Art Seeking Understanding: Annotated Bibliography of Empirical Aesthetics and the Psychology of Art

- *To help researchers in their respective projects find existing stimuli and measures, better identify gaps in the existing literature, variables that need to be controlled for, and potential pitfalls, details are provided on the methods and the specific analyses.*

Three notes on the bibliography for those in the arts and humanities who are not familiar with the tools used by psychologists:

- *Details are not provided on the alpha level at which the effects are significant (i.e. $p <$ .05, .01, .001). Readers can assume that if an effect is reported, it is significant at the .05 level at least. That is to say, readers can be fairly confident that the differences observed are not due to chance. If an effect is partially significant—that is, between the conventional cut off of .05 and .1—the exact p value is reported. Readers should be aware that we can be a little less certain that such effects are not due to chance.*
- *Where available, details of effect sizes are reported here. Effects sizes tell us how much a given variable is related to another variable. Different kinds of effect sizes are calculated in different ways, and tend to be associated with particular kinds of analysis (e.g. Pearson's r for correlations, Cohen's d for t-tests). The importance and size of an effect should be understood in the context of what is being studied, but there are nonetheless certain well used "rules of thumb" for interpreting effects sizes. The following measures of effect sizes are commonly reported in the studies:*

  Cohen's d: small = 0.2-0.3, medium = 0.5, large = 0.8, very large = 2
  Partial eta-squared: small = 0.01, medium = 0.06, large = 0.14
  Pearson's r (correlation co-efficient): small= 0.1-0.3, medium= 0.3-0.5, large= 0.5-1
  R^2 (measure of variance explained): small = 0.01, medium = 0.13, large = 0.26

  Regression coefficients (which tend to be referred to as 'b') are usually unstandardized—that is, they are expressed in terms of the scale used to measure the variable and need to be understood in that context. As such, they are already an unstandardized effect size.
- *Sample sizes are reported for each study. One reason why this is important is for determining whether a study is well powered: sample size is important for knowing whether a study is likely to find a hypothesised effect if it exists. For example, with small samples sizes, small effects are likely to go undetected.*

Articles are listed in chronological order within the following broad groups:

Articles on Art, Aesthetic Appreciation and the Cognitive Emotions

Keltner, D. & Haidt, J. (2003). Approaching awe, a moral, spiritual and aesthetic emotion. *Cognition and Emotion*, 17, 2: 297-314.

> In this classic theoretical article, the authors offer a characterisation of the emotion awe, drawing on a range of literature from philosophy, theology, sociology and psychology. The authors propose that awe has a prototype structure that is characterised by two main appraisals: an appraisal of vastness—that is, that one cannot accommodate a stimulus according to one's conceptual schema—and an appraisal of a need to accommodate the stimulus. The authors suggest that emotions that are similar to those in the awe family usually have one of these appraisals without the other, noting that surprise, for example, involves the need for accommodation without an appraisal of vastness. The authors also suggest that emotions which are part of the awe family proper—such as admiration—are accompanied by other appraisals (such as great ability in the case of admiration) in addition to these core appraisals. The authors offer an illuminating discussion of the evolutionary origins of awe, and how it came to be extended into other domains. (For important empirical work on the nature of awe see, e.g., Shiota, MN., Keltner, D., & Mossman, A. (2007). The nature of awe: Elicitors, appraisals, and effects on self-concept. *Cognition and Emotion*, 21, 5: 944-963.)

Silvia, PJ. (2010). Confusion and Interest: The Role of Knowledge Emotions in Aesthetic Experience. *Psychology of Aesthetics, Creativity and the Arts*, 4, 2: 75-80.

> In this article, Silvia seeks to characterise the nature of interest and confusion, and begins to explore how they relate to aesthetic appreciation. In motivating the studies reported, Silvia notes that confusion and interest are cases of knowledge-based emotions, which as a sub-group of emotions are caused by people's beliefs about their own thoughts and knowledge, including their goals concerning learning. Having noted that the appraisal structure of interest consists of an appraisal of how well something fits with what is known and expected (a novelty-complexity appraisal) as well as an appraisal of how well they can understand the new information (a coping potential appraisal), Silvia proposes that confusion has the same novelty-complexity proposal as interest, but the opposite coping potential appraisal—confusing stimuli are those that are not easy to comprehend. Silvia confirms this appraisal structure in two studies. Sixty-one students participated in study 1. Participants were shown 14 works of experimental visual art (including works by Altemus, Arrieta, Burgaud, Chirot and Leftwich). Participants were asked to rate their feelings of interest (interesting-uninteresting, boring-exciting), and confusion (confusing-clear, perplexing-obvious), as well as their appraisal of novelty-complexity (simple-complex, familiar-unfamiliar, common-unusual) and comprehensibility (comprehensible-incomprehensible, easy to understand-hard to understand). The main results confirmed the proposed appraisal patterns: with novelty-complexity significantly predicting interest (b=.45) and confusion (b=.29); and coping potential significantly predicting interest (b=.4) and confusion (b=-.47). Interesting pictures were complex and comprehensible, but confusing pictures were complex and incomprehensible. A second study sought to provide further evidence of this appraisal structure by seeing whether manipulating the coping potential appraisal caused changes in the level of interest and confusion. Fifty students participated. Participants were given two abstract poems from Macleod's 'The Life of Haifisch'. For the second poem, half were given a clue

to the meaning (comprehensibility condition) and half were not (incomprehensibility condition). Participants were asked to rate how confusing and interesting they found the poems. The main results were that those who received the extra information about the meaning found the poem significantly more interesting (*b*=1.18) and less confusing (*b*=-2.68) than the first poem. Silvia interprets this as indicating that providing information about something's comprehensibility shifts confusion to interest. (For more research on aesthetic emotions such as interest, and how it is related to empirical aesthetics as it was conducted in the 1970s, see e.g. Silvia, PJ. (2005). Emotional Responses to Art: From Collation and Arousal to Cognition and Emotion. *Review of General Psychology*, 9, 4: 342-357.)

Silvia, PJ. (2013). Interested Experts, Confused Novices: Art Expertise and the Knowledge Emotions. *Empirical Studies of the Arts*, 31, 1: 107-115.

This article explores the role of confusion and interest in aesthetic appreciation, particularly in relation to expertise differences. Silvia motivates the study presented with a discussion of the structure of interest and confusion. Interest steams from the appraising an object or event as high in novelty, complexity or uncertainty, and as high in comprehensibility; whereas confusion stems from appraisals of an object or event as novel, complex, and unexpected, but difficult to understand and probably incomprehensible (see Silvia, 2010, above). One hundred and seventy-four people participated. Participants viewed 11 reproductions of images by e.g. Altemus, Arrieta, Chirot, Morin, and Topel, that mostly consisted of abstract works that juxtaposed letters, words, and representational imagery. Participants were asked to rate the images in terms of feelings of interest (interest-uninteresting, exciting-boring), confusion (confusing-clear, perplexing-obvious), novelty-complexity (simple-complex, common-unusual) and comprehensibility (comprehensible-incomprehensible, easy to understand-hard to understand, coherent-incoherent). Participants also completed Smith & Smith's (2006) Aesthetic Fluency Scale as a measure of expertise. The main analysis revealed that those with expertise found the images to be more interesting (*b*=.15) and less confusing (*b*=-.13). In line with the theoretical models of interest and confusion, interest was marked by appraisals of high novelty-complexity (*b*=.32) and comprehensibility (*b*=.55); and confusion was marked by high novelty-complexity (*b*=.56) and low comprehensibility (*b*=-.36). Interestingly, there were also significant interactions between expertise and interest and confusion. In the case of interest, expertise interacted with appraisals of novelty-complexity (*b* =.08) and comprehensibility (*b* =-.1)—as expertise increased, the effect of novelty-complexity on interest in the face of art went up, and the effect of comprehensibility went down. For confusion, expertise interacted with comprehensibility (*b*=-.1)—as expertise increased, the effect of comprehensibility on confusion decreased. Silvia concludes by suggesting that conceptual or abstract artworks are more interesting to experts, and that expertise changes the basis on which artworks become interesting—increasingly favouring novelty over comprehensibility.

Muth, C., & Carbon, CC. (2013). The Aesthetic Aha: On the pleasure of having insights into Gestalt. *Acta Psychologica*, 144: 25-30.

This article contributes to the literature on the role of interest in art appreciation. The authors motivate their study by noting that many modern artworks impede everyday processing routines while remaining popular. For example, Kristof Goergen's artwork 'jeu', which is a football made of concrete, produces a conflict between anticipated action and the heavy material. The authors propose that such cases can be reconciled with the processing fluency account of aesthetic appreciation by positing that aesthetic appreciation is often a dynamic process that involves perceivers "re-familiarising" themselves with and continually "elaborating" a work to increase fluency during an episode of appreciation. In line with this, the authors sought to test the idea that fluency of processing might not increase in a linear fashion by mere exposure, but with insights that arise during a process of elaboration. Thirty participants were asked to look at 36 pictures that were similar to mooney faces, and either contained a face that is difficult to identify as such or did not contain a face. Participants were shown the images in blocks 13 times, with 500ms presentation times for each image within a block, and the judgements participants were asked to make alternated between liking and judgements of how clearly they saw a face or how similar the stimuli were to a face. The size of the pictures decreased every 2nd block by 20%. The highest level of clearness or similarity to a face was used as an indication of insight: that is, the sudden perception of the gestalt figure. The main results revealed that liking of an image was higher immediately after an insight event (though only remained higher temporarily), and the amount of liking was significantly predicted by the amount of insight. By contrast, and against the mere exposure hypothesis, liking did not increase with multiple exposures. The authors close with a stimulating discussion of how the method they deployed differs from the perception of art.

