave, A. (1999) Pollock and Krasner: Script and postscript. In *Jackson Pollock: Interviews, articles, and reviews, 1943–1993*, pp. 262–279. ed. P. Karmel. Museum of Modern Art. [DJG]

Cheema, B. (1989) *An investigation comparing aesthetic preference responses to original Mondrian compositions and their computer modified counterparts* [unpublished BSc thesis]. University College London. [CM]

Chikofsky, E. & Cross, J. H., II. (1990) Reverse engineering and design recovery: A taxonomy. *IEEE Software* 7(7):13–17. DOI: 10.1109/52.43044. [aNJB]

Cho, H. & Schwarz, N. (2006) If I don't understand it, it must be new: Processing fluency and perceived product innovativeness. *Advances in Consumer Research* 33:319–20. [aNJB]

Chomsky, N. (1966) *Topics in the theory of generative grammar*. Mouton. [aNJB]

Clark, A. J. (2008) *Supersizing the mind: Embodiement, action, and cognitive extension*. Oxford University Press. [rNJB, RAW]

Clark, A. J. & Chalmers, D. J. (1998) The extended mind. *Analysis* 58:10–23. [rNJB]

Clark, K. (1961) *Looking at pictures*. Holt, Rinehart and Winston. [aNJB]

Clark, T. J. (1973) *Image of the people: Gustave Courbet and the Second French Republic 1848–1851*. New York Graphic Society. [rNJB]

Clark, T. J. (1982) Clement Greenberg's theory of art. In: *The politics of interpretation*, ed. W. J. T. Mitchell, pp. 203–20. The University of Chicago Press. [rNJB]

Clark, T. J. (2001) *Farewell to an idea: Episodes from a history of modernism*. Yale University Press. [rNJB]

Cohen, D. J. & Jones, H. E. (2008) How shape constancy relates to drawing accuracy. *Psychology of Aesthetics, Creativity, and the Arts* 2:8–19. [AK]

Collingwood, R. G. (1938) *The principles of art*. Oxford University Press. [aNJB]

Collingwood, R. G. (1946) *The idea of history*. Oxford University Press. [aNJB]

Coltheart, M., Menzies, P. & Sutton, J. (2009) Abductive inference and delusional belief. *Cognitive Neuropsychiatry* 15(1–3):261–87. DOI: 10.1080/13546800903439120. [aNJB]

Connell, J. & Gibson, C. (2003) *Sound tracks: Popular music, identity and place*. Routledge. [rNJB]

Conway, M. A. (1990) *Autobiographical memory: An introduction*. Open University Press. [rNJB]

Conway, M. A. (2005) Memory and the self. *Journal of Memory and Language* 53 (4):594–628. DOI: 10.1016/j.jml.2005.08.005. [rNJB]

Cooper, H. & Spronk, R. (2001) *Mondrian: The transatlantic paintings*. Harvard University Art Museums. [CM]

Coremans, P. B. (1949) *Van Meegeren's faked Vermeers and de Hooghs: A scientific examination*. J. M. Meulenhoff. [aNJB]

Craig, B., Kernot, B., & Anderson, C. (1999) *Art and performance in oceania*. University of Hawaii Press. [rNJB]

Crane, D. (1989) *The transformation of the avant-garde: The New York art world, 1940–1985*. University of Chicago Press. [aNJB]

Crimp, D. (1981) Richard Serra: Sculpture exceeded. *October* 18:67–78. [aNJB]

Croce, B. (1902/1909) *Aesthetic as science of expression and general linguistic*, trans. D. Ainslie. Macmillan. [aNJB]

Croce, B. (1921) *The essence of aesthetic*, trans. D. Ainslie. William Heinemann. [aNJB]

Cross, E., Hamilton, A. & Grafton, S. (2006) Building a motor simulation de novo: Observation of dance by dancers. *NeuroImage* 31:1257–67. [RWG]

Csikszentmihalyi, M. & Robinson, R. E. (1990) *The art of seeing: An interpretation of the æsthetic experience*. J. Paul Getty Museum & The Getty Education Institute for the Arts. [aNJB]

Cudworth, C. L. (1954) Ye Olde Spuriosity Shoppe, or, *Put it in the Anhang. Notes, Second Series* 12(1):25–40. [aNJB]

Cupchik, G. C. (1992) From perception to production: A multi-level analysis of the aesthetic process. In: *Emerging visions of the aesthetic process: Psychology, semiology, philosophy*, ed. G. C. Cupchik & J. Laszlo, pp. 83–99. Cambridge University Press. [HL]

Cupchik, G. C., Vartanian, O., Crawley, A. & Mikulis, D. J. (2009) Viewing artworks: Contributions of cognitive control and perceptual facilitation to aesthetic response. *Brain and Cognition* 70:84–91. [HL]

Currie, G. (1989) *An ontology of art*. Macmillan Press and Scots Philosophical Club. [aNJB]

Currie, G. (1990) *The nature of fiction*. Cambridge University Press. [aNJB]

Currie, G. (1995) Imagination and simulation: Aesthetics meets cognitive science. In: *Mental simulation: Evaluations and applications*, ed. M. Davies & T. Stone, pp. 151–69. Blackwell. [aNJB]

Currie, G. (2003) Aesthetics and cognitive science. In: *The Oxford handbook of aesthetics*, ed. J. Levinson, pp. 706–21. Oxford University Press. [aNJB]

Currie, G. (2004) *Arts and minds*. Oxford University Press. [arNJB]

Currie, G. & Ravenscroft, I. (2003) *Recreative minds: Imagination in philosophy and psychology*. Oxford University Press. [aNJB]

Cutting, J. E. (2003) Gustave Caillebotte, French impressionism, and mere exposure. *Psychonomic Bulletin & Review* 10:319–43. [aNJB]

Cutting, J. E. (2006) The mere exposure effect and aesthetic preference. In: *New directions in aesthetics, creativity and the psychology of art*, ed. P. Locher, C. Martindale, & L. Dorfmann, pp. 33–46. Baywood. [JG]

Damasio, A. R. (1994) *Descartes' error: Emotion, reason, and the human brain*. G. P. Putnam. [aNJB]

Danto, A. C. (1964) The artworld. *Journal of Philosophy* 61(19):571–84. [aNJB]

Danto, A. C. (1966) The historical individual. In: *Philosophical analysis and history*, ed. W. H. Dray, pp. 265–96. Harper & Row. [rNJB]

Danto, A. C. (1974) The transfiguration of the commonplace. *The Journal of Aesthetics and Art Criticism* 33(2):139–48. [aNJB]

Danto, A. C. (1981) *The transfiguration of the commonplace: A philosophy of art*. Harvard University Press. [arNJB, KT]

Danto, A. C. (1992) *Beyond the Brillo box: The visual arts in post-historical perspective*. University of California Press. [aNJB]

Danto, A. C. (1998) *After the end of art: Contemporary art and the pale of history*. Princeton University Press. [aNJB]

Danto, A. C. (2003) *The abuse of beauty: Aesthetics and the concept of art*. Open Court. [arNJB]

Danto, A. C. (2009) *Andy Warhol*. Yale University Press. [aNJB]

David, S. V. & Gallant, J. L. (2005) Predicting neuronal responses during natural vision. *Network* 16:239–60. [DJG]

David, S. V., Vinje, W. E. & Gallant, J. L. (2004) Natural stimulus statistics alter the receptive field structure of V1 neurons. *Journal of Neuroscience* 24:6991–7006. [DJG]

Davies, D. (2004) *Art as performance*. Blackwell. [aNJB]

Davies, S. (1982) The aesthetic relevance of authors' and painters' intentions. *The Journal of Aesthetics and Art Criticism* 41(1):65–76. [rNJB]

Davies, S. (1991a) *Definitions of art*. Cornell University Press. [JG]

Davies, S. (1991b) The ontology of musical works and the authenticity of their performances. *Nous* 25(1):21–41. [rNJB]

Davies, S. (1996) Interpreting contextualities. *Philosophy and Literature* 20(1):20–38. [rNJB]

Davies, S. (1997) First art and art's definition. *Southern Journal of Philosophy* 35:19–34. [JDS]

Davies, S. (2006a) Aesthetic judgments, artworks and functional beauty. *The Philosophical Quarterly* 56(223):224–41. DOI: 10.1111/j.1467-9213.2006.00439.x. [aNJB]

Davies, S. (2006b) Authors' intentions, literary interpretation, and literary value. *British Journal of Aesthetics* 46(3):223–47. [SD]

Davies, S. (2012) *The artful species: Aesthetics, art, and evolution*. Oxford University Press. [rNJB]

Dennett, D. C. (1987) *The intentional stance*. MIT Press. [aNJB, MR]

Dennett, D. C. (1990) The interpretation of texts, people and other artifacts. *Philosophy and Phenomenological Research* 50(Issue Supplement):177–94. [aNJB]

De Smedt, J. & De Cruz, H. (2011) A cognitive approach to the earliest art. *Journal of Aesthetics and Art Criticism* 69:379–89. [JDS]

Dewey, J. (1910) The analysis of a complete act of thought. In: *How we think,* pp. 68–78. D. C. Heath.   [aNJB]

Dickie, G. (1964) The myth of the aesthetic attitude. *American Philosophical Quarterly* 1:56–65.   [rNJB]

Dickie, G. (1984/1997) *The art circle: A theory of art.* Chicago Spectrum Press. [aNJB]

Dickie, G. (2000) The institutional theory of art. In: *Theories of art today*, ed. N. Carroll, pp. 93–108. The University of Wisconsin Press.   [aNJB]

Diesendruck, G., Markson, L. & Bloom, P. (2003) Children's reliance on the creator's intent in extending names for artifacts. *Psychological Science* 14:164–68. [SAG]

Dissanayake, E. (1992) *Homo aestheticus: Where art comes from and why.* University of Washington Press.   [rNJB]

Dretske, F. I. (1981) *Knowledge and the flow of information.* MIT Press.   [rNJB]

Dretske, F. I. (1988) *Explaining behavior: Reasons in a world of causes.* MIT Press.   [aNJB]

Dretske, F. I. (1994) The explanatory role of information. *Philosophical Transactions: Physical Sciences and Engineering* 349(1689):59–69.   [rNJB]

Dubuffet, J. (1986) *Asphyxiating culture and other writings.* Four Walls Eight Windows.   [rNJB]

Ducasse, C. J. (1964) Art and the language of the emotions. *The Journal of Aesthetics and Art Criticism* 23(1):109–12.   [aNJB]

Dutton, D. (1974) To understand it on its own terms. *Philosophy and Phenomenological Research* 35(2):246–56.   [aNJB]

Dutton, D. (1979) Artistic crimes: The concept of forgery in the arts. *British Journal of Aesthetics* 19(4):302–14. DOI: 10.1093/bjaesthetics/19.4.302.   [aNJB]

Dutton, D. (1993) Tribal art and artifact. *The Journal of Aesthetics and Art Criticism* 51(1):13–21.   [rNJB]

Dutton, D. (2000) But they don't have our concept of art. In: *Theories of art today,* ed. N. Carroll, pp. 217–38, University of Wisconsin Press.   [MR]

Dutton, D. (2003) Authenticity in art. In: *The Oxford handbook of aesthetics*, ed. J. Levinson, pp. 258–74. Oxford University Press.   [GEN]

Dutton, D. (2005) Aesthetic universals. In: *The Routledge companion to aesthetics, second edition*, ed. B. N. Gaut & D. M. Lopes, pp. 279–92. Routledge.   [aNJB]

Dutton, D. (2009) *The art instinct: Beauty, pleasure & human evolution.* Bloomsbury Press.   [aNJB, GEN]

Dutton, D., ed. (1983) *The forger's art: Forgery and the philosophy of art.* University of California Press.   [aNJB]

Eaton, M. M. (2000) A sustainable definition of "art." In: *Theories of art today,* ed. N. Carroll, pp. 141–59. University of Wisconsin Press.   [aNJB]

Eco, U. & Sebeok, T. A. eds. (1983) *The sign of three: Dupin, Holmes, Peirce.* Indiana University Press.   [aNJB]

Ejima, Y., Takahashi, S., Yamamoto, H. & Goda, N. (2007) Visual perception of contextual effect and its neural correlates. In: *Representation and brain,* ed. S. Funahashi, pp. 3–20. Springer.   [ST]

Ekman, P. (1992) An argument for basic emotions. *Cognition & Emotion* 6(3–4):169–200. DOI: 10.1080/02699939208411068.   [aNJB]

Elias, N. (1939/1969) *The civilizing process, Vol. I. The history of manners.* Blackwell.   [aNJB]

Ellsworth, P. C. & Scherer, K. R. (2003) Appraisal processes in emotion. In: *Handbook of affective sciences*, ed. R. J. Davidson, K. R. Scherer & H. H. Goldsmith, pp. 572–95. Oxford University Press.   [rNJB, PJS]

Engelbrecht, M., Betz, J., Klein, C. & Rosenberg, R. (2010) Dem Auge auf der Spur: Eine historische und empirische Studie zur Blickbewegung beim Betrachten von Gemälden. *IMAGE: Zeitschrift für interdisziplinäre Bildwissenschaft* 11:29–41.   [CM]

Esslin, M. (1961) *The theatre of the absurd.* Doubleday.   [aNJB]

Evans, G. (1982) *The varieties of reference.* Oxford University Press.   [aNJB]

Farroni, T., Csibra, G., Simion, F. & Johnson, M. H. (2002) Eye contact detection in humans from birth. *Proceedings of the National Academy of Sciences USA* 99:9602–605.   [JDS]

Fechner, G. T. (1871) *Zur Experimentalen Aesthetik.* Breitkopf & Härtel.   [WTF]

Fechner, G. T. (1876) *Vorschule der Äesthetik [Elements of aesthetics].* Druck und Verlag von Breitkopf & Härtel.   [arNJB, AC, WTF, PJS]

Felsen, G. & Dan, Y. (2005) A natural approach to studying vision. *Nature Neuroscience* 8:1643–46.   [DJG]

Field, D. J. (1994) What is the goal of sensory coding? *Neural Computation* 6:559–601.   [DJG]

Field, D. J. (1987) Relations between the statistics of natural images and the response profiles of cortical cells. *Journal of the Optical Society of America A* 4:2379–94.   [DJG]

Fischer, D. H. (1971) *Historians' fallacies: Toward a logic of historical thought.* Routledge and Kegan Paul.   [rNJB]

Fodor, J. A. (1993) *Déjà vu* all over again: How Danto's aesthetics recapitulates the philosophy of mind. In: *Danto and his critics*, ed. M. Rollins, pp. 41–54. Blackwell.   [aNJB, MR, KT]

Foster, H. (2002) *Design and crime and other diatribes.* Verso.   [aNJB]

Frankland, P. W. & Bontempi, B. (2005) The organization of recent and remote memories. *Nature Reviews Neuroscience* 6:119–30.   [ST]

Franklin, M. B., Becklen, R. C. & Doyle, C. L. (1993) The influence of titles on how paintings are seen. *Leonardo* 26(2):103–108.   [rNJB]

Frazer, J. G. (1890/1959) *The new golden bough: A study in magic and religion.* Macmillan.   [GEN]

Frazier, B. N., Gelman, S. A., Wilson, A. & Hood, B. (2009) Picasso paintings, moon rocks, and hand-written Beatles lyrics: Adults' evaluations of authentic objects. *Journal of Cognition and Culture* 9:1–14.   [SAG]

Freedberg, D. (1989) *The power of images: Studies in the history and theory of response.* Chicago University Press.   [aNJB]

Freedberg, D. & Gallese, V. (2007) Motion, emotion and empathy in esthetic experience. *Trends in Cognitive Sciences* 11(5):197–203.   [aNJB, RWG]

Freeman, N. H. (2004) Aesthetic judgement and reasoning. In: *Handbook of research and policy in art education*, ed. E. W. Eisner & M. D. Day, pp. 359–78. A National Art Education Association (USA) project. Erlbaum. [NHF]

Freeman, N. H. (2011) Varieties of pictorial judgement: A functional account. In: *The aesthetic mind: Philosophy and psychology*, ed. E. Schellekens & P. Goldie, pp. 414–26. Oxford University Press.   [NHF]

Fried, M. (1967/1998) *Art and objecthood: Essays and reviews.* The University of Chicago Press.   [rNJB]

Fried, M. (1998) *Art and objecthood: Essays and reviews.* University of Chicago Press.   [aNJB]

Friedman, O. & Neary, K. R. (2008) Determining who owns what: Do children infer ownership from first possession? *Cognition* 107:829–49.   [SAG]

Frigg, R. & Howard, C. (2011) Fact and fiction in the neuropsychology of art. In: *The aesthetic mind: Philosophy and psychology*, ed. E. Schellekens & P. Goldie, pp. 54–70. Oxford University Press.   [aNJB]

Gamble, C. (1982) Interaction and alliance in Paleolithic society. *Man* 17:92–107. [JDS]

Gann, K. (2010) *No such thing as silence: John Cage's 4′33″.* Yale University Press. [aNJB]

Gardner, H. (1970) Children's sensitivity to painting styles. *Child Development* 41 (3):813–21.   [aNJB]

Geisler, W. S. (2008) Visual perception and the statistical properties of natural scenes. *Annual Review of Psychology* 59:167–92.   [DJG]

Geldzahler, H. (1994) *Making it new: Essays, interview, and talks.* Turtle Point Press.   [aNJB]

Gell, A. (1998) *Art and agency: An anthropological theory.* Oxford University Press.   [aNJB]

Gelman, S. A. (2003) *The essential child: Origins of essentialism in everyday thought.* Oxford University Press.   [arNJB, SAG]

Gelman, S. A. & Bloom, P. (2000) Young children are sensitive to how an object was created when deciding what to name it. *Cognition* 76:91–103. DOI: 10.1016/s0010-0277(00)00071-8.   [rNJB, SAG]

Gelman, S. A. & Bloom, P. (2007) Developmental changes in the understanding of generics. *Cognition* 105(1):166–83. DOI: 10.1016/j.cognition.2006.09.009. [rNJB]

Gelman, S. A., Coley, J. D. & Gottfried, G. M. (1994) Essentialist beliefs in children: The acquisition of concepts and theories. In: *Mapping the mind: Domain specificity in cognition and culture,* ed. L. A. Hirschfeld & S. A. Gelman, pp. 341–65. Cambridge University Press.   [rNJB]

Gelman, S. A. & Ebeling, K. S. (1998) Shape and representational status in children's early naming. *Cognition* 66(2):B35–47. DOI: 10.1016/s0010-0277(98)00022-5.   [rNJB]

Gelman, S. A., Manczak, E. M. & Noles, N. S. (2012) The nonobvious basis of ownership: Preschool children trace the history and value of owned objects. *Child Development* 83(5):1732–47.   [SAG]

Gelman, S. A. & Markman, E. M. (1986) Categories and induction in young children. *Cognition* 23:183–209.   [SAG]

Gelman, S. A. & Wellman, H. M. (1991) Insides and essences: Early understandings of the non-obvious. *Cognition* 38(3):213–44. DOI: 10.1016/0010-0277(91) 90007-q.   [rNJB, SAG]

Gendler, T. S. (2000) The puzzle of imaginative resistance. *The Journal of Philosophy* 97(2):55–81.   [aNJB]

Gendler, T. S. (2004) Thought experiments rethought – and reperceived. *Philosophy of Science* 71(5):1152–63. DOI: 10.1086/425239.   [aNJB]

Gendler, T. S. (2006) Imaginative contagion. *Metaphilosophy* 37(2):183–203. DOI: 10.1111/j.1467-9973.2006.00430.x.   [aNJB]

Gendler, T. S. (2010) *Intuition, imagination, and philosophical methodology.* Oxford University Press.   [arNJB]

Gendler, T. S. & Hawthorne, J., eds. (2002) *Conceivability and possibility.* Oxford University Press.   [aNJB]

German, T. P. & Johnson, S. C. (2002) Function and the origins of the design stance. *Journal of Cognition and Development* 3(3):279–300. DOI: 10.1207/s15327647jcd0303_2.   [aNJB]

Gibbs, R. W. (2006) *Embodiment and cognitive science*. Cambridge University Press. [rNJB, RWG]

Gibbs, R. & Colston, H. (2012) *Interpreting figurative meaning*. Cambridge University Press. [RWG]

Gilmore, J. (2000) *The life of a style: Beginnings and endings in the narrative history of art*. Cornell University Press. [rNJB]

Gilmore, J. (2011) A functional view of artistic evaluation. *Philosophical Studies* 155 (2):289–305. DOI: 10.1007/s11098-010-9570-8. [rNJB, JG]

Ginzburg, C. (1979) Clues: Roots of a scientific paradigm. *Theory and Society* 7 (3):273–88. [aNJB]

Gobbini, M. I. & Haxby, J. V. (2007) Neural systems for recognition of familiar faces. *Neuropsychologia* 45(1):32–41. DOI: 10.1016/j.neuropsychologia.2006.04.015. [rNJB]

Godfrey-Smith, P. & Sterelny, K. (2007) Biological information. *Stanford Encyclopedia of Philosophy*. Available at: http://plato.stanford.edu/entries/information-biological/. [aNJB]

Godley, J. (1951) *Master art forger: The story of Han van Meegeren*. Wilfred Funk. [aNJB]

Goldman, A. I. (1967) A causal theory of knowing. *Journal of Philosophy* 64(12):357–72. [rNJB]

Goldman, A. I. (1999) Internalism exposed. *Journal of Philosophy* 95(6):271–97. [rNJB]

Goldman, A. I. (2006) *Simulating minds: The philosophy, psychology, and neuroscience of mindreading*. Oxford University Press. [aNJB]

Gombrich, E. H. (1950/1951) *The story of art, fourth edition*, Phaidon. [aNJB]

Gombrich, E. H. (1960) *Art and illusion: A study in the psychology of pictorial representation*. Princeton University Press. [aNJB, AK]