Valdesolo, P., & Graham, J. (2014). Awe, Uncertainty, and Agency Detection. *Psychological Science*, 25, 1: 170-178.

The authors contribute to the growing literature on the nature of awe. In motivating the studies reported in this article, the authors note that awe has been thought to involve two appraisals: a perception of vastness, and the need to accommodate. The authors propose that uncertainty may mediate the relationship between the two appraisals in experiences of awe. That is, awe may increase a perceived vastness that outstrips one's cognitive structures in some manner, which leads to feelings of lost certainty and control, and motivate a search for ways of accommodating that vastness. On this basis, based on the claims of Kierkegaard and James, the authors predict that awe should lead to judgements that seem to reduce uncertainty, such as interpretations of events as the consequence of intentional and purpose-driven agents. To this end, in 5 studies, the authors examined the relationship between awe and supernatural beliefs and perceptions of pattern randomness. Eighty-one students participated in study 2. Participants were either asked to watch a clip from BBC's *Planet Earth* series (awe condition), or a 1959 news interview conducted by Mike Wallace (neutral condition). Participants in both conditions were then asked to complete a number of measures: (1) Kay et al.'s (2009) Belief in Supernatural Control (which contains items such as "The events in this world unfold according to God's or some other nonhuman entity's plan"); (2) Shenhav et al.'s (2012) measure of belief in God; (3) four items measuring belief in non-deistic and non-theistic supernatural beliefs from Epley et al. (2008); (5) Webster & Kruglanski's (1994) Need for Closure Scale; and (6) a number of items

measuring emotions, including awe and its components. The main results indicate that participants' belief in supernatural control, belief in God, and intolerance for uncertainty were significantly higher in the awe condition compared to the control condition (cohen's *d* effect sizes=.47, .60, and .68 respectively). A mediation analysis revealed that awe affects beliefs in God by increasing intolerance for uncertainty (p=.054). To help demonstrate that awe leads to the motivation to reduce uncertainty through accommodating the perceived vastness, rather than simply priming supernatural concepts, the authors sought to replicate the effect in a non-supernatural domain. Seventy-six students took part in study 4. The conditions and manipulations were the same as study 2. The measures of supernatural beliefs were replaced with a measure of intentional design: participants were presented with 10 twelve-digit number strings of 1s and 2s they were told were either intentionally designed by a human or randomly generated, and asked to indicate the degree to which each seemed random or human. The main results indicate that participants in the awe condition believed that strings of digits were designed by a human agent significantly more than participants in the neutral condition (cohen's *d* effect size=.77). A mediation analysis revealed that awe affects beliefs in human agency by increasing intolerance for uncertainty.

Muth, C., Hesslinger, VM., & Carbon, CC. (2015). The Appeal of Challenge in the Perception of Art: How Ambiguity, and the Opportunity for Insight Affect Appreciation. *Psychology of Aesthetics, Creativity and the Arts*, 9, 3: 206-216.

This article examines why it is that we enjoy challenging and ambiguous art. The authors begin with a discussion of the literature on aesthetic fluency—suggesting that fluency cannot explain our liking for indeterminate and ambiguous art such as Cubist works. The authors propose that ambiguous works present multiple opportunities to create order, and our enjoyment in these cases might derive from deciphering recognisable patterns, and interest—which the authors call "aesthetic ahas". Following Gombrich (1960) and Hyman (2010), the authors make the interesting point that people do not need to completely resolve ambiguity to take pleasure in art: Cubist artwork "hide" objects in a way that means that they are always, to a degree, indeterminate; and artworks that do allow for complete resolution can feel banal and gimmicky. Thirty-nine people rated 17 ambiguous artworks from the 20th and 21st century in terms of liking, interest, powerfulness of affect ("how strong [sic] does the artwork affect you?"), perceptual affect ("how strong [sic] does the artwork affect your perception?"), and cognitive affect ("how strong [sic] does the artwork affect your thoughts?"). The participants viewed the stimuli again, rated and described their ambiguity, rated the level of "solvability of ambiguity", recorded their insights, and finally rated the strength of their insights. The main results indicate that ambiguity and strength of insights had a significant positive effect on ratings of all dependent variables: the higher participants assessed the ambiguity of the stimulus and the strength of insights gained, the more they appreciated the stimulus in terms of liking, interest, affect, perceptual affect and cognitive affect. Of particular relevance for aesthetic cognitivism, the authors also report a selection of the free responses of participants to cast light on some of the different kinds of insight people find in art, including: perceptual insights (e.g. an emerging gestalt), what they call "cognitive insights" (e.g. stylistic aspects or symbolic interpretations), reflexive insights (e.g. into one's own perceptual mechanisms). In discussing the significance of their findings, the authors observe that since solvability was not

significantly related to the aesthetic appreciation variables, their findings suggest that the ambiguity of artworks does not need to be resolved for aesthetic appreciation to take place. Moreover, in contrast with the literature on processing fluency, the authors note that their study provides evidence of a clear positive relation of high levels of ambiguity with liking, interest and powerfulness of affect. (For further work in this vein, see Muth, C., Raab, MH., & Carbon, CC. (2016). Semantic Stability is More Pleasurable in Unstable Episodic Contexts. On the Relevance of Perceptual Challenge in Art Appreciation. *Frontiers in Human Neuroscience*, 10, 43: 1-11.)

Fayn, K., MacCann, C., Tiliopoulos, N., & Silvia, PJ. (2015). Aesthetic Emotions and Aesthetic People: Openness Predicts Sensitivity to Novelty in the Experiences of Interest and Pleasure. *Frontiers in Psychology*, 6, 1877: 1-11.

This article examines the relationship between Openness to Experience and aesthetic appreciation, and in particular in why such an association exists, in two studies. In motivating the studies, the authors note that while it has been demonstrated that Openness is related to the tendency to appreciate a large variety of types art (e.g. Furnham & Walker, 2001), aesthetic engagement (e.g. McManus & Furnham, 2009), and creativity (e.g. Feist, 1998), it is difficult to know what to make of these associations—given that some of the items measuring Openness explicitly mention aesthetic engagement. The authors note that Openness is a heterogenous personality domain with two main aspects: an openness domain which measures interest in aesthetic matters and a tendency for exploration of sensory or perceptual information, and an intellect domain which measures interest in truth, and a tendency for exploration of abstract information. The authors outline the differences between pleasure and knowledge emotions such as interest and confusion (see, e.g., Silvia, 2010, above) and note that previous work (Fayn et al., 2015) has shown that the openness domain is related to greater interest overall and less reliance on understanding, whereas the intellect domain is related to greater understanding. In the study report in this article, the authors sought to investigate the relationship between the different domains of Openness to Experience and the appraisal structures of pleasure, interest and confusion. Fifty-three students participated in study 1. Participants were asked to complete scales measuring the openness and intellect scales from the Big Five Aspects Scales, and then to rate 7 representational and abstract works of modern art on scales assessing interest (interesting-uninteresting, engaging-boring), pleasure (pleasure-displeasing, enjoyable-unenjoyable), and arousal (calm-aroused, sluggish-excited). The main results indicate that the openness domain was significantly associated with interest, pleasure and arousal, but the intellect domain was not. The authors conclude that this study confirms that the openness domain is associated with aesthetic matters. Two hundred and twenty-five students took part in study 2. Participants completed the measures of the Big Five Aspect Scales, Smith and Smith's (2006) aesthetic fluency scale, and were asked to rate 18 images of various styles and valences of paintings in terms of how interesting, confusing and pleasing they were. Participants were also asked to appraise the paintings in terms of novelty (complex-simple, unusual-common), and comprehensibility (hard-to-understand-easy to understand, comprehensible-incomprehensible). The main results indicate that the openness domain was associated with finding the images more interesting (b=.61), more pleasing (b=.77), and less confusing (b=-.31); whereas the intellect domain was associated with finding the images

less confusing (*b*=-.29), but not interest (*b*=-.06) or pleasure (*b*=.09). In discussing the significance of their findings, the authors suggest that the openness and intellect domains both predicted reactivity to novelty in art, and openness (but not intellect) was associated with greater pleasure and with novelty leading to pleasure from art. The authors provide a helpful discussion of the relevance of their findings for the relationship between aesthetic appreciation and fluency accounts of aesthetic pleasure.

Grafm AK., & Landwehr, JR. (2015). A Dual-Process Perspective on Fluency-Based Aesthetics: The Pleasure-Interest Model of Aesthetic Liking. *Personality and Social Psychology Review*, 19, 4: 395-410.

In this article, the authors outline a theoretical account of aesthetic liking. They propose that our aesthetic judgements are the result of two hierarchical, fluency-based processes, which tend to output pleasure and interest respectively. They propose that our processing of a stimulus is at first stimulus-driven, and that preferences at this stage are based on pleasure and displeasure. However, the authors suggest that when there is a sufficient need for cognitive enrichment, elaborate perceiver driven processes can emerge—giving rise to fluency-based appraisals of interest, boredom or confusion. The authors motivate the need for two distinct processes on the grounds that there are seemingly inconsistent findings in the literature: some evidence suggest that aesthetic liking is a function of processing ease (e.g., Reber, Schwarz and Winkielman, 2004); but other evidence suggests that aesthetic liking is linked to difficult-to-process stimulus characteristics such as novelty and complexity. This article makes a similar contribution to Belke et al (2010) in suggesting that fluency-based processes are not just involved in our immediate, intuitive preferences, but also play a role in higher-order preferences. The article provides an overview of research on processing fluency, including findings suggesting that repeated exposure, typicality and priming all increase aesthetic liking; as well as apparently inconsistent findings, such as findings suggesting that novelty and complexity (which decrease fluency) increase liking, particularly when they provide opportunities for cognitive elaboration and understanding. (For similar models that posit two processing systems in aesthetic appreciation, see e.g. Leder, Belke, Oeberst, & Augustin (2004), below, and Redies, C. (2015). Combining universal beauty and cultural context in a unifying model of visual aesthetic experience. *Frontiers in Human Neuroscience*, 9, 218: 1-20.)

Schoeller, F. (2015). Knowledge, Curiosity, and Aesthetic Chills. *Frontiers in Psychology*, 6, 1546: 1-3.

In this brief theoretical article, Schoeller makes a number of predictions about the occurrence of chills in response to aesthetic stimuli. Schoeller proposes that chills correspond to the satisfaction of the humans' internal drive to acquire knowledge about the external world, and to perceive objects and situations as meaningful. A little confusingly however, Schoeller proceeds to suggest that aesthetic chills correspond to situations in which we possess a complete understanding, and those in which we possess no understanding at all. Schoeller outlines some of the research that points to the role of the former in chills phenomena.

Fayn, K., Silvia, PJ., Erbas, Y., Tiliopoulos, N., & Kuppens, P. (2018). Nuanced aesthetic emotions: emotion differentiation is related to knowledge of the arts and curiosity. *Cognition & Emotion*, 32, 3: 593-599.

> This article examines whether those who process artworks in a deeper and more nuanced way may be able to make more fine-grained emotional distinctions—emotional differentiation—which is thought to be linked to emotional mastery by providing people with greater knowledge of the antecedents and consequences of their emotions, and how to cope with them. Based on the findings that curiosity is associated with greater engagement with and processing of art, the authors hypothesise that greater emotional differentiation will be related to curiosity. The authors examine this in a correlational manner. Two hundred students participated in the study. Participants were asked to complete a number of individual difference measures: namely, the revised Curiosity and Exploration Inventory (CEI-II)—which consists of a "stretching" subscale that measures seeking new experiences and information, and an "embracing" subscale that measures willingness to embrace novelty, uncertainty and unpredictability—and Smith & Smith's (2006) Aesthetic Fluency Scale to measure expertise. Participants were then asked to rate 18 visual works of art in terms of how interesting, beautiful, awe-inspiring, pleasant, disturbing, disgusting, upsetting, and haunting they found them (on 7-point scales)—with the first 4 items measuring positive emotional differentiation and the last 4 items measuring negative emotional differentiation. The main analyses indicate art expertise was a significant predictor of negative emotional differentiation (*b*=.22), the effect of curiosity on negative emotional differentiation was mediated by art expertise (point estimate=.04), and the effect of expertise on negative emotional differentiation was mediated by comprehension (point estimate=.07). The authors interpret their findings as indicating that more fine-grained emotional differentiation is driven by greater knowledge, and that this effect was mediated by comprehension, suggesting that the more fine-grained emotional abilities of art experts may be due to their mastery of art.

Taylor, PM., & Uchida, Y. (2019). Awe or horror: differentiating two emotional responses to schema incongruence. *Cognition and Emotion*,

> This article contributes to the literature on the aesthetic cognitive emotions by presenting evidence from two studies that awe can be distinguished from horror. Horror had previously been thought to be a subtype of awe (by e.g. Gordon et al., 2017). The authors argue that both awe and horror are responses to schema incongruence—the idea that our experiences are not able to be accommodated by our existing beliefs and frames of reference—and give rise to a sense of needing to accommodate those experiences. They suggest that there are two kinds of schema incongruence: vastness and extremity. According to the authors, vastness is mostly spatial, signals new opportunities to meet one's needs, and results in awe; whereas extremity signals that "vital relationship, relationships or assumptions have become unviable or dangerous, and one must adapt to meet one's needs", and tends to result in horror. The authors offer a helpful discussion of some of the differences between the schema-incongruent emotions generally—noting for example, that trivial aberrations or novelties elicit surprise, confusion or interest; whereas awe and horror are elicited by contradictions of core schemata. Two hundred and nineteen MTurk workers participated in study 1. Participants were either asked to imagine a time when they felt horror (defined as an experience of vastness, where something or

someone is harmed) or awe (defined as an experience of vastness, where you feel that someone or something is amazing). Participants were then asked to indicate what had made them feel that way, and to rate 23 items measuring 9 appraisal domains. The results indicated that appraisals of 'attentional activity', personal agency, certainty and fairness were greater in awe, and appraisals of external human agency, goal-path obstacles and anticipated effort were higher in the horror condition. The authors interpret this pattern as suggesting that horror leads to coping anxiety and that horror is more difficult to resolve. To further examine the differences between the elicitors, and nature of the appraisals involved in horror and awe respectively, the authors conducted a second study. One hundred and thirty-four MTurk works participated. Participants were asked to recall a time when they had experienced awe, horror and contentment and then rated their schema incongruence and need for accommodation on a number of scales. An exploratory factor analysis of the schema incongruence items was found to reveal a two-factor solution. The first factor was interpreted as extremity (α = .84), and included items such as "overwhelming", "situational severity", "outside of the ordinary", "unlike anything I had experienced before". The second factor was interpreted as spiritual vastness (α = .82) and included items such as "exceeded expectations", "sublime", "I felt the existence of things more powerful than myself", and "spiritual significance". An exploratory factor analysis of the need for accommodation scale revealed a two-factor solution. The first factor was interpreted as shock (α = .89) and included items such as "unbelievable", "couldn't imagine", "incomprehensible" and "challenged my worldview". The second factor was interpreted as chaos (α = .76) and included items such as "confused", "contradicted my worldview" and "contradicted my values". Analyses by condition on these factors revealed that awe was associated with greater shock and spiritual vastness than horror and contentment, and horror was associated with greater chaos and extremity than awe and contentment.

McPhetres, J. (2019). Oh, the things you don't know: awe promotes awareness of knowledge gaps and science interest. *Cognition & Emotion*, 33, 8: 1599-1615.

This article seeks to contribute to the growing literature on awe by characterising how it contributes to epistemic behaviour. McPhetres motivates the studies reported by suggesting that as a cognitive emotion which involves the appraisal that something outstrips one's cognitive resources, awe may make people aware of the gaps in their knowledge and cause them to seek out an epistemic framework to fill those gaps. In study 1c, eight hundred and fifty participants from Prolific took part in the study. Participants were either asked to watch an awe-inspiring video from the BBC's Planet Earth (awe condition), or a humorous video from the BBC's Walk On The Wild Side (control condition), and were then asked to complete a measure of knowledge gaps in regard to nature (including items such as "I really understand how the natural world works"; "This activity makes me realise how much I don't know about nature"), and a measure of science interest (including items such as "Science magazines and stories are interesting"). The main results indicate that those in the awe condition reported significantly greater awareness of knowledge gaps (Cohen's *d* effect size=.32) and greater science interest (Cohen's *d* effect size=.20); and while awe was a significant predictor of knowledge gaps (*b*=.16) when controlling for the other emotions measured, awe was not a significant predictor of science interest. To explore the specific role of awe in awareness of knowledge gaps and science interest a further experiment was conducted. Two hundred and twelve students

participated. Participants were assigned to one of four conditions: awe, control, awe + relevant information, and awe + irrelevant information. McPhetres predicted that awe (versus control) would lead to greater awareness of knowledge gaps and science interest, and that providing relevant information would diminish the knowledge gaps and so decrease science interest in the awe condition to the level of controls. Participants were asked to watch a virtual reality video of the aurora (awe condition), a video from the BBC's Walk on the Wild Side, the video of the aurora followed by a video explaining the phenomenon (awe + relevant information condition), or the video of the aurora followed by a video about how to tie a tie (awe + irrelevant information condition). Participants were asked to complete similar measures as in study 1c. The main results were as follows. Those in the awe condition where the knowledge gaps were not satisfied (i.e. the awe, and awe + irrelevant information, conditions) reported greater science interest than those in the control and awe + relevant information conditions (Cohen's *d* effect size=.32). While those in the awe conditions reported greater awareness of knowledge gaps compared to those in the control condition (Cohen's *d* effect size=.50), the awareness of knowledge gaps of those in the awe + relevant information condition was not significantly different from those in the awe condition. McPhetres interprets the latter result as indicating that it may be difficult to fill the knowledge gaps created by awe. Mediation analyses indicate that the effect of awe on science knowledge was mediated by increases in awareness of knowledge gaps (*b*=.18). McPhetres acknowledges that the small effect sizes, and mixed pattern of results between the studies reported suggest that further cautious research in this area is needed. McPhetres also notes that further research on awe, knowledge gaps and religion are needed—however, McPhetres notes that trait measures related to religion were unrelated to the constructs investigated.