Gombrich, E. H. (1963) *Meditations of a hobby horse: And other essays on the theory of art*. Phaidon. [aNJB]

Gombrich, E. H. (1979) *The sense of order: A study in the psychology of decorative art*. Phaidon. [aNJB, WTF]

Gombrich, E. H. (1990) Pictorial instructions. In: *Images and understanding, thoughts about images, ideas about understanding*, ed. H. B. Barlow, C. Blakemore & M. Weston-Smith, pp. 26–45. Cambridge University Press. [aNJB]

Gombrich, E. H. (2000) Concerning "The science of art": Commentary on Ramachandran and Hirstein. *Journal of Consciousness Studies* 7(8–9):17. [aNJB]

Gombrich, E. H. (2002) *The preference for the primitive: Episodes in the history of western taste and art*. Phaidon Press. [aNJB]

Goodman, N. (1968) *The languages of art*. Oxford University Press. [aNJB]

Goodman, N. (1978) *Ways of worldmaking*. Hackett. [aNJB]

Gopnik, A. & Meltzoff, A. N. (1997) *Words, thoughts, and theories*. MIT Press. [aNJB]

Gopnik, A. & Schulz, L. eds. (2007) *Causal learning: Psychology, philosophy, and computation*. Oxford University Press. [aNJB]

Gopnik, A. & Wellman, H. M. (1994) The theory theory. In: *Mapping the mind: Domain specificity in cognition and culture*, ed. L. A. Hirschfeld & S. A. Gelman, pp. 257–93. Cambridge University Press. [aNJB]

Gopnik, B. (2012) Aesthetic science and artistic knowledge. In: *Aesthetic science: Connecting minds, brains, and experience*, ed. A. P. Shimamura & S. E. Palmer, pp. 129–59. Oxford University Press. [aNJB]

Gordon, P. C. & Holyoak, K. J. (1983) Implicit learning and generalization of the "mere exposure" effect. *Journal of Personality and Social Psychology* 45:492–500. [aNJB]

Görner, V. (1997) *Jörg Immendorf: Bild mit Geduld [Immendorf: Picture with Patience]*. Hatje Cantz. [aNJB]

Gottschalk, L. (1950/1969) *Understanding history: A primer of historical method* (second ed.). Alfred A. Knopf. [rNJB]

Gracyk, T. (2009) Ontological contextualism. In: *A companion to aesthetics: second edition*, ed. S. Davies, K. M. Higgins, R. Hopkins, R. Stecker & D. E. Cooper, pp. 449–53. Wiley-Blackwell. [aNJB]

Graham, D. J. & Field, D. J. (2007) Statistical regularities of art images and natural scenes: spectra, sparseness and nonlinearities. *Spatial Vision* 21:149–64. [DJG]

Graham, D. J. & Field, D. J. (2008) Variations in intensity statistics for representational and abstract art, and for art from the eastern and western hemispheres. *Perception* 37:1341–52. [DJG]

Graham, D. J. & Field, D. J. (2009) Natural images: Coding efficiency. In: *Encyclopedia of neuroscience, Vol. VI*, ed. L. R. Squire, pp. 19–27. Academic Press. [DJG]

Grandy, R. E. (2007) Artifacts: Parts and principles. In: *Creations of the mind: Theories of artifacts and their representation*, ed. E. Margolis & S. Laurence, pp. 18–32. Oxford University Press. [aNJB]

Green, C. (2012) Mondrian || Nicholson – Nicholson || Mondrian: In parallel. In: *Mondrian || Nicholson: In parallel*, ed. C. Green & B. Wright, pp. 13–39. Courtauld Gallery. [CM]

Green, C. & Wright, B. (2012) Catalogue. In: *Mondrian || Nicholson: In parallel*, ed. C. Green & B. Wright, pp. 87–147. Courtauld Gallery. [CM]

Green, H. (2007) *Wood: Craft, culture, history*: Penguin Group USA. [rNJB]

Greenberg, C. (1961) *Art and culture*. Beacon Press. [arNJB]

Grice, H. P. (1957) Meaning. *The Philosophical Review* 66(3):377–88. [aNJB]

Griffiths, P. E. (1999) Squaring the circle: Natural kinds with historical essences. In: *Species: New interdisciplinary essays*, ed. R. A. Wilson, pp. 209–28. MIT Press. [aNJB]

Guercio, G. (2006) *Art as existence: The artist's monograph and its project*. MIT Press. [aNJB]

Gutheil, G., Bloom, P., Valderrama, N. & Freedman, R. (2004) The role of historical intuitions in children's and adults' naming of artifacts. *Cognition* 91(1):23–42. DOI: 10.1016/s0010-0277(03)00165-3. [aNJB]

Gutheil, G., Gelman, S. A., Klein, E., Michos, K. & Kelaita, K. (2008) Preschoolers' use of spatiotemporal history, appearance, and proper name in determining individual idenity. *Cognition* 107:366–80. [rNJB]

Guthrie, R. D. (2005) *The nature of Paleolithic art*. University of Chicago Press. [JDS]

Hacking, I. (1995) Two kinds of "new historicism" for philosophers. In: *History and … : histories within the human sciences*, ed. R. Cohen & M. S. Roth, pp. 296–318. University Press of Virginia. [rNJB]

Hacking, I. (1999) *The social construction of what?* Harvard University Press. [rNJB]

Hacking, I. (2002) *Historical ontology*. Harvard University Press. [rNJB]

Hansen, J. & Topolinski, S. (2011) An exploratory mindset reduces preference for prototypes and increases preference for novel exemplars. *Cognition and Emotion* 25:709–16. [PCH]

Harris, P. L. (2000) *The work of the imagination*. Blackwell. [aNJB]

Harris, P. L. & Koenig, M. A. (2006) Trust in testimony: How children learn about science and religion. *Child Development* 77:505–24. [SAG]

Haskell, H. (1996) *The early music revival: A history*. Dover Publications. [aNJB]

Hauser, A. (1951) *The social history of art*. Routledge & Kegan Paul. [aNJB]

Heider, F. (1958) *The psychology of interpersonal relations*. Wiley. [aNJB]

Heider, F. & Simmel, M. (1944) An experimental study of apparent behavior. *American Journal of Psychology* 57(2):243–59. [rNJB]

Heinich, N. (1996a) "C'est un oiseau!" Brancusi vs Etats-Unis, ou quand la loi définit l'art. *Droit en Société*, 34:649–72. [rNJB]

Heinich, N. (1996b) *The glory of van Gogh: An anthropology of admiration*, trans. P. Leduc Browne. Princeton University Press. [aNJB]

Hekkert, P. & van Wieringen, P. C. W. (1990) Complexity and prototypicality as determinants of appraisal of cubist paintings. *British Journal of Psychology* 81:483–95. [rNJB]

Hekkert, P. & van Wieringen, P. C. W. (1996a) Beauty in the eye of expert and nonexpert beholders: A study in the appraisal of art. *American Journal of Psychology* 109:389–407. [AC]

Hekkert, P. & van Wieringen, P. C. W. (1996b) The impact of level of expertise on the evaluation of original and altered versions of post-impressionistic paintings. *Acta Psychologica* 94:117–31. [OV]

Helmholtz, H. V. (1863) *Die lehre von den tonempfindungen als physiologische grundlage für die theorie der musik*. Vieweg. [aNJB]

Hilpinen, R. (2004) Artifact. *Stanford encyclopedia of philosophy (online)*. http://plato.stanford.edu/entries/artifact/. [aNJB]

Hirstein, W. (2010) The misidentification syndromes as mindreading disorders. *Cognitive Neuropsychiatry* 15:133–30. [WH]

Hogan, P. C. (forthcoming) Stylistics, emotion and neuroscience. In *The Routledge handbook of stylistics*. ed. M. Burke. Routledge. [PCH]

Hogan, P. C. (2011) *What literature teaches us about emotion*. Cambridge University Press. [rNJB, PCH]

Honing, H. (2009) *Musical cognition: A science of listening*. Transaction Publishers. [WTF]

Hood, B. (2009) *SuperSense: Why we believe in the unbelievable*. Harper Collins. [SAG]

Hood, B. M. & Bloom, P. (2008) Children prefer certain individuals over perfect duplicates. *Cognition* 106(1):455–62. DOI: 10.1016/j.cognition.2007.01.012. [arNJB]

Hookway, C. (2002) Emotions and epistemic evaluations. In: *The cognitive basis of science*, ed. P. Carruthers, S. Stich & M. Siegal, pp. 251–62. Cambridge University Press. [aNJB]

Howell, M. & Prevenier, W. (2001) *From reliable sources: An introduction to historical methods*. Cornell University Press. [rNJB]

Hume, D. (1757/1993) Of the standard of taste. In: *Selected essays*, ed. S. Copley & A. Edgar, pp. 133–54, Oxford University Press. [aNJB]

Hutchins, E. (1999) Cognitive artifacts. In: *The MIT encyclopedia of the cognitive sciences*, ed. R. A. Wilson & F. C. Keil. MIT Press. [RAW]

Hutchins, E. (2010) Cognitive ecology. *Topics in Cognitive Science* 2:705–15. [LM]

Hyman, J. (2006) In search of the big picture. *New Scientist* 191(2563):44–45. [rNJB]

Hyman, J. (2010) Art and Neuroscience. In: *Beyond mimesis and convention*, vol. 262, ed. R. Frigg & M. Hunter, pp. 245–61. Springer Netherlands. [rNJB]

Ingold, T. (2010) The textility of making. *Cambridge Journal of Economics* 34:91–102. [LM]

Ishizu, T. & Zeki, S. (2012) Toward a brain-based theory of beauty. *PLoS ONE* 6: e21852. [OV]

Jacobsen, T. (2006) Bridging the arts and sciences: A framework for the psychology of aesthetics. *Leonardo* 39(2):155–62. [rNJB]

Jacobsen, T., Schubotz, R. I., Höfel, L. & von Cramon, D. Y. (2006) Brain correlates of aesthetic judgment of beauty. *NeuroImage* 29(1):276–85. DOI: 10.1016/j.neuroimage.2005.07.010. [rNJB]

Jeshion, R., ed. (2010) *New essays on singular thought*. Oxford University Press. [aNJB]

Juslin, P. N. & Västfjäll, D. (2008) Emotional responses to music: The need to consider underlying mechanisms. *Behavioral and Brain Sciences* 31:559–621. DOI: 10.1017/S0140525X08005293. [aNJB]

Kahneman, D. & Miller, D. (1986) Norm theory: Comparing reality to its alternatives. *Psychological Review* 93:136–53. [PCH]

Kahneman, D., Knetsch, J. L. & Thaler, R. H. (1990) Experimental tests of the endowment effect and the Coase theorem. *The Journal of Political Economy* 98:1325–48. [SAG]

Kahneman, D., Treisman, A. & Gibbs, B. J. (1992) The reviewing of object files: Object-specific integration of information. *Cognitive Psychology* 24(2):175–219. [rNJB]