Articles on Art Appreciation and the Development of Intellectual Abilities

Rauscher, FH., Shaw, GL., & Ky., KN. (1993). Listening to Mozart enhances spatial-temporal reasoning: Towards a neurophysiological basis. *Neuroscience Letters*, 185, 44-47.

In this article, the authors demonstrated that listening to Mozart's "Sonata for Two Pianos in D Major, K. 448" for 10 minutes temporarily improved their spatial intelligence, as measured by the ability to mentally rotate three-dimensional objects. Thirty-six participants were given three different treatments: silence, Mozart or relaxation, each followed by a number of spatial ability items from the Stanford-Binet intelligence test. Based on Long and Shaw's (1991) hypothesis that listening to music might activate the same neurons as those used in spatial-temporal tasks, the authors explain their findings by suggesting that listening to music primed neurons involved in spatial reasoning tasks.

Nantais, KM., & Schellenberg, EG. (1999). The Mozart Effect: An artefact of preference. *Psychological Science*, 10: 370-373.

In this article, the authors provide evidence that the Mozart Effect (Rauscher, Shaw and Ky, 1993) is due to preference. In study 1, fifty-six participants were asked to complete spatial temporal tasks, after listening to a 10-minute piece composed by Mozart or Schubert (Art condition) and sitting in silence for 10

minutes (Control condition). Results indicate that listening to music improved performance on the spatial-temporal task. In study 2, twenty-eight participants completed spatial temporal tasks after listening to Mozart for 10 minutes (Art condition) and 10-minutes of listening to a short-story by Stephen King for 10 minutes (Control condition). Results indicate that the advantage provided by music disappeared when the control condition consisted of listening to a short story, and that performance was a function of preference rather than type of stimuli.

Dolev, JC., Friedlaender, LK., & Braverman, I. (2001). Use of Fine Art to Enhance Visual Diagnostic Skill. *Journal of American Medical Association*, 286, 9: 1020-1021.

This article seeks to examine whether training in appreciation of the fine arts leads to improvements in diagnostic skills. In total, one hundred and seventy-six first year medical students took part in the study in two cohorts. Participants in the first cohort were assigned to either a course in the fine arts, or a control course, or a lecture course. Participants in the second cohort were either assigned to a course in the fine arts, or a control course. Participants in the fine arts condition were asked to attend a programme in which they were asked to study a preselected painting for 10 minutes before describing it in detail to their group of 4 students, with prompting with open-ended questions by a curator. Participants in the control condition attended clinical sessions in which a physician taught history-taking and physical-examination skills. Participants in the lecture condition participated in an anatomy lecture which featured images related to that week's dissection. Participants were given a set of photographs of people with medical disorders immediately before and after the intervention, and asked to make observations (but not diagnoses or pathological processes). Responses were rated for the number of visual diagnostic features identified. Results indicated that participants in the art condition identified significantly more diagnostic features in their post-intervention tests compared to their pre-intervention tests than participants in both the control and lecture conditions (where the latter was present). The authors comment that the effect of art may be due to the fact that the students are unfamiliar with art: they do not have a bias as to which visual attributes are important.

Jones, MH., West, SD., & Estell, DB. (2006). The Mozart Effect: Arousal, Preference and Spatial Performance. *Psychology of Aesthetics, Creativity and the Arts*, S, 1: 26-32.

In this article, the authors directly tested two competing explanations of the Mozart effect (Rauscher, Shaw and Ky, 1993). Forty-one participants were asked to complete the spatial relations subtest of the Stanford-Binet intelligence task following exposure to Mozart or silence. Results indicated that listening to Mozart led to an increase in performance on the spatial ability task, and suggest that this was mediated by arousal and not preference. (For further work on the Mozart effect, in addition to the studies cited above, see Thompson, WF., Schellenberg, EG., & Husain, G. (2001). Arousal, mood, and the Mozart Effect. *Psychological Science*, 12: 248-251).

Naghshinkeh, S., Hafler, JP., Miller, AR., Blanco, MA., Lipsitz, SR., Dubroff, RP., Khoshbin, MD., & Katz, JT. (2008). Formal Art Observation Training Improves Medical Students' Visual Diagnostic Skills. *Journal of General Internal Medicine*, 23, 7: 991-7.

This article seeks to examine whether formal art observation training might help clinicians become better at using physical examinations to treat patients by improving "visual literacy, i.e. the ability to find meaning in imagery." Fifty-eight medical students took part in the study: 24 participants were assigned to the art condition and 34 students were assigned to the control condition. Participants in the art condition were asked to take a course which consisted of 8 weekly 2.5h sessions, which consisted of a 75-minute observation exercise at the Boston Museum of Fine Arts and a 1h lecture linking visual arts concepts, such as balance and form, to physical diagnosis. In the observation exercises, in groups of 12, participants were asked to inspect, describe, and interpret pre-specified paintings which were thought to exhibit the visual art concepts (such as balance, light, form) that would be discussed in the lecture, and to build on the interpretations of others in the group. Participants in the art group also took part in two sessions where members of the medical faculty guided students through their observations of volunteer patients, and two voluntary sessions where they were trained in line drawing. Participants in both conditions were asked to complete a 1h written visual skills examination before and after the intervention, which included exercises to interpret and describe three patients with a variety of clinical disorders and two artworks. The results indicate that participants in the art group made significantly more accurate observations on the outcome measures than participants in the control group.

Pellico, LH., Friedlaender, L., & Fennie, KP. (2009). Looking is Not Seeing: Using Art to Improve Observational Skills. *Journal of Nursing Education*, 48, 11: 648-653.

In this article, the authors contribute to a growing literature on the relationship between training in the visual arts and observational skills in a medical context. Sixty-six students on an accelerated nursing programme took part in the study. 34 participants were assigned to a special program called "Looking is Not Seeing" in which they were sent to a university arts museum in groups of 5 or 6 and asked to study a preselected painting for 10 minutes, and asked to make as many observations of the painting as possible. After 10 minutes, participants were asked to report to the group what they had observed in the paintings, without interpretations, with some prompting through open-ended questions by a docent. After providing a visual inventory of the painting in this manner, participants were then coached to consider how thoughts and feelings were communicated through visual forms, light, manner and mood. Only painting which were rich in detail, with many features that were open to alternative interpretations, were selected. Participants in the control condition followed the normal curriculum. Participants in both conditions were asked to view six patient photographs, and were given 5 minutes to make written observations about the patient, and 3 minutes to interpret the patient for each photograph. Result indicate that participants in the art group offered a significantly larger number of plausible clinical observations and alterative diagnoses than participants in the control group.

Oatley, K. & Djikic, M. (2018). The Psychology of Narrative Art. *Review of General Psychology*, 22, 2: 161-168.

In this article, the authors provide a review of empirical studies on narrative, including the effect of reading fiction on the development of empathic and theory of mind capabilities, as well as self-transformation. With regard to the

relationship between reading fiction and theory of mind capabilities, the authors discuss Mar, Oatley, Hirsh, dela Paz and Peterson (2006), Mar, Oatley and Peterson (2006), and Kidd and Castano's (2013) findings that reading fiction leads to improvements in theory of mind capabilities. The authors discuss failed replications of these findings, as well as evidence concerning the domain-specificity and duration of the effects. With regard to self-transformation, the authors discuss the findings of Djikic, Oately, Zoeterman and Peterson (2009) and Djikic, Oatley and Carland (2012) which show that reading literary stories results in small changes in participants' personalities compared to reading similar texts matched for content, length, and difficulty. The authors hypothesise that such effects are due to what they call "indirect communication"—where an artist or author gets someone to think or feel in a certain way without directly instructing them. The authors relate these findings to general conceptions of the nature of art and literature, drawing on Collingwood's (1938) expression theory of art, among other sources. (A review of similar topics and evidence is provided by Oatley, K. (2012). The Cognitive Science of Fiction. *WIREs Cognitive Science*, 3: 425-430).

Studies on Art Creation and Training and the Development of Intellectual Abilities

Cohen, & Bennett (1997). Why can't most people draw what they see? *Journal of Experimental Psychology: Human Perception and Performance*, 23: 609-621.

In this classic paper, the authors seek to empirically cast light on the psychological capacities involved in drawing ability. Work on this issue is particularly relevant for aesthetic cognitivism insofar as it seeks to establish whether artists see the world differently, and perhaps more deeply. The authors propose four possible sources of drawing inaccuracies, drawing on limited evidence from developmental studies on drawing in children, the writing of art historians such as Gombrich, and the testimony of famous artists: (1) inaccurate perception of the stimulus; (2) poor decisions about how and where to make marks in order to accurately depict a stimulus; (3) poor motor control; (4) or poor evaluation of the accuracy of their depictions. The authors try to determine which of these factors is responsible for drawing inaccuracies in a series of four complex studies. Seventy-two students took part in study 1: Twelve participated as artists, and 60 participated as critics. There were three drawing conditions: tracing, tracing at a distance (where tracing is done on a transparent shelf with a photograph some distance below the shelf), and traditional drawing. Each artist only participated in one drawing condition, and the critics were required to rank or rate the visual accuracy of the drawings. Participants were asked to draw a generator and a face. Results indicated that the pictures produced by tracing were judged to be more accurate than those produced by tracing at a difference, which in turn were judged to be more accurate than those produced in the traditional condition. Results also indicate that renderings of a generator were judged to be more accurate than ratings of a human face. The authors interpret these findings in the following way: (1) drawing inaccuracies were principally the result of artists' misperceptions of the objects or their own drawings on the grounds that the artists were able to produce significantly more accurate tracings—which principally require motor skills, and good decisions about what marks to make—compared to traditional drawing—which unlike tracing requires accurate perception of the stimulus and accurate evaluation of the depiction; and (2) some drawing inaccuracies were the result of poor motor skills and poor

representational abilities, on the grounds that depictions of the face require more difficult representational decisions and motor skills to "blend features" due to the face's lack of sharply defined features. (The authors note that the results of the tracing at a distance condition cannot be interpreted with any certainty, as this can be done either in the same way that tracing is done, or in the way traditional drawing is done). Thirty-eight students participated in study 2: with 9 students participating as artists and 29 students participating as critics. Artist participants were asked to trace a tracing of a face and a generator, and these were then rated for their visual accuracy by the critic participants. Tracing a tracing only requires motor skills and not good perceptual decisions or evaluations of the depiction, and so the authors predicted that if motor abilities are contributing to inaccuracies in drawing, then there should be a significant difference in the accuracy of the tracings of the generator and faces. The results show a small but nonetheless significant difference between the accuracy of tracings of the generator and face, suggesting that motor skills play a small role in differences in drawing accuracy. Forty-two students participated in study 3: with 12 students participating as artists, and 30 students participating as critics. Artists were asked to render two images: one of the face and one of the generator. One of these images was a photograph, and one was a tracing. The results indicate that there was a main effect of image content—with artists rendering the generator as more accurate than the face, and type of image—with artists rendering the tracings as more accurate than renderings of the photograph, and a significant interaction between type of image and image content—with artists rendering the tracing of the face more accurately than the photograph of the face. The authors reason that since the copying of the tracing only removes the need for representational decisions compared to the drawing from a photograph, the fact that there was significant but small difference between the accuracy of the different types of image indicates that poor representational abilities only contribute minimally to drawing inaccuracies. One-hundred and ninety-five students participated in study 4: Thirty-nine students participated as artists—with 28 non-art students and 11 art students; and 156 students participated as critics. Artists were asked to produce renderings of the photographs of the face and the generator, and to rate how accurate their renderings, and 12 renderings from study 1 were. The results indicate that all artists—irrespective of their skill level—overestimated the accuracy of renderings compared to the critics, and there were no significant differences based on skill level. The authors interpret this finding as showing that artists superior ability at drawing cannot be due to a superior ability to detect the inaccuracies in their renderings. Using a process of elimination, the authors generally conclude that the main difference between people who can draw and those who can't must be in their perception of the world—the only factor that was not directly investigated in this article. The authors propose that most people cannot accurately depict objects because they rely on idealised prototypes of the objects to be drawn, and often ignore the way the object actually appears.

Kozbelt, A. (2001). Artists as experts in visual cognition. *Visual Cognition*, 8, 6: 705-723.

This article is one of the earliest to explore the perceptual advantages of artists. In particular, Kozbelt wishes to establish whether artist's have visual capabilities that give them an advantage in drawing, such as being able to analyse the structure of what they are drawing in order to be able to render it convincingly. Forty-six participants took part: 17 first-year art students, 13 fourth-year art

students, and 16 novices. Participants were given four kinds of perception task, and four drawing tasks. Perception tasks consisted of (1) an out-of-focus pictures task (where participants are asked to guess what is depicted in the photographs), (2) a Gestalt completion task (where participants were asked to identify partly drawn common objects), (3) an embedded figures task (where participants were asked to find and trace a target shape in a more complex drawing), (4) a mental rotation task (where participants are required to mentally rotate pictures of pairs of 3D-shapes to determine whether they are identical or merely similar). Drawing tasks consisted a large range of tasks involving simple copying and mental manipulation of images by mentally rotating images, mentally superimposing images and mentally subtracting images from one another: a task to draw a picture of a pair of scissors from a photograph, a task to draw a pair of real scissors from the angle of the scissors in the photograph (without the photograph present), a task to draw a simple picture of wavy lines, a task to draw a picture of wavy lines at a 90-degree angle, a task to copy pictures of letters of the alphabet using only one line, a task to mentally superimpose one letter on top of another and draw it, a task to mentally superimpose two letters and only draw the bits that overlap, a task to draw four faces that were upright, inverted, tilted and rotated, and a task to trace over a photocopy of a painting of Picasso in a single line. All drawings were judged for the accuracy of the proportions by three judges with some training in art or design. Results indicate that first-year art students outperformed novices on the perception tasks (with mean z-scores of -.37 and .35 respectively), but fourth year art students did not outperform first-year art students, except in the case of the out-of-focus pictures task and the mental rotation task, with fourth-year art students performing better on the out-of-focus pictures task than first-year art students (with mean z-scores of -.3 and .4), and first year art students performing better than fourth-year art students on the mental rotation task (with mean z-scores of .34 and -.45). There was a strong correlation between performance on the drawing tasks and perception tasks (r= .63), with a substantial amount of common variance (40%), which Kozbelt interprets as indicating that there are common visual processes involved in both the perception tasks and the drawing tasks. In his discussion, Kozbelt draws two main conclusions, First, artists are not only better able to draw because they have superior fine motor skills, but also because they have superior perceptual skills. Second, Kozbelt draws a distinction between "open" and "closed" domains. He suggests that in closed domains, such as chess-playing, the standards of success are well-defined, and expertise consists in the development of a large number of domain-relevant patterns (estimated to be around 50,000 according to Chase & Simon, 1973). By contrast, in open domains, such as art making, where the standards of success are ill-defined, expertise consists of the flexible use of proceduralised knowledge to perform proficiently in novel circumstances.

Kolbelt, A., Siedel, A., Elbassiouny, A., Mark, Y., Owen, DR. (2010). Visual selection contributes to artists' advantages in realistic drawing. *Psychology of Aesthetics, Creativity and the Arts*, 4, 2: 93-102.

The authors in this paper seek to examine how cognition is related to skilled drawing. In introducing the article, they note artists' ability to create accurate depictions has been explained via bottom-up (i.e. data driven) or top-down (i.e. knowledge-driven) accounts. Supporters of the bottom-up approach include Ruskin, who advised artists to minimise conceptual interference and recover "the innocence of the eye". Supporters of the top-down approach include Gombrich,

who argued that more accurate depictions are a product of the artists' ability to use their understanding of the structure of objects to meet their depictive goals. To cast light on this debate, the authors seek to establish (1) whether artists' schemata highlight the most relevant aspects of a visual scene to include and emphasise in a depiction—which the authors call 'visual selection' and (2) whether inverting a stimulus to reduce conceptual interference improves drawing accuracy. In study 1, thirty-one individuals participated: 15 were art students, and 16 were non-art students. Participants were asked to trace a photograph of a human face with 70 pieces of tape. The resulting depictions were then rated for accuracy by 15 artists and 26 non-artists on nine dimensions. The results indicate that there was a main effect of group membership on drawing accuracy, with the art students performing better than the non-art students (omega squared effect size=.05). A significant interaction between membership of the artist group and membership of the judger group was also found: with art-student judges finding the depictions by art students much more accurate than the depictions by non-art students; and non-art-student judges not finding the depictions by art students to be more accurate than the depictions by non-art students. The authors conclude that this study shows that the ability to select visually important features contributes to artists' advantages in creating accurate depictions, and that the 'realism' of an image may not be transparent to people equally. In study 2, forty-four individuals who were not studying art and did not have any drawing experience participated. The method was the same as in study 1, except that participants were randomly assigned to trace the face when it is presented upside down or upright. As in study 1, the drawings were analysed by 13 artists and 23 non-artists. The results indicate that while there was no main effect of orientation on the accuracy of the depiction, there was a significant interaction between rater group and orientation, with only those raters who were artists judging the depictions in the inversion condition to be more accurate than those in the upright condition (omega squared effect size=.04). The authors conclude that the result of study 1 are the first direct empirical support for Gombrich's argument that artists are better at selecting the most important parts of an object or scene to use in their depictions. In their discussion of their findings, they note that the results of their two studies appear to be inconsistent with one another. In trying to bring about a rapprochement between the bottom-up and top-down accounts, the authors suggest that bottom-up strategies, such as inverting a stimulus, may be important for clarifying small details, and two-dimensional proportions; whereas top-down strategies may be important for selecting the most relevant features to include in a depiction. Furthermore, the authors note that there may be equivocation in the debate—supporters of top-down and bottom-up theories may be operating with different concepts of knowledge. The knowledge that supporters of top-down theories are referring to is of knowledge of object types of the kind that is useful in everyday object recognition. The knowledge that is referred to by supporters of top-down theories, by contrast, is "highly specialised, artificial, and domain (or even medium) specific" and consist of knowledge of how to achieve a desired effect.