Kant, I. (1793/2000) *Critique of the power of judgment*, trans. P. Guyer & E. Matthews. Cambridge University Press. [arNJB]

Kaplan, S. (1992) Environmental preference in a knowledge-seeking, knowledge-using organism. In: *The adapted mind: Evolutionary psychology and the generation of culture*, ed. J. H. Barkow, L. Cosmides & J. Tooby, pp. 581–98. Oxford University Press. [aNJB]

Kaufman, J. C. & Baer, J. (2012) Beyond new and appropriate: Who decides what is creative? *Creativity Research Journal* 24:83–91. [OV]

Keil, F. C. (1989) *Concepts, kinds, and cognitive development*. MIT Press. [aNJB]

Keil, F. C. (2006) Explanation and understanding. *Annual Review of Psychology* 57 (1):227–54. DOI:10.1146/annurev.psych.57.102904.190100. [aNJB]

Keil, F. C. & Wilson, R. A. eds. (2000) *Explanation and cognition*. MIT Press. [aNJB]

Kelemen, D. (1999) Function, goals and intention: Children's teleological reasoning about objects. *Cognition* 3(12):461–68. [aNJB]

Kelemen, D. (2004) Are children "intuitive theists"? Reasoning about purpose and design in nature. *Psychological Science* 15: 295–301. [JDS]

Kelemen, D. & Carey, S. (2007) The essence of artifacts: Developing the design stance. In: *Creations of the mind: Theories of artifacts and their representation*, ed. E. Margolis & S. Laurence, pp. 212–30. Oxford University Press. [aNJB, SAG]

Keysar, B. & Barr, D. J. (2002) Self-anchoring in conversation: Why language users do not do what they "should." In: *Heuristics and biases. The psychology of intuitive judgment*, ed. T. Gilovich, D. Griffin & D. Kahneman, pp. 150–66. Cambridge University Press. [aNJB]

Kieran, M. & Lopes, D. M. (2006) *Knowing art: Essays in aesthetics and epistemology*. Springer. [aNJB]

Kinder, A., Shanks, D. R., Cock, J. & Tunney, R. J. (2003) Recollection, fluency, and the explicit/implicit distinction in artificial grammar learning. *Journal of Experimental Psychology: General* 132:551–65. [aNJB]

Kintsch, W. (1998) *Comprehension: A paradigm for cognition*. Cambridge University Press. [aNJB]

Kintsch, W. (2005) An overview of top-down and bottom-up effects in comprehension: The CI perspective. *Discourse Processes* 39(2–3):125–28. DOI: 10.1080/0163853x.2005.9651676. [aNJB]

Kirk, U., Skov, M., Christensen, M. S. & Nygaard, N. (2009a) Brain correlates of aesthetic expertise: A parametric fMRI study. *Brain and Cognition* 69(2):306–15. DOI: 10.1016/j.bandc.2008.08.004. Available at: http://www.sciencedirect.com/science/article/pii/S0278262608002443. [rNJB, AC]

Kirk, U., Skov, M., Hulme, O., Christensen, M. S. & Zeki, S. (2009b) Modulation of aesthetic value by semantic context: An fMRI study. *NeuroImage* 44(3):1125–32. DOI: 10.1016/j.neuroimage.2008.10.009. Available at: http://www.sciencedirect.com/science/article/pii/S1053811908011099. [rNJB, AC, HL, OV]

Knobe, J. (2010) Person as scientist, person as moralist. *Behavioral and Brain Sciences* 33(04):315–29. DOI: 10.1017/S0140525X10000907. [aNJB]

Knobe, J. & Nichols, S. (2008) *Experimental philosophy*. Oxford University Press. [rNJB]

Koechlin, E. & Summerfield, C. (2007) An information theoretical approach to prefrontal executive function. *Trends in Cognitive Sciences* 11:229–35. [ST]

Koenderink, J. J. & van Doorn, A. J. (2006) Pictorial space, a modern reappraisal of Adolf Hidebrand. In: *Visual thought: The depictive space of depiction*, ed. L. Albertazzi, pp. 135–54. John Benjamins. [NHF]

Koenig, M. A. (2010) Selective trust in testimony: Children's evaluation of the message, the speaker, and the speech act. In: *Oxford studies in epistemology*, vol. 3, ed. T. Szabó Gendler & J. Hawthorne, pp. 253–73. Oxford University Press. [SAG]

Kornblith, H., ed. (2001) *Epistemology: Internalism and externalism*. Blackwell Publishers Ltd. [rNJB]

Kozbelt, A. & Seeley, W. P. (2007) Integrating art historical, psychological, and neuroscientific explanations of artists' advantages in drawing and perception. *Psychology of Aesthetics Creativity, and the Arts* 1:80–90. [AK]

Kozbelt, A., Seidel, A., ElBassiouny, A., Mark, Y. & Owen, D. R. (2010) Visual selection contributes to artists' advantages in representational drawing. *Psychology of Aesthetics, Creativity, and the Arts* 4:93–102. [AK]

Krauss, R. E. (1979) Grids. *October* 9(50):64. [rNJB, CM]

Kreitler, H. & Kreitler, S. (1972) *The psychology of the arts*. Duke University Press. [aNJB, HL]

Kripke, S. (1980) *Naming and necessity*. Harvard University Press. [rNJB]

Kristeller, P. O. (1952) The modern system of the arts: A study in the history of aesthetics (II). *Journal of the History of Ideas* 13(1):17–46. [WTF]

Kruger, J., Wirtz, D., Van Boven, L. & Altermatt, T. W. (2004) The effort heuristic. *Journal of Experimental Social Psychology* 40(1):91–98. DOI: 10.1016/s0022-1031(03)00065-9. [arNJB, JG]

Kwon, M. (2002) *One place after another: Site-specific art and locational identity*. MIT Press. [aNJB]

Kwon, M. (2009) Approaching architecture: The case of Richard Serra and Michael Asher. *Yale University Art Gallery Bulletin*:44–55. [aNJB]

Lackey, J. & Sosa, E., eds. (2006) *The epistemology of testimony*. Oxford University Press. [rNJB]

Lamarque, P. (1999) The aesthetic and the universal. *Journal of Aesthetic Education* 33:1–17. [JDS]

Lambie, J. A. & Marcel, A. J. (2002) Consciousness and the varieties of emotion experience: A theoretical framework. *Psychological Review* 109(2):219–59. DOI: 10.1037//0033-295X.109.2.219. [rNJB]

Lang, B., ed. (1987) *The concept of style (second edition)* Cornell University Press. [aNJB]

Langlois, J. H. & Roggman, L. A. (1990) Attractive faces are only average. *Psychological Science* 1:115–21. [PCH]

Lazarus, R. S. (1991) *Emotion and adaptation*. Oxford University Press. [rNJB]

Leavis, F. R. (1962) *Two cultures? The significance of C. P. Snow*. Chatto & Windus. [aNJB]

Leder, H., Belke, B., Oeberst, A. & Augustin, D. (2004) A model of aesthetic appreciation and aesthetic judgments. *British Journal of Psychology* 95:489–508. DOI: 10.1348/0007126042369811. [arNJB, AC, HL, OV]

Leder, H., Carbon, C.-C. & Ripsas, A.-L. (2006) Entitling art: Influence of title information on understanding and appreciation of paintings. *Acta Psychologica* 121(2):176–98. DOI: 10.1016/j.actpsy.2005.08.005. [rNJB, HL, OV]

Leder, H., Gerger, G., Dressler, S. G. & Schabmann, A. (2012) How art is appreciated. *Psychology of Aesthetics, Creativity, and the Arts* 6:1–10. [HL]

LeDoux, J. (1996) *The emotional brain: The mysterious underpinnings of emotional life*. Touchstone. [aNJB, PCH]

Lehrer, K. (2006) Knowing content in the visual arts. In *Knowing art: Essays in aesthetics and epistemology*, ed. M. Kieran & D.M. Lopes, pp. 1–18. Springer. [JDS]

Leonards, U., Baddeley, R., Gilchrist, I. D., Troscianko, T., Ledda, P. & Williamson, B. (2007) Mediaeval artists: Masters in directing the observer's gaze. *Current Biology* 17: R8–R9. [NHF]

Levinson, J. (1990) *Music, art, and metaphysics*. Cornell University Press. [aNJB]

Levinson, J. (1996a) Art, value, and philosophy. *Mind* 105(420):667–82. [aNJB]

Levinson, J. (1996b) *The pleasures of aesthetics: Philosophical essays*. Cornell University Press. [rNJB, WH, MR]

Levinson, J. (2002) The irreducible historicality of the concept of art. *British Journal of Aesthetics* 42(4):367–79. DOI: 10.1093/bjaesthetics/42.4.367. [aNJB]

Levinson, J. (2007) Aesthetic contextualism. *Postgraduate Journal of Aesthetics* 4 (3):1–12. [aNJB]

Levinson, J. (2010) Defending hypothetical intentionalism. *The British Journal of Aesthetics* 50(2):139–50. DOI: 10.1093/aesthj/ayp072. [rNJB, SD]

Lewicki, M. S. (2002) Efficient coding of natural sounds. *Nature Neuroscience* 5:356–63. [DJG]

Leyton, M. (1992) *Symmetry, causality, mind*. MIT Press. [rNJB, SAG]

Liebenberg, L. (1990) *The art of tracking: The origin of science*. David Philip. [rNJB]

Lindell, A. K. & Mueller, J. (2011) Can science account for taste? Psychological insights into art appreciation. *Journal of Cognitive Psychology* 23(4):453–75. DOI: 10.1080/20445911.2011.539556. [rNJB]

Lipton, P. (1991/2004) *Inference to the best explanation*. Routledge. [aNJB]

Livingston, P. (2003) Intention in art. In: *The Oxford handbook of aesthetics*, ed. J. Levinson, pp. 275–90. Oxford University Press. [aNJB]

Locher, P. (2003) An empirical investigation of the visual rightness theory of picture perception. *Acta Psychologica* 114(2):147–64. DOI: 10.1016/j.actpsy.2003.07.001. [aNJB]

Locher, P. J. (2012) Empirical investigation of an aesthetic experience with art. In: *Aesthetic science: Connecting minds, brains, and experience*, ed. A. P. Shimamura & S. E. Palmer, pp. 163–88. Oxford University Press. [aNJB]

Locher, P. J., Overbeeke, K. & Stappers, P. J. (2005) Spatial balance of color triads in the abstract art of Piet Mondrian. *Perception* 34(2):169–89. DOI: 10.1068/p5033. [aNJB, CM]

Lopes, D. M. (1996) *Understanding pictures*. Oxford University Press. [aNJB]

Lopes, D. M. (2002) Review of *Inner vision: An exploration of art and the brain* by Semir Zeki. *The Journal of Aesthetics and Art Criticism* 60(4):365–66. DOI: 10.1111/1540-6245.00082. [aNJB]

Lopes, D. M. (2004) Directive pictures. *The Journal of Aesthetics and Art Criticism* 62(2):189–96. DOI: 10.1111/j.1540-594X.2003.00151.x. [aNJB]

Lopes, D. M. (2005) *Sight and sensibility: Evaluating pictures*. Oxford University Press. [aNJB, SR]

Lopes, D. M. (2010) *A philosophy of computer art*. Routledge. [aNJB]

Machotka, P. (1966) Aesthetic criteria in childhood: Justifications of preference. *Child Development* 37(4):877–85. [aNJB]

MacLeod, S. (1999) *The life of Haifisch*. Broken Boulder Press. [aNJB]

Malafouris, L. (2010) The brain–artefact interface (BAI): A challenge for archaeology and cultural neuroscience. *Social Cognitive and Affective Neuroscience* 5(2–3):264–73. DOI: 10.1093/scan/nsp057. [LM]

Malafouris, L. (2011) Enactive discovery: The aesthetic of material engagement. In: *Situated aesthetics: Art beyond the skin*, ed. R. Manzotti, pp. 123–41. Imprint Academic. [LM]

Malafouris, L. (2013) *How things shape the mind: A theory of material engagement*. MIT Press. [LM]

Malevich, K. (1959) *The non-objective world*, trans. H. Dearstyne. Theobold. [aNJB]

Manzotti, R., ed. (2011) *Situated aesthetics: Art beyond the skin*. Imprint Academic. [rNJB]

Margolis, E. & Laurence, S., eds. (2007) *Creations of the mind: Theories of artifacts and their representation*. Oxford University Press. [aNJB]

Margolis, J. (1980) Prospects for a science of aesthetic perception. In: *Perceiving artworks*, ed. J. Fisher, pp. 213–39. Temple University Press. [aNJB]

Margolis, J. (2000) The deviant ontology of artworks. In: *Theories of art today*, ed. N. Carroll, pp. 109–29. The University of Wisconsin Press. [aNJB]

Marinetti, F. T. (1909, 20 February) Manifeste du Futurisme, *Le Figaro*, p. 1. [aNJB]

Martin, L. J. (1906) An experimental study of Fechner's principles in aesthetics. *Psychological Review* 13:142–219. DOI:10.1037/h0076085. [aNJB]

Martindale, C. (1984) The pleasures of thought: A theory of cognitive hedonics. *The Journal of Mind and Behavior* 5:49–80. [aNJB]

Martindale, C. (1990) *The clockwork muse: The predictability of artistic change*. Basic Books. [arNJB, OV]

Martindale, C. & Moore, K. (1988) Priming, prototypicality, and preference. *Journal of Experimental Psychology: Human Perception and Performance* 14:661–70. [PCH]

Martindale, C., Moore, K. & Borkum, J. (1990) Aesthetic preference: Anomalous findings for Berlyne's psychobiological theory. *American Journal of Psychology* 103:53–80. [aNJB]

Martlew, M. & Connolly, K. J. (1996) Human figure drawings by schooled and unschooled children in Papua New Guinea. *Child development* 67:2743–62. [JDS]

Matan, A. & Carey, S. (2001) Developmental changes within the core of artifact concepts. *Cognition* 78(1):1–26. DOI: 10.1016/s0010-0277(00)00094-9. [aNJB]

Mauss, M. (1902/1972) *A general theory of magic*, trans. R. Brain. Norton. [GEN]

McClure, S. M., Li, J., Tomlin, D., Cypert, K. S., Montague, L. M. & Montague, P. R. (2004) Neural correlates of behavioral preference for culturally familiar drinks. *Neuron* 44(2):379–87. Available at: http://www.sciencedirect.com/science/article/pii/S0896627304006129. [AC]

McCullagh, C. B. (1984) *Justifying historical descriptions*. Cambridge University Press. [rNJB]

McDermott, L. (1996) Self-representation in Upper Paleolithic female figurines. *Current Anthropology* 37:227–48. [JDS]

McManus, I. C. (2006) Measuring the culture of C. P. Snow's *Two Cultures*. *Empirical Studies of the Arts* 24(2):219–27. DOI: 10.2190/5NM6-FV42-X38A-F3VP. [aNJB]

McManus, I. C., Cheema, B. & Stoker, J. (1993) The aesthetics of composition: A study of Mondrian. *Empirical Studies of the Arts* 11(2):83–94. [arNJB, CM]

McWhinnie, H. J. (1968) A review on aesthetic measure. *Acta Psychologica* 28:363–75. DOI: 10.1016/0001-6918(68)90025-5. [aNJB]

Menary, R., ed. (2010) *The extended mind*. MIT Press. [rNJB]

Meskin, A. & Weinberg, J. M. (2003) Emotions, fiction, and cognitive architecture. *The British Journal of Aesthetics* 43(1):18–34. DOI: 10.1093/bjaesthetics/43.1.18. [aNJB]

Meyer, L. B. (1956) *Emotion and meaning in music*. Chicago University Press. [WFT]

Miller, J. G. (1984) Culture and development of everyday social explanation. *Journal of Personality and Social Psychology* 46:961–78. [aNJB]

Millikan, R. G. (1984) *Language, thought, and other biological categories*. MIT Press. [aNJB]

Millikan, R. G. (1999) Historical kinds and the special sciences. *Philosophical Studies* 95(1–2):45–65. [rNJB]

Millikan, R. G. (2000) *On clear and confused ideas: An essay about substance concepts*. Cambridge University Press. [rNJB]

Millikan, R. G. (2004) *Varieties of meaning*. MIT Press. [aNJB]

Millis, K. & Larson, M. (2008) Applying the construction–integration framework to aesthetic responses to representational artworks. *Discourse Processes* 45:263–87. [HL]

Millis, K. (2001) Making meaning brings pleasure: The influence of titles on aesthetic experiences. *Emotion*, 3:320–29. DOI: 10.1037/1528-3542.1.3.320. [rNJB, HL]

Mishkin, H. G. (1959) The published works of Giovanni Battista Sammartini: A bibliographical reappraisal. *The Musical Quarterly* 45(3):361–74. DOI: 10.1093/mq/XLV.3.361. [aNJB]

Mitchell, P., Ropar, D., Ackroyd, K. & Rajendran, G. (2005) How perception impacts on drawings. *Journal of Experimental Psychology: Human Perception and Performance* 31:996–1003. [AK]

Mitchell, S. D. (2009) *Unsimple truths: Science, complexity, and policy*. University of Chicago Press. [rNJB]

Morelli, G. (1880/1893) *Italian masters in German galleries: A critical essay on the Italian pictures in the galleries of Munich, Dresden and Berlin*, trans. L. M. Richter. Bell. [aNJB]

Morris, M. W., Nisbett, R. E. & Peng, K. (1995) Causal attribution across domains and cultures. In: *Causal cognition: A multidisciplinary debate*, ed. D. Sperber, D. Premack & A. J. Premack, pp. 577–613. Oxford University Press. [aNJB]

Morton, A. (2003) *The importance of being understood: Folk psychology as ethics*. Routledge. [aNJB]

Mras, G. P. (1966) *Eugène Delacroix's theory of art*. Princeton University Press. [aNJB]

Müller, M., Höfel, L., Brattico, E. & Jacobsen, T. (2010) Aesthetic judgments of music in experts and laypersons – An ERP study. *International Journal of Psychophysiology* 76:40–51. [OV]

Munar, M., Nadal, M., Rosselló, J., Flexas, A., Moratti, S., Maestú, F., Marty, G. & Cela-Conde, C. J. (2012) Lateral orbitofrontal cortex involvement in initial negative aesthetic impression formation. *PLoS ONE* 7:e38152. [OV]

Munro, T. (1951) Aesthetics as science: Its development in America. *The Journal of Aesthetics and Art Criticism* 9(3):161–207. [arNJB]

Munro, T. (1968) *Evolution in the arts and other theories of culture history*. The Cleveland Museum of Art. [aNJB]

Munro, T. (1970) *Form and style in the arts: An introduction to aesthetic morphology*. Press of Case Western Reserve University. [aNJB]

Murphy, G. L. & Medin, D. L. (1985) The role of theories in conceptual coherence. *Psychological Review* 92(3):289–316. [arNJB]

Nadal, M., Munar, E., Capó, M., Rosselló, J. & Cela-Conde, C. (2008) Towards a framework for the study of the neural correlates of aesthetic preference. *Spatial Vision* 21:379–96. [PCH]

Nathan, D. O. (2006) Art, meaning, and artist's meaning. In: *Contemporary debates in aesthetics and the philosophy of art*, ed. M. Kieran, pp. 282–93. Blackwell. [SD]

Nelson, S. M. (1990) Diversity of Upper Paleolithic 'Venus' figurines and archaeological mythology. In *Powers of observation: Alternate views in archaeology*, ed. S. M. Nelson & A. B. Kehoe, pp. 11–22. American Anthropological Association. [JDS]

Nemeroff, C. J. & Rozin, P. (1994) The contagion concept in adult thinking in the United States: Transmission of germs and of interpersonal influence. *Ethos: Journal of the Society for Psychological Anthropology* 22:158–86. [SAG, GEN]

Newman, G. E. & Bloom, P. (2012) Art and authenticity: The importance of originals in judgments of value. *Journal of Experimental Psychology: General* 141 (3):558–69. DOI: 10.1037/a0026035. [arNJB, GEN]

Newman, G. E., Diesendruck, G. & Bloom, P. (2011) Celebrity contagion and the value of objects. *Journal of Consumer Research* 38:215–28. [rNJB, SAG, GEN]

Nichols, S., ed. (2006) *The architecture of the imagination: New essays on pretence, possibility, and fiction*. Oxford University Press. [aNJB]

Nichols, S. & Stich, S. P. (2003) *Mindreading: An integrated account of pretence, self-awareness, and understanding other minds*. Oxford University Press. [aNJB]

Nisbett, R. E. (2003) *The geography of thought: How Asians and Westerners think differently…and why*. Free Press. [aNJB]

Nodine, C. F., Locher, P. J. & Krupinski, E. A. (1993) The role of formal art training on perception and aesthetic judgement of art compositions. *Leonardo* 26 (3):219–27. [AC]

Noë, A. (2011) Art and the limits of neuroscience. *Opinionator, The New York Times*, (December 4). Available at: http://opinionator.blogs.nytimes.com/2011/2012/2004/art-and-the-limits-of-neuroscience. [rNJB, KT]

Norman, D. A. (1993) *Things that make us smart*. Basic Books. [RAW]

Norman, D. A. (1988) *The design of everyday things*. Basic Books. [aNJB]

Nozick, R. (1981) *Philosophical explanations*. Harvard University Press. [aNJB]

Oatley, K. (2011) *Such stuff as dream: The psychology of fiction*. Wiley-Blackwell. [RWG]

Ògúnjìmí, B. & Na'allah, A. R. (2005) *Introduction to African oral literature and performance*. Africa World Press. [rNJB]

Olshausen, B. A. & Field, D. J. (2004) Sparse coding of sensory inputs. *Current Opinion in Neurobiology* 14:481–87. [DJG]

Olshausen, B. A. & Field, D. J. (2005) How close are we to understanding V1? *Neural Computation* 17:1665–99. [DJG]