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*, 6, 2: 124-136.

This article seeks to help resolve the debate between supporters of a bottom-up theory of accurate drawing—which emphasises accurate perception of low-level

features by supressing sources of misperception, and supporters of a top-down theory—which emphasizes knowledge-guided selection of information important for depiction. With regard to bottom-up theories, the authors seek to build on a series of findings suggesting that those who are able to draw more accurately have more accurate bottom-up perceptual processing—as measured by perceptual constancy errors and susceptibility to illusions. The authors seek to establish the parameters under which inhibiting perceptual constancies benefits accuracy of drawing: is inhibiting perceptual constancies only useful to establish an object's basic proportions or is it useful more generally? With regard to top-down theories, the authors seek to build on findings that artists are able to use their knowledge of how certain visual information is more important for efficient recognition to make their depictions more accurate. The authors seek to establish whether these findings generalise: Is there evidence of improved visual selection among artists in the depiction of non-face stimuli, and freehand drawing (rather than simply line tracing)? Moreover, this study seeks to examine the relative power of both these bottom-up and top-down factors in predicting the accuracy of depictions. Forty-eight individuals took part: 15 were artists and 33 were non-artists. Each participant was presented with two perception tasks and two drawing tasks. The perception tasks were to measure low-level perceptual accuracy, and consisted of a size-matching task and a shape-matching task to assess the extent to which participants were susceptible to perceptual constancies. The two drawing tasks consisted of a limited-line tracing task—which required participants to trace a photograph of an elephant with a limited number of lines as accurately as possible in 15-minutes; and a free-hand drawing task in which participants were asked to draw a picture of an octopus as accurately as possible. The accuracy of the drawings and tracings was rated by 3 individuals with extensive experience in observation drawing, and the number of four-types of vertices that are among the nonaccidental properties that facilitate object recognition over a range of viewpoints was rated by 2 judges with extensive drawing or painting experience. Results indicate there was an effect of group membership on susceptibility to depth perceptual constancy errors—with artists being less susceptible to perceptual constancy errors than non-artists—but not on size perceptual constancy errors. Accuracy of free-hand drawing and limited line tracing were both significantly and moderated correlated with reduced depth perceptual constancy errors (Pearson's correlations r=-.32 and -.39). Finally, there was a significant effect of group membership on the use of three of the four vertices that are nonaccidental properties that facilitate condition-invariant object recognition. In discussing their results, the authors suggest that their findings support both bottom-up and top-down theories: accurate drawing is related to both size-constancy suppression (though not shape-constancy suppression as found by e.g. Cohen & Jones, 2008) and visual selection processes, with these together accounting for approximately 20% of the variance in freehand drawing performance.

Chamberlain, R., Wageman, J. (2015). Visual Arts Training is Linked to Flexible Attention to Local and Global Levels of Visual Stimuli. *Acta Psychologica*, 161: 185-197.

In this article, the authors examined the relationship between drawing skill and various aspects of local processing. Forty-six participants took part: 23 art students, and 23 non-art students. Participants were given 8 main tasks involving local processing. (1) Participants were given a 3D embedded figures task to measure differences in local processing, on the grounds that art students who are

skilled at observational drawing were predicted to be better at accurately perceiving details. (2) Participants were given a measure of the subjective strength of visual illusions in a task that requires local processing, on the grounds that Cohen and Bennett (1997) have argued that artists are less susceptible to visual illusions. (3) Participants were given a coherent motion test and a coherent form test, to assess global processing on the grounds that artists need to be able to assess global characteristics such as proportion and spatial relationships between local parts when creating observational drawings. (4) Participants were given a Navon level-switching task on the grounds that attentional flexibility has been shown to be associated with creativity. (5) Participants were given two observational drawing tasks—one from a photograph, and one of a 'still life' of three-dimensional objects. Results for (1) indicate that drawing ability was positively related to local processing ability, and group membership was negatively related to local processing ability—with non-art students performing better than art students. Results for (2) indicate that there was only a significant difference in subjective strength of illusion between groups for the ponzo illusion—with non-art students showing less susceptibility to the illusion—but there was no relationship between illusion strength and drawing ability. Results for (3) indicate that there was no relationship between coherent form identification and drawing ability or group membership, but there was a significant difference between the groups in the coherent motion task—with non-art students performing better than art students—and the relationship between coherent motion accuracy and drawing ability approaching significance. Results for (4) indicate that there was no relationship between performance on local or global trials and drawing ability or group membership, but there was a significant relationship between group membership and the cost of switching in incongruent pairs of trials—with art students showing less cost in accuracy and reaction time for incongruent pairs. The authors conclude that these findings show that observational drawing skill is supported by "islets of enhanced visual attention, rather than a unitary local processing enhancement or bias" and that there is mixed evidence that studying art is related to enhanced global processing and the ability to switch between perceptual levels.

Andersen, PN., Klausen, ME., & Skogli, EW. (2019). Art of Learning – An Art-Based Intervention Aimed at Improving Children's Executive Functions. *Frontiers in Psychology*, 10, 1769.

This paper examines the relationship between engagement with the arts and executive functions—which are known to be involved in behavioural self-regulation, goal-directed behaviour, planning for the future, reasoning, and exerting cognitive control. One hundred and three children aged 6-9 at 5 public schools in Norway were recruited to take part. The authors randomly administered the 12-week Art of Learning curriculum—an arts rich curriculum which involves artists delivering 36 predetermined art activities over the course of the 12-weeks—to students in three schools, with the two normal schools using their normal curriculum. Measures of EF for all children were completed by teachers before the intervention, immediately after the end of the intervention and 6 months after the end of the intervention. The results indicate that the Arts-based curriculum significantly improved executive function. More specifically, the arts-based curriculum significantly improved measures of executive function relation to behavioural self-regulation rather than metacognition.

Drake, JE., Simmons, S., Rouser, S., Poloes, I., Winner, E. (2019). Artists Excel on Image Activation But Not Image Manipulation Tasks. *Empirical Studies of the Arts*.

> The authors hypothesise that given that many artists do not simply reproduce what they observe but rather produce and manipulate mental images as they plan and execute their works, artists may be better at what they term 'image activation' and 'image manipulation'. Thirty-two fourth-year students doing art and design majors (art condition) and 40 psychology students were asked to compete four measures of visual imagery and two control measures (verbal IQ and creativity). The authors measured 'image activation' by measuring their tendency to have vivid mental imagery (as artists need to conjure vivid and clear mental images in creating their work), their ability to complete out-of-focus pictures (as artists may need to fill in detail from scenes seen at a distance), and their ability to abstract (as artists may need to envision underlying and essential structure). The authors measured 'image manipulation' by measuring their ability mentally rotate objects in three-dimensional space. Results indicate that the arts students performed significantly better on the measures of tendency to have vivid mental imagery (as measured by the Vividness of Visual Imagery Questionnaire) and abstraction (as measured by the Limited-Line-Tracing Task). The authors conclude that their findings provide tentative evidence that art students may be better at 'image activation' but not at 'image manipulation'.

Chamberlain, R., Drake, JE., Kozbelt, A., Hickman, R., Siev, J., & Wagemans, J. (2019). Artists as experts in visual cognition: An update. *Psychology of Aesthetics, Creativity, and the Arts*, 13: 58-73.

> In this article, the authors try to help disentangle the complex, and at times contradictory, picture that has emerged in the two decades prior to this article's publication about the relationship between perceptual abilities and training as an artist. Seventy-nine participants took part in the study: 42 in the art group, and 37 in the non-group. Participants in both conditions were asked to complete a number of tasks: (1) a mental rotation task, (2) an out-of-focus pictures task, (3) the embedded figures test—which requires participants to try to identify a target shape in a stimulus array of patterns, (4) a Navon hierarchical shape task, (5) a strength of visual illusions test, (6) a bistable figure task—which requires participants to manipulate their internal perceptual representations, (6) the limited-line-tracing task—which measures participants' ability to select the most important information to include in a depiction, (7) an observational still-life drawing task, and (8) a creative drawing task—which measures participants' skill in creating a drawing from their imagination. The result of (1) indicate that there was no effect of group membership on the mental rotation task. The results of (2) indicate that there was no relationship between group membership and performance on the out-of-focus pictures task. The results of (3) indicate that there was a significant relationship between group membership and accuracy on the embedded figures task—with art students outperforming non-art students. The results of (4) indicate that there was no relationship between group membership and performance on the Navon hierarchical shape task. The results of (5) indicate that the there was no effect of group membership on the strength of visual illusions. The results of (6) indicate that there was an effect of group membership on the bistable figure task—with art students experiencing more perceptual reversals and shorter percept durations than non-art students. Finally, performance levels on the mental rotation task, embedded figure task and

bistable figure task were found to correlate with observational and creative drawing ability (with Pearson correlations *r* between .22 and .41). Overall, art students showed enhancements in disembedding in the embedded figures task and in instigating reversals in the bistable figure task, independently of IQ; and performance on the mental rotation task, embedded figure task and bistable figure task were correlated with both observation and creative drawing ability. In contrast, the ability to identify out-of-focus pictures, avoid interference in the Navon task, and overcome visual illusions did not reliably differ between art and non-art students and did not correlate with observational or creative drawing. In offering an overall interpretation of their findings, the authors suggest art students performed better on tasks that require top-down facilitation of visual attention, but art students and non-art students performed equally well on tasks driven by bottom-up perceptual processing mechanisms.