Olson, K. R. & Shaw, A. (2011) "No fair, Copycat!": What children's response to plagiarism tells us about their understanding of ideas. Developmental Science 14:431–39. [GEN]

Onians, J. (2008) *Neuroarthistory: From Aristotle and Pliney to Baxandall and Zeki*. Yale University Press. [AC, KT]

Osborne, H. (1981) What is a work of art? *The British Journal of Aesthetics* 21(1):3–11. DOI: 10.1093/bjaesthetics/21.1.3. [rNJB]

Osgood, C. E. & Suci, G. J. (1955) Factor analysis of meaning. *Journal of Experimental Psychology: General* 50:325–38. [aNJB]

Ostrofsky, J. & Kozbelt, A. (2011) A multi-stage attention hypothesis of drawing ability. *In:* Thinking through drawing: Practice into knowledge: Proceedings of an interdisciplinary symposium on drawing, cognition and education, *ed. A. Kantrowitz, A. Brew, & M. Fava, pp. 61–66. Teachers College, Columbia University, Art and Art Education Department.* [AK]

Ostrofsky, J., Kozbelt, A. & Seidel, A. (2012) Perceptual constancies and visual selection as predictors of realistic drawing skill. *Psychology of Aesthetics, Creativity, and the Arts* 5:124–36. [AK]

Palmer, S. E., Schloss, K. B. & Gardner, J. S. (2012) Hidden knowledge in aesthetic judgments: Preference for color and spatial composition. In: *Aesthetic science: Connecting minds, brains, and experience*, ed. A. Shimamura & S. E. Palmer, pp. 189–222. Oxford University Press. [aNJB, PJS]

Panofsky, E. (1955) *Meaning in the visual arts: Papers in and on art history*. Doubleday Anchor Books. [aNJB]

Panofsky, E. (1995) *Three essays on style*. MIT Press. [aNJB]

Parsons, G. & Carlson, A. (2008) *Functional beauty*. Oxford University Press. [arNJB, GP]

Parsons, M. J. (1987) *How we understand art: A cognitive developmental account of æsthetic experience*. Cambridge University Press. [aNJB]

Peretz, I. (2006) The nature of music from a biological perspective. *Cognition* 100 (1):1–32. DOI: 10.1016/j.cognition.2005.11.004. [aNJB]

Peretz, I. & Coltheart, M. (2003) Modularity of music processing. *Nature Neuroscience* 6(7):688–91. DOI: 10.1038/nn1083. [aNJB]

Petrie, B. (1974) Boccioni and Bergson. *The Burlington Magazine* 116(852):140–47. [aNJB]

Pickford, R. W. (1972) *Psychology and visual aesthetics*. Hutchinson. [aNJB]

Pihko, E., Virtanen, A., Saarinen, V.-M., Pannasch, S., Hirvenkari, L., Tossavainen, T., Haapala, A. & Hari, R. (2011) Experiencing art: The influence of expertise and painting abstraction level. *Frontiers in Human Neuroscience* 5:94. doi: 10.3389/fnhum.2011.00094. Available at: http://www.frontiersin.org/Journal/Abstract.aspx?s=537&name=human_neuroscience&ART_DOI=10.3389/fnhum.2011.00094. [AC]

Piliavin, I. M., Rodin, J. & Piliavin, J. A. (1969) Good Samaritanism: An underground phenomenon? *Journal of Personality and Social Psychology* 13:289–99. [aNJB]

Pinker, S. (1997) *How the mind works*. Norton. [aNJB]

Pinker, S. (2002) *The blank slate: The modern denial of human nature*. Penguin Books. [aNJB]

Pinto, N., Cox, D. D. & DiCarlo, J. J. (2008) Why is real-world visual object recognition hard? *PLoS Computational Biology* 41:e27. [DJG]

Pizlo, Z. (2008) *3D shape: Its unique place in visual perception*. MIT Press. [NHF]

Plassmann, H., O'Doherty, J., Shiv, B. & Rangel, A. (2008) Marketing actions can modulate neural representations of experienced pleasantness. *Proceedings of the National Academy of Sciences* 105(3):1050–54. DOI: 10.1073/pnas.0706929105. [rNJB]

Plumhoff, J. E. & Schirillo, J. A. (2009) Mondrian, eye movements, and the oblique effect. *Perception* 38:719–31. [CM]

Popper, K. R. (1962) *The open society and its enemies, Vol. II, the high tide of prophecy: Hegel, Marx, and the aftermath*. Princeton University Press. [aNJB]

Popper, K. R. (1957/1976) *The poverty of historicism*. Routledge & Kegan Paul. [aNJB]

Pratt, C. C. (1961) Aesthetics. *Annual Review of Psychology* 12:71–92. DOI: 10.1146/annurev.ps.12.020161.000443. [aNJB]

Premack, D. & Woodruff, G. (1978) Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences* 4:515–26. DOI: 10.1017/S0140525X00076512. [aNJB]

Preston, B. (1998) Why is a wing like a spoon? A pluralist theory of function. *The Journal of Philosophy* 95(5):215–54. [arNJB, GP]

Prins, G. (1991) Oral history. In: *New perspectives on historical writing*, ed. P. Burke, pp. 114–39. Pennsylvania State University Press. [rNJB]

Putnam, H. (1975) *Mind, language and reality: Philosophical papers, vol. 2*. Cambridge University Press. [arNJB]

Putnam, H. (1981) *Reason, truth and history*. Cambridge University Press. [rNJB]

Pylyshyn, Z. W. (1999) Is vision continuous with cognition? The case for cognitive impenetrability of visual perception. *Behavioral and Brain Sciences* 22(3):341–423. [aNJB]

Pylyshyn, Z. W. & Storm, R. W. (1988) Tracking multiple independent targets: Evidence for a parallel tracking mechanism. *Spatial Vision* 3(3):179–97. DOI: 10.1163/156856888x00122. [rNJB]

Quine, W. V. O. (1969) *Ontological relativity and other essays.* Columbia University Press. [aNJB]

Ramachandran, V. S. (2001) Sharpening up "The science of art." *Journal of Consciousness Studies* 8(1):9–29. [aNJB]

Ramachandran, V. S. (2011) *The tell-tale brain: A neuroscientist's quest for what makes us human*. Norton. [rNJB, PCH]

Ramachandran, V. S. & Hirstein, W. (1999) The science of art: A neurological theory of aesthetic experience. *Journal of Consciousness Studies* 6(6–7):15–51. [aNJB, WH, KT]

Rappaport, R. A. (1999) *Ritual and religion in the making of humanity*. Cambridge University Press. [rNJB]

Reber, R. (2002) Reasons for the preference for symmetry. *Behavioral and Brain Sciences* 25:415–16. [rNJB]

Reber, R. (2008) Art in its experience: Can empirical psychology help assess artistic value? *Leonardo* 41(4):367–72. DOI: 10.1162/leon.2008.41.4.367. [arNJB]

Reber, R. (2012) Processing fluency, aesthetic pleasure, and culturally shared taste. In: *Aesthetic science: Connecting minds, brains, and experience*, ed. A. P. Shimamura & S. E. Palmer, pp. 223–49. Oxford University Press. [arNJB, CM, PJS]

Reber, R., Schwarz, N. & Winkielman, P. (2004a) Processing fluency and aesthetic pleasure: Is beauty in the perceiver's processing experience? *Personality and Social Psychology Review* 8(4):364–82. DOI: 10.1207/s15327957pspr0804_3. [aNJB]

Reber, R. & Unkelbach, C. (2010) The epistemic status of processing fluency as source for judgments of truth. *Review of Philosophy and Psychology* 1(4):563–81. DOI: 10.1007/s13164-010-0039-7. [rNJB]

Reber, R., Wurtz, P. & Zimmermann, T. D. (2004b) Exploring "fringe" consciousness: The subjective experience of perceptual fluency and its objective bases. *Consciousness and Cognition* 13:47–60. DOI: 10.1016/S1053-8100(03)00049-7. [aNJB]

Redies, C., Hasenstein, J. & Denzler, J. (2007) Fractal-like image statistics in visual art: Similarity to natural scenes. *Spatial Vision* 21:137–48. [DJG]

Reisenzein, R. (1986) A structural equation analysis of Weiner's attribution-affect model of helping behavior. *Journal of Personality and Social Psychology* 50 (6):1123–33. DOI: 10.1037/0022-3514.50.6.1123. [aNJB]

Rekoff, M. G. (1985) On reverse engineering. *IEEE Transactions on Systems, Man, and Cybernetics* SMC-15(2):244–52. DOI: 10.1145/336512.336526. [aNJB]

Rhodes, G. (2006) The evolutionary psychology of facial beauty. *Annual Review of Psychology* 57(1):199–226. DOI:10.1146/annurev.psych.57.102904.190208. [arNJB]

Richerson, P. J. & Boyd, R. (2005) *Not by genes alone, how culture transformed human evolution*. The University of Chicago Press. [rNJB]

Richter, H. (1998) *Dada: Art and anti-art*. Thames & Hudson. [aNJB]

Rips, L. J. (1989) Similarity, typicality, and categorization. In: *Similarity and analogical reasoning*, ed. S. Vosniadu & A. Ortony, pp. 21–59. Cambridge University Press. [SAG]

Rips, L. J., Blok, S. & Newman, G. (2006) Tracing the identity of objects. *Psychological Review* 113(1):1–30. DOI: 10.1037/0033-295X.113.1.1. [arNJB]

Robinson, J. (1979) Expressing the way the world is: Expression as reference. *Journal of Aesthetic Education* 13(1):29–44. [aNJB]

Robinson, J. (1995) Startle. *The Journal of Philosophy* 92(2):53–74. [aNJB]

Robinson, J. (2004) The art of distancing: How formal devices manage our emotional responses to literature. *The Journal of Aesthetics and Art Criticism* 62(2):153–62. DOI: 10.1111/j.1540-594X.2004.00148.x. [aNJB]

Robinson, J. (2005) *Deeper than reason: Emotion and its role in literature, music, and art*. Clarendon. [arNJB, WH]

Roese, N. J. & Olson, J. M. (1995) *What might have been: The social psychology of counterfactual thinking*. Erlbaum. [aNJB]

Rölleke, H. (1991) New results of research on Grimm's Fairy Tales. In: *The Brothers Grimm and Folktale*, ed. J. M. McGlathery. University of Illinois Press. [rNJB]

Rollins, M. (2003a) Perceptual strategies and pictorial content. In: *Looking into pictures: An interdisciplinary approach to pictorial space*, ed. H. Hecht, R. Schwartz & M. Atherton, pp. 99–122. MIT Press. [rNJB]

Rollins, M. (2003b) The mind in pictures: Perceptual strategies and the interpretation of visual art. *The Monist* 86(4):608–31.   [rNJB]

Rollins, M. (2004) What Monet meant: Intention and attention in understanding art. *The Journal of Aesthetics and Art Criticism* 62(2):175–88. DOI: 10.1111/j.1540-594X.2004.00150.   [arNJB, MR]

Rollins, M. (2011) Neurology and the new riddle of pictorial style. In: *The aesthetic mind: Philosophy and psychology*, ed. E. Schellekens & P. Goldie, pp. 391–413. Oxford University Press.   [rNJB]

Rollins, M., ed. (1993) *Danto and his critics*. Blackwell.   [aNJB]

Rosengren, K. S., Johnson, C. & Harris, P. (2000) *Imagining the impossible: Magical, scientific, and religious thinking in children.* Cambridge University Press.   [SAG]

Roskill, M. (1976/1989) *What is art history? Second edition.* The University of Massachusetts Press.   [aNJB]

Ross, L. (1977) The intuitive psychologist and his shortcomings: Distortions in the attribution process. In: *Advances in experimental social psychology (Vol. 10)*, ed. L. Berkowitz, pp. 173–220. Academic Press.   [aNJB]

Ross, S. (2012) Comparing and sharing taste: Reflections on critical advice. *Journal of Aesthetics and Art Criticism* 70(4):363–71.   [SR]

Rowell, M. (1971) Interview with Charmion von Wiegand, June 20, 1971. In: *Piet Mondrian 1872–1944, Centennial exhibition*, ed. Solomon R. Guggenheim Foundation, pp. 77–86. Solomon R. Guggenheim Foundation.   [CM]

Rowell, M. (1999) *Brancusi vs. United States, the historic trial, 1928.* Adam Biro.   [rNJB]

Rozin, P. & Nemeroff, C. (2002) Sympathetic magical thinking: The contagion and similarity "heuristics." In: *Heuristics and biases: The psychology of intuitive judgment*, ed. T. Gilovich, D. Griffin, & D. Kahneman, pp. 201–16. Cambridge University Press.   [GEN]

Ruben, D.-H. (1990) *Explaining explanation.* Routledge.   [aNJB]

Ruggi, S. & Gilli, G. M. (2008) Dialogando sul bello. *Scuola e didattica* 15(63):34–38.   [NHF]

Russell, P. A. (2003) Effort after meaning and the hedonic value of paintings. *British Journal of Psychology* 94(1):99–110. DOI: 10.1348/000712603762842138   [rNJB]

Rust, N. C. & Movshon, J. A. (2005) In praise of artifice. *Nature Neuroscience* 8:1647–50.   [DJG]

Sartre, J.-P. (1965) *Situations,* trans. B. Eisler. Hamish Hamilton.   [aNJB]

Savage-Rumbaugh, E. S. (1994) *Kanzi: The bonobo at the brink of the human mind.* Wiley.   [RAW]

Schaeffer, J.-M. (1999) *Pourquoi la fiction? [Why fiction?]* Éditions du Seuil.   [aNJB]

Schank, R. C. (1990) *Tell me a story: Narrative and intelligence.* Northwestern University Press.   [aNJB]

Schank, R. C. (1999) *Dynamic memory revisited.* Cambridge University Press.   [aNJB]

Scharfstein, B.-A. (2009) *Art without borders: A philosophical exploration of art and humanity.* University of Chicago Press.   [aNJB]

Schellekens, E. & Goldie, P. eds. (2011) *The aesthetic mind: Philosophy and psychology.* Oxford University Press.   [aNJB]

Schwarz, N. (1994) Judgment in a social context: Biases, shortcomings, and the logic of conversation. *Advances in Experimental Social Psychology* 26:123–62. DOI: 10.1016/S0065-2601(08)60153-7.   [aNJB]

Shafer, R. J., ed. (1969/1974) *A guide to historical method.* Dorsey Press.   [rNJB]

Shimamura, A. P., ed. (2012) *Toward a science of aesthetics.* Oxford University Press.   [rNJB]

Shimamura, A. P. & Palmer, S. E., eds. (2012) *Aesthetic science: Connecting minds, brains, and experience.* Oxford University Press.   [arNJB]

Shiner, L. (2001) *The invention of art. A cultural history.* University of Chicago Press.   [HL, WTF]

Shiner, L. (2003) *The invention of art: A cultural history.* University of Chicago Press.   [rNJB]

Shklovsky, V. (1917/1965) Art as technique. In: *Russian formalist criticism*, ed. L. T. Lemon & M. J. Reis, pp. 3–24. University of Nebraska Press.   [aNJB]

Shultz, T. R. (1982) Rules of causal attribution. *Monographs of the Society for Research in Child Development* 47(1):1–51.   [aNJB]

Sibley, F. (1959) Aesthetic concepts. *The Philosophical Review* 68:421–50.   [SR]

Silvia, P. J. (2005a) Cognitive appraisals and interest in visual art: Exploring an appraisal theory of aesthetic emotions. *Empirical Studies of the Arts* 23:119–33.   [rNJB]

Silvia, P. J. (2005b) Emotional responses to art: From collation and arousal to cognition and emotion. *Review of General Psychology* 9(4):342–57.   [rNJB, PJS]

Silvia, P. J. (2005c) What is interesting? Exploring the appraisal structure of interest. *Emotion* 5:89–102. DOI: 10.1037/1528-3542.5.1.89.   [arNJB]

Silvia, P. J. (2009) Looking past pleasure: Anger, confusion, disgust, pride, surprise, and other unusual aesthetic emotions. *Psychology of Aesthetics, Creativity, and the Arts* 3:48–51.   [aNJB, PJS]

Silvia, P. J. (2012) Human emotions and aesthetic experience: An overview of empirical aesthetics. In: *Aesthetic science: Connecting minds, brains, and experience*, ed. A. P. Shimamura & S. E. Palmer, pp. 250–75. Oxford University Press.   [aNJB, PJS]

Silvia, P. J. & Brown, E. M. (2007) Anger, disgust, and the negative aesthetic emotions: Expanding an appraisal model of aesthetic experience. *Psychology of Aesthetics, Creativity, and the Arts* 1:100–106.   [PJS]

Simon, H. A. (1969/1996). *The sciences of the artificial,* third edition. MIT Press.   [rNJB]

Simoncelli, E. P. & Olshausen, B. A. (2001) Natural image statistics and neural representation. *Annual Review of Neuroscience* 24:1193–215.   [DJG]

Skolnick, D. & Bloom, P. (2006) The intuitive cosmology of fictional worlds. In: *The architecture of the imagination: New essays on pretence, possibility, and fiction*, ed. S. Nichols, pp. 73–86. Oxford University Press.   [aNJB]

Skov, M. & Vartanian, O. (2009) *Neuroaesthetics.* Baywood.   [arNJB]

Slingerland, E. G. & Collard, M. (2011) *Creating consilience: Integrating the sciences and the humanities.* Oxford University Press.   [rNJB]

Smail, D. L. (2008) *On deep history and the brain.* University of California Press.   [rNJB]

Smith, J. D. & Melara, R. J. (1990) Aesthetic preference and syntactic prototypicality in music: 'Tis the gift to be simple. *Cognition* 34(3):279–98. DOI: 10.1016/0010-0277(90)90007-7.   [aNJB]

Smith, L. F., Bousquet, S. G., Chang, G. & Smith, J. K. (2006) Effects of time and information on perception of art. *Empirical Studies of the Arts* 24(2):229–42. DOI: 10.2190/DJM0-QBDW-03V7-BLRM.   [rNJB]

Smith, L. F. & Smith, J. K. (2006) The nature and growth of aesthetic fluency. In: *New directions in aesthetics, creativity, and the psychology of art*, ed. P. Locher, C. Martindale, L. Dorfman, V. Petrov & D. Leontiev, pp. 47–58. Baywood.   [aNJB]

Snow, C. P. (1959) *The two cultures.* Cambridge University Press.   [arNJB]

Solso, R. L. (1994) *Cognition and the visual arts.* MIT Press.   [aNJB]

Song, H. & Schwarz, N. (2008a) Fluency and the detection of misleading questions: Low processing fluency attenuates the moses illusion. *Social Cognition* 26:791–99.   [aNJB]

Song, H. & Schwarz, N. (2008b) If it's hard to read, it's hard to do: Processing fluency affects effort prediction and motivation. *Psychological Science* 19:986–88. DOI: 10.1111/j.1467-9280.2008.02189.x.   [aNJB]

Sosa, E. (2007) *A virtue epistemology: Apt belief and reflective knowledge, Volume I.* Oxford University Press.   [aNJB]

Specht, S. M. (2010) Artists' statements can influence perceptions of artwork. *Empirical Studies of the Arts* 28(2):193–206. DOI: 10.2190/EM.28.2.e.   [rNJB]

Speer, J. H. (2010) *Fundamentals of tree-ring research.* University of Arizona Press.   [aNJB]

Sperber, D. (2007) Seedless grapes. In: *Creations of the mind: Theories of artifacts and their representation*, ed. E. Margolis & S. Laurence, pp. 124–37, Oxford University Press.   [aNJB]

Sperber, D. & Wilson, D. (2002) Pragmatics, modularity and mind-reading. *Mind & Language* 17(1–2):3–23. DOI: 10.1111/1468-0017.00186.   [aNJB]

Stafford, B. M. (2007) *Echo objects: The cognitive work of images.* The University of Chicago Press.   [aNJB]

Stafford, B. M. (2011) *A field guide to a new meta-field: Bridging the humanities-neurosciences divide.* University of Chicago Press.   [aNJB]

Stalnaker, N. (2005) Fakes and forgeries. In: *The Routledge companion to aesthetics, second edition*, ed. B. N. Gaut & D. M. Lopes, pp. 513–25. Routledge.   [aNJB]

Stanovich, K. E. (2009) Distinguishing the reflective, algorithmic, and autonomous minds: Is it time for a tri-process theory? In: *In two minds: Dual processes and beyond*, ed. J. S. B. T. Evans & K. Frankish, pp. 55–88. Oxford University Press.   [aNJB]

Stecker, R. (2003) Value in art. In: *The Oxford handbook of aesthetics*, ed. J. Levinson, pp. 307–24. Oxford University Press.   [aNJB]

Stecker, R. (2006) Interpretation and the problem of the relevant intention. In: *Contemporary debates in aesthetics and the philosophy of Art*, ed. M. Kieran, pp. 269–81. Blackwell.   [SD]

Steinberg, L. (1955) Month in review: Fifteen years of Jackson Pollock. *Arts* 30 (3):43–46.   [aNJB]

Stephens, G., Silbert, L. & Hasson, U. (2010) Speaker–listener neural coupling underlies successful communication. *Proceedings of the National Academy of Sciences* 107:14425–30.   [RWG]

Sterelny, K. (2003) *Thought in a hostile world: The evolution of human cognition.* Blackwell Publishing.   [aNJB]

Sterelny, K. (2012) *The evolved apprentice: How evolution made humans unique.* MIT Press.   [aNJB]

Stolnitz, J. (1960) *Aesthetics and philosophy of art criticism: A critical introduction.* Houghton Mifflin.   [rNJB]

Strawson, P. F. (1959) *Individuals: An essay in descriptive metaphysics.* Methuen.   [rNJB]

Sutton, J. (2000) Body, mind, and order: Local memory and the control of mental representations in medieval and Renaissance sciences of self. In: *1543 and all*

that: Word and image in the proto-scientific revolution, ed. G. Freeland & A. Corones, Kluwer, pp. 117–50.   [rNJB]