Fung, ASK. (2017). Music enables the holistic development and discover of self: A phenomenological study of two Christian musicians. *Psychology of Music*, 45, 3: 400-416.

This unusual article explores the connections between spirituality and training in music. Fung offers a summary of the literature on the relationship between music appreciation, creation and spirituality. Fung reports the analysis of a series of interviews conducted over two years with two Christian musicians about their musical training, and their transitional experiences as developing professionals. Of particular relevance to aesthetic cognitivism is Fung's documentation of how the musicians used their musical training to promote spirituality and self-knowledge and self-perfection.

Articles on the Role of Cognitive Processes in Art Appreciation

Cupchik, GC., & Gebotys, RJ. (1988). The search for meaning in art: interpretative styles and judgments of quality. *Visual Arts Research*, 14: 38-50.

The authors of this paper examine whether naïve and trained viewers search for different kinds of meaning in works of art in two studies. The article includes a discussion of theoretical perspectives on the way that experts and naïve viewers approach art appreciation. Drawing on Bartlett (1932), the authors note that naïve viewers' style of art appreciation has been understood as an extension of everyday perception, where people try to recognise and identify objects. Drawing on depth-of-processing theorists, the authors suggest that in ordinary perception, and indeed in naïve art viewing, the sensory-physical information is discarded in favour of object recognition. By contrast, the authors suggest that trained viewers "attend to sensory-physical information (i.e. color, texture, shape) rather than discard it because it constitutes the stuff of artistic style". The authors predict that naïve viewers will search for objects in artworks which can be recognised and are familiar, and will ignore "nonobject qualities" as irrelevant; whereas trained viewers will also search for the visual effects as the "key to uncovering the uniqueness of an artwork". Thirty-five people participated in study 1: Twenty-four naïve students, and eleven trained artists. The main stimuli of importance here was what the authors call the "search for meaning" paradigm. To create the "search for meaning" paradigm, an art historian and an artist/art teacher selected 13 paintings and 17 sculpture triads. The three stimuli in a triad reflected a transformation along the dimension 'literal to visual effects': included one straightforwardly representational works, and

two transformations that were increasingly less realistic and focused more on sensory-visual qualities. The main results indicate that trained participants were significantly more likely to select the visual effects order than the literal order, and naïve participants were significant more likely to select the literal order than the visual effects order. Forty-eight students participated in study 2: Twenty-four non-art students, and 24 fine art students. Participants were administered a subset of triads from the "search for meaning" paradigm as well as pairs of kitsch and quality artworks matched for content. In the latter case, participants viewed the pairs twice and indicated which painting they preferred, and by how much, and which painting was better than the others, and by how much. The main results of the "search for meaning" paradigm replicated those of study 1. Scores on the search for meaning task were correlated with scores on the preference and quality task: the tendency to pick the "visual effects" order correlated with the tendency to prefer the high-quality, non-kitsch paintings, and the tendency to pick the literal order correlated with the tendency to pick the low-quality, kitsch paintings. The authors offer a rich discussion of their findings, including the claims that "a literal search for meaning leads to a superficial appreciation of art" and "liking realistic and emotional evocative painting can limit the viewer's ability to discriminate aesthetic quality".

Martindale, C., Moore, K., & Borkum, J. (1990). Aesthetic preference: Anomalous findings for Berlyne's psychobiological theory. *American Journal of Psychology*, 103, 1: 53-80.

This classic paper empirically tests Berlyne's psychobiological theory of aesthetic preference in 7 studies. According to Berlyne's theory, aesthetic liking is related to non-specific reticular-system arousal by an inverted U-shaped function, where arousal can be increased by (a) collative properties such as novelty, complexity, and incongruity; (b) psychophysical properties such as intensity, pitch, hue, and brightness, and (c) ecological properties such as innate or learned signal value, meaningfulness, or association of the stimulus. The authors summarise a large amount of evidence suggesting that these variables are related to aesthetic pleasure in a monotonic or U-shaped fashion; and most importantly for aesthetic cognitivism, that collative variables are the most important determinants of aesthetic preferences. For example, in a study of preference for classical music, Martindale and Moore (1989) found that subject-rated meaningfulness accounted for 51% of the explained variance in preference (compared to only 4% for subject-rated complexity). Four of the experiments will be summarised here. Forty students participated in study 3. Participants were presented with 14 polygons, and asked to rate them in terms of liking, complexity-simplicity, meaningfulness-meaninglessness, and orderliness-disorderliness. The main result of relevance here indicated that there was a significant effect of meaningfulness once complexity was partialled out—with an R^2 of .64—and no effect of complexity once meaningfulness was partialled out. Thirty-nine students took part in study 5. Participants were presented with 40 standardised drawings and were asked to rate the drawing (and not the representational content) in terms of liking, meaningfulness-meaninglessness, orderliness-disorderliness, photographic-nonphotographic, naturalness-unnaturalness, and static-dynamic. The main result of relevance here indicated that there was a significant effect of meaningfulness once complexity was partialled out—with an R^2 of .83—and no effect of complexity once meaningfulness was partialled out. Thirty-four students participated in study 6. Participants were asked to rate 80 eminent Italian painting from the period 1130-

1729 that featured humans (but were not portraits) on a number of dimensions, including those used in study 5. The main result of relevance here is that there was a significant effect of meaningfulness once complexity was partialled out—with an R^2 of .22—and no effect of complexity once meaningfulness was partialled out. Twenty-two students participated in study 7. Participants were asked to rate 51 eminent French paintings from 1590-1929, which included representational and abstract works on the same scales used in study 5. The main results of relevance show that meaningfulness was a significant predictor of liking once complexity was partialled out—with an R^2 of .37—and, to a lesser extent, complexity was a significant predictor of liking once meaningfulness was partialled out—with an R^2 of .27. Analysis of the data by art expertise revealed that meaningfulness was an even stronger predictor of liking among those high in art expertise, compared to those low in expertise.

Temme, JE. (1992). Amount and Kind of Information in Museums: Its Effects on Visitors Satisfaction and Appreciation of Art. *Visual Arts Research*, 18, 2: 28-36.

This paper examines how contextual information affects appreciation of artworks in two lab and two field experiments. Based on previous research showing that 87% of museum patrons reported that receiving information about artworks increased their enjoyment of them (and only 3% reporting a decrease), the authors sought to establish the circumstances under which information increased appreciation of art. One hundred and seventy-two students participated in study 1. Participants were presented with either 20 "artistically ambiguous" artworks or 20 "artistically non-ambiguous" art—where the authors define artistic ambiguity as to whether something is artistically good and whether it should be considered "art" or "kitsch"—drawn from two exhibitions at the Rijksmuseum, along with information about each artwork from the exhibition either before judging the paintings, after judging the paintings, or when receiving no contextual information. (NB: there is some ambiguity in the article as to whether participants in both painting conditions received the information at different times). Participants were asked to rate the paintings on four scales—beautiful-ugly, agreeable-disagreeable, absorbing-dull, and interesting-disinteresting [sic]. The results indicate that, in the case of the artistically ambiguous paintings, contextual information increased participants' rating of the paintings on all of the scales; but in the case of the artistically unambiguous paintings, contextual information only increased participants' ratings of paintings on the interesting-disinteresting scale. One hundred and ninety-eight participants were asked to complete a 140-item questionnaire after attending the a very successful exhibition at the Stedelijk museum. The main results of interest here were that those who had a formal education in art and attended museums more frequently reported needing information less when looking at paintings compared to those without a formal education or attended museums less frequently. Temme interprets this as indicating support for an uncertainty reduction mechanism: the more uncertain one is about one's opinions, the greater will be the need for information in appreciating artworks. To further examine the optimum amount of information to increase aesthetic appreciation, the authors conducted a further field study. One hundred and sixty visitors to the Centraal Museum in Utrecht participated. Participants were presented with 12 seventeeth-century dutch paintings, which were all accompanied by explanatory texts of four different lengths. For each participant, the time they spent looking at the paintings and reading the explanatory texts was recorded; and after examining

all the paintings, participants completed a 15-item questionnaire about their aesthetic response to the artworks. In general, the main finding was that more information decreased aesthetic appreciation overall: with decreases in pleasure, interest, beauty and kitsch-art. The authors explain the apparent inconsistency with the results of study 1 by suggesting that the paintings were not seen as artistically ambiguous.

Franklin, MB., Becklen, RC., & Doyle, CL. (1993). The influence of titles on how paintings are seen. *Leonardo*, 26: 103-108.

This exploratory paper seeks to examine the effect of providing titles on people's appreciation of art. The authors begin with a helpful discussion of the theoretical background concerning whether titles *should* be relevant to aesthetic appreciation—noting, for example, that formalists such as Bell and Fry argued that information external to the frame should not influence the appreciation of visual works, and others, such as Fisher and Levinson arguing that titles serve the function of influencing interpretation as well as the aesthetic qualities of a work. Levinson, for example, argues that if Van Gogh's neutrally titled *Cypresses at Arles* were in fact titled "Sinister Trees," it would change the aesthetic qualities of the painting. The authors of this study sought to empirically determine whether the information given by a title affects: (1) people's understanding of the content represented in a work; and (2) people's perceptual organization of the image. Thirty-one students participated. Participants were presented with 2 paintings twice—Gorky's *Agony* and Monet's *Terrace at Ste. Adresse.* Participants were either presented with the original title, or an alternative—"Carnival" in the case of the Gorky and "The Coming Storm" in the case of the Monet. Participants were asked to read aloud the title, look at the painter, describe what they were seeing (measure of interpretation of content) and use a pointer to indicate what they were looking at (measure of perception of spatial organisation). Each unit of participants' descriptions were rated in terms of their consonance with one title or another (where the raters were blind to the condition). Results indicate that the titles had a significant effect on the participants' descriptions of the paintings. Participants pattern of pointing at the painting was recorded, and rated in terms of which painting and title they were related to. Results indicate that the raters were able to reliably determine which viewing patterns belonged to which painting, but were not able to reliably determine the title given to participants. The authors interpret this as suggesting that titles contribute to people's interpretation of an artwork but not their perceptual organisation of it. Finally, through an analysis of the content of what participants said, the authors propose that there are three identifiable strategies through which image and title are brought together: (1) 'framing by title'—where the description was guided by the title meaning without explicitly mentioning it; (2) 'dialoguing with title'—where the title is explicitly mentioned and references are made to how the painting is consonant or dissonant with it; and (3) metaphorizing the title—where the meaning of the title is reinterpreted to resolve initial tensions between the literal meaning of the title and the appearance of the work.

Cupchik, GC., Shereck, L., & Spiegel, S. (1994). The Effects of Textual Information on Artistic Communication. *Visual Arts Research*, 20, 1: 62-78.

The authors of this article seek to explore how different kinds of information about artworks affects aesthetic responses to those works in two studies. In study 1, forty-eight students participated. Participants were asked to view three artworks which each composed of a painting and a sculpture, with varying amounts of information: only title, information about the emotional effect the artist sought to achieve, and information about the stylistic devices the artist had used. Participants were asked to rate each piece on 5 scales measuring affective (pleasing, powerful), cognitive (challenging, interesting), and contextual (personally meaningful) judgements before being given one of the pieces of information. Participants were asked to write about the meaning of the piece before completing the measures again. Results indicate that there was no effect of the type of information on any of the ratings, but there was an effect of time on some of the ratings—with participants finding the works more powerful, personally meaningful, challenging, and marginally more interesting after writing about the meaning of the work. The authors suggest that these findings suggest that interpretative activity generally "enhances a viewer's relationship to an artwork in affective and cognitive dimensions", and are consistent with art appreciation requiring "the active construction of meaning rather than the mere selection of information". Forty-eight students participated in study 2: twenty-four artistically naïve students, and 24 experienced art students. Participants were presented with 24 figurative and rhetorical sculptures by two artists and asked to rate the sculptures on 7 main dimensions measuring affective (pleasure, expressive, and weak-powerful), cognitive (challenging, interesting and simple-complex) and contextual (socially relevant, personally meaningful) judgements. Participants were then provided with some information (descriptive information about physical features of the artwork, or stylistic information that related qualities of the work to evocative effects, or contextual information about its social meaning), and asked to rate the sculptures once again. The results indicate that there was a significant interaction between artistic style and rating time for six of the scales: with the rhetorical works becoming more expressive, interesting, challenging, socially relevant and personally meaningful than the figural works. Significant interactions were found between artistic training and artistic style on four scales: with naïve viewers judging the figurative art to be more powerful, complex and socially relevant, and artistically trained participants judgeing the rhetorical works to be more challenging, powerful, complex and socially relevant. Significant interactions were also found between the type of information given and rating for six of the scales: with descriptive information decreasing ratings on the affective (powerful and expressive) and cognitive (challenging and interesting) scales; contextual information having a general enhancing effect, particularly on the two scales related to meaning; and formalist information enhancing judgements on interestingness, but decreasing ratings of powerfulness and expressiveness. The authors conclude by suggesting that their findings show that the effect of contextual information on art appreciation depends on the particular aims of the artwork concerned.

Hekkert, P. & Van Wieringen, PCW. (1996). Beauty is in the Eye of the Expert and Nonexpert Beholders: A Study in the Appraisal of Art. *American Journal of Psychology*, 109, 3: 389-407.

This article contributes to the literature on the difference that expertise makes to aesthetic appreciation, with a particular focus on the importance of originality (a cognitive judgement) for experts. The authors motivate their study with an outline of previous studies that have examined the factors that bring about

differences in taste. They note, for example, that personality variables are only able to explain a small percentage of variance in preferences, and discuss a number of studies that suggest the art-related education and experience are among some of the most important factors. Sixty people participated in the study: 34 art experts and 26 non-experts. Experts were presented with 30 sets of slides of artists who had recently applied for a scholarship for artists starting out in their careers, covering both artists who failed and those who succeeded as well as a range of styles and media. Non-experts were presented with 26 sets. The sets were judged on 11 scales: simple-complex, static-dynamic, coherent-incoherent, absence of craftsmanship-craftmanship, poor in concept-rich in concept, lacking power of expression-power of expression, positive development-negative development, not-original-original, little personal affinity-strong personal affinity, uninteresting-interesting, and poor quality-good quality. The findings of the study are complex, but the principal finding was that originality was much more strongly correlated with judgements of quality in experts (r = .81) compared to non-experts (r = .40); and craftsmanship was more strongly correlated with judgements of quality for nonexperts (r = .97) than for the experts (r = .84). For the experts, three criteria—concept, craftsmanship, and originality—explained 96% of the variance of the quality judgements; whereas two criteria—craftsmanship and development—explained 97% of the variance of the non-experts.

Cupchik, GC. (1999). The Thinking-I and the Being-I in Psychology of the Arts. *Creativity Research Journal*, 12, 3: 165-173.

In this theoretical article, Cupchik designates two broad ways of creating and appreciating artworks. On the one hand, there is what he calls "Thinking-I"—which is about the work and concerns processes related to perception, cognition and reflection. On the other hand, there is what he calls "Being-I"—which is about the relation of the work to the self and is concerned with processes related to representation, unconscious dynamic processes and transcendence. Cupchik outlines a range of findings related to each of the processes that make up each of these overarching modes.

Millis, K. (2001). Making meaning brings pleasure: the influence of titles on aesthetic experiences. *Emotion*, 1: 320-329.

Millis seeks to examine the effect of information in the form of title on cognitive and emotional responses to art in three studies (the two most important are summarised here). Millis outlines two ways in which this might happen, depending on the nature of the title: (1) a descriptive title might disambiguate the represented content of a work in a way that makes it more coherent, (2) a metaphorical title might allow for elaboration of the meaning of the literal content of the work. Millis sought to test the impact of these types of title on aesthetic responses. One hundred and ten students participated in study 1. Participants were presented with 15 representational illustrations and photographs from books on art, design and photography, along with either descriptive titles—which literally described the content represented, elaborated titles—which provided an explanation or metaphorical interpretation of the content represented, or the title "untitled". Participants were asked to report how well they understood the meaning of the work (which was used as the measure of descriptive understanding), how much they enjoyed the artwork, how

interested they were in the artwork, to what extent the artwork elicited emotions, and to what extent the artwork elicited thoughts (collectively, these items were used as a measure of aesthetic experience). Results indicate that labelling the works with descriptive and elaborative titles increased the participants ratings of their understanding of the works relative to labelling the works "untitled", and elaborative titles increased understanding of illustrations relative to illustrations that were "untitled" or had descriptive titles. Elaborative titles also resulted in increased aesthetic experiences of works relative to works with descriptive titles or labelled "untitled". In a second study, Millis investigated whether elaborative titles increased aesthetic responses because it made the meaning of the participants' final representation of the work richer, or because it merely activated a greater number of associations. One hundred and two students participated in study 2. The procedure was similar to study 1: participants were asked to rate artworks with descriptive, elaborative or random titles. The main finding was that elaborative titles increased aesthetic responses relative to random and descriptive titles, but aesthetic responses to random and descriptive titles did not differ from one another. Millis suggests that this shows that the elaboration effect observed in study 1 is due to the coherence and richness of the participants' representation, rather than simply the number of concepts activated.

Lachapelle, R., Murray, D., & Neim, S. (2003). Aesthetic Understanding as Informed Experience: The Role of Knowledge in Our Art Viewing Experiences. *Journal of Aesthetic Education*, 37, 3: 78-98.

The authors outline and present evidence for a cognitive theory of art appreciation. According to the model presented, there are four main stages when approaching an artwork: the 'mediating knowledge' stage, 'objectified knowledge' stage, 'constructed knowledge' stage, and the 'reconstructed knowledge' stage. In the 'mediating knowledge' stage, art