Sutton, J. (2006) Spongy brains and material memories. In: *Embodiment and environment in early modern drama and performance*, ed. M. Floyd-Wilson & G. A. Sullivan, pp. 14–34. Northwestern University Press.   [rNJB]

Sutton, J. (2008) Material agency, skills and history: Distributed cognition and the archaeology of memory. In: *Material agency: Towards a non-anthropocentric approach*, ed. C. Knappett & L. Malafouris, pp. 37–55. Springer.   [rNJB]

Sutton, J. (2010) Exograms and interdisciplinarity: History, the extended mind, and the civilizing process. In: *The extended mind*, ed. R. Menary, pp. 189–225. MIT Press.   [rNJB]

Takahashi, S. (1995) Aesthetic properties of pictorial perception. *Psychological Review* 102(4):671–83.   [arNJB]

Tan, E. (1995) *Emotion and the structure of narrative film: Film as an emotion machine*. Routledge.   [PCH]

Tanner, J., ed. (2003) *The sociology of art: A reader*. Routledge.   [aNJB]

Tatarkiewicz, W. (1971) What is art? The problem of definition today. *The British Journal of Aesthetics* 11(2):134–53. DOI: 10.1093/bjaesthetics/11.2.134.   [rNJB]

Temme, J. E. V. (1992) Amount and kind of information in museums: Its effects on visitors satisfaction and appreciation of art. *Visual Arts Research* 18(2):28–36.   [rNJB]

Thagard, P. (2002) The passionate scientist: Emotion in scientific cognition. In: *The cognitive basis of science*, ed. P. Carruthers, S. Stich & M. Siegal, pp. 235–50. Cambridge University Press.   [aNJB]

Thaut, M. H. (2005) *Rhythm, music, and the brain: Scientific foundations and clinical applications*. Routledge.   [PCH]

Thompson, W. F. (2008) *Music, thought, and feeling: Understanding the psychology of music*. Oxford University Press.   [rNJB]

Tolhurst, W. (1984) Toward an aesthetic account of the nature of art. *The Journal of Aesthetics and Art Criticism* 42(3):261–69.   [rNJB]

Tooby, J. & Cosmides, L. (2001) Does beauty build adapted minds? Toward an evolutionary theory of aesthetics, fiction and the arts. *SubStance* 30(94/95):6–27. DOI: 10.1353/sub.2001.0017.   [aNJB]

Topolinski, S. & Strack, F. (2009) The architecture of intuition: Fluency and affect determine intuitive judgments of semantic and visual coherence, and of grammaticality in artificial grammar learning. *Journal of Experimental Psychology: General* 138(1):39–63.   [aNJB]

Tribble, E. & Sutton, J. (2011) Cognitive ecology as a framework for Shakespearean studies. *Shakespeare Studies* 39:94(10).   [rNJB]

Turner, P. (1983) Children's responses to art: Interpretation and criticism. *Journal of Art and Design Education* 2:185–98.   [NHF]

Ullman, S. (1984) Visual routines. *Cognition* 18:97–159. DOI: 10.1016/0010-0277 (84)90023-4.   [aNJB]

Vartanian, O. & Goel, V. (2004) Neuroanatomical correlates of aesthetic preference for paintings. *NeuroReport* 15:893–97.   [PCH, OV]

Vasari, G. (1550/1991) *The lives of the artists*, J. Conaway Bondanella & P. Bondanella, trans. Oxford University Press.   [aNJB]

Vermaas, P. E. & Houkes, W. (2003) Ascribing functions to technical artefacts: A challenge to etiological accounts of functions. *The British Journal for the Philosophy of Science* 54(2):261–89. DOI: 10.1093/bjps/54.2.261.   [aNJB]

Vlach, J. M. (1990) *The Afro-American tradition in decorative arts*. University of Georgia Press.   [rNJB]

von Koenigswald, G. H. R. (1972) Early *Homo sapiens* as an artist: The meaning of Paleolithic art. In: *The origin of Homo sapiens/Origine de l'homme moderne*, ed. F. Bordes, pp. 133–39. UNESCO.   [JDS]

Vuust, P. & Kringelbach, M. (2010) The pleasure of music. In: *Pleasures of the brain*, ed. M. Kringelbach & K. Berridge, pp. 255–69. Oxford University Press.   [PCH]

Walton, K. L. (1970) Categories of art. *The Philosophical Review* 79(3):334–67.   [aNJB, SR]

Walton, K. L. (1978) Fearing fictions. *The Journal of Philosophy* 75(1):5–27.   [aNJB]

Walton, K. L. (1987) Style and the products and processes of art. In: *The concept of style (second ed.)*, ed. B. Lang, pp. 72–103. Cornell University Press.   [aNJB]

Walton, K. L. (1990) *Mimesis as make-believe: On the foundations of the representational arts*. Harvard University Press.   [aNJB]

Walton, K. L. (2008) *Style and the products and processes of art [1987]*. Reprinted in *Marvelous images*. Oxford University Press.   [JL]

Watanabe, S., Sakamoto, J. & Wakita, M. (1995) Pigeons' discrimination of paintings by Monet and Picasso. *Journal of Experimental Analysis of Behavior* 63(165–74). DOI: 10.1901/jeab.1995.63-175.   [aNJB]

Weiner, B. (1980) A cognitive (attribution)-emotion-action model of motivated behavior: An analysis of judgments of help giving. *Journal of Personality and Social Psychology* 39:186–200.   [aNJB]

Wellman, H. M. (1990) *The child's theory of mind*. MIT Press.   [aNJB]

Werness, H. B. (1983) Han van Meegeren *fecit*. In: *The forger's art: Forgery and the philosophy of art*, ed. D. Dutton, pp. 1–57. University of California Press.   [aNJB]

Westphal-Fitch, G., Huber, L., Gomez, J.-C. & Fitch, W. T. (2012) Production and perception rules underlying visual patterns: Effects of symmetry and hierarchy. *Philosophical Transactions of the Royal Society B* 367, 2007–22.   [WTF]

White, M. (1965) *Foundations of historical knowledge*. Harper & Row.   [rNJB]

White, R. (2005) *Prehistoric art. The symbolic journey of humankind*. H. N. Abrams.   [JDS]

Whiten, A. & Byrne, R. W. eds. (1997) *Machiavellian intelligence II: Extensions and evaluations*. Cambridge University Press.   [aNJB]

Whitfield, S. (2000) *Lucio fontana*. University of Califonia Press.   [aNJB]

Whitfield, T. & Slatter, P. (1979) The effect of categorization and prototypicality on aesthetic choice in a furniture selection task. *British Journal of Psychology* 70:67–75.   [PCH]

Wiesmann, M. & Ishai, A. (2010) Training facilitates object recognition in Cubist paintings. *Frontiers in Human Neuroscience* 4:11. doi:10.3389/neuro.09.011.2010. Available at: http://www.frontiersin.org/Journal/Abstract.aspx?s=537&name=human_neuroscience&ART_DOI=10.3389/neuro.09.011.2010.   [rNJB, AC]

Wigmore, J. H. (1913) *The principles of judicial proof as given by logic, psychology, and general experience and illustrated in judicial trials*. Little, Brown.   [rNJB]

Willats, J. (1997) *Art and representation: New principles in the analysis of pictures*. Princeton University Press.   [NHF]

Willats, J. (2005) *Making sense of children's drawings*. Erlbaum.   [NHF]

Willats, J. (2006) Rudolph Arnhem's graphic equivalents in children's drawings and paintings by Paul Klee. In: *Visual thought: The depictive space of depiction*, ed. L. Albertazzi, pp. 195–20. John Benjamins.   [NHF]

Wilson, R. A. (2004) *Boundaries of the mind: The individual in the fragile sciences: Cognition*. Cambridge University Press, MIT Press.   [rNJB, RAW]

Wilson, R. A. & Clark, A. (2009) How to situate cognition: Letting nature take its course. In: *The Cambridge handbook of situated cognition*, ed. M. Aydede & P. Robbins, pp. 55–77. Cambridge University Press.   [rNJB, RAW]

Wilson, T. D. (2002) *Strangers to ourselves: Discovering the adaptive unconscious*. Harvard University Press.   [rNJB]

Wilson Bareau, J. (2001) *Manet by himself*. Little, Brown.   [aNJB]

Winckelmann, J. J. (1756/1987) *Reflections on the imitation of Greek works in painting and sculpture*, ed. E. Heyer & R. C. Norton, trans., Open Court.   [aNJB]

Winckelmann, J. J. (1972) *Winckelmann: Writings on art*, ed. D. G. Irwin. Phaidon.   [aNJB]

Winkelman, P., Halberstadt, J., Fazendeiro, T. & Catty, S. (2006) Prototypes are attractive because they are easy on the mind. *Psychological Science* 17:799–806. DOI: 10.1111/j.1467-9280.2006.01785.x.   [aNJB]

Winkielman, P., Schwarz, N., Fazendeiro, T. & Reber, R. (2003) The hedonic marking of processing fluency: Implication for evaluative judgment. In: *The psychology of evaluation: Affective processes in cognition and emotion*, ed. J. Musch & K. C. Klauer, pp. 189–217. Erlbaum.   [aNJB]

Wölfflin, H. (1920/1950) *Principles of art history: The problem of the development of style in later art*, M. D. Hottinger, trans., Dover Publications.   [aNJB]

Wollheim, R. (1974) *On art and the mind*, Harvard University Press.   [aNJB]

Wollheim, R. (1980) *Art and its objects, second edition with six supplementary essays*. Cambridge University Press.   [aNJB]

Wollheim, R. (1993) Danto's gallery of indiscernibles. In: *Danto and his critics*, ed. M. Rollins, pp. 28–38. Blackwell.   [aNJB, MR]

Yassif, E. (1999) *The Hebrew folktale: History, genre, meaning*. Indiana University Press.   [rNJB]

Yule, G. (2006) *The study of language,* 3rd ed. Cambridge University Press.   [WTF]

Zacks, J. & Tversky, B. (2001) Event structure in perception and conception. *Psychological Bulletin* 127(1):3–21.   [aNJB]

Zatorre, R, Chen, J. & Penhune, V. (2007) When the brain plays music: Auditory-motor interactions in music perception and production. *Nature Reviews Neuroscience* 8:547–58.   [RWG]

Zeki, S. (1998) Art and the brain. *Dædalus* 127:71–103.   [aNJB]

Zeki, S. (1999) *Inner vision: An exploration of art and the brain*. Oxford University Press.   [arNJB, KT]

Zeki, S. & Lamb, M. (1994) The neurology of kinetic art. *Brain* 117:607–36.   [aNJB]

Zipes, J. D. (2006) *Why fairy tales stick: The evolution and relevance of a genre*. Routledge.   [rNJB]

Zizak, D. M. & Reber, A. S. (2004) Implicit preferences: The role(s) of familiarity in the structural mere exposure effect. *Consciousness and Cognition* 13:336–62. DOI: 10.1016/j.concog.2003.12.003.   [aNJB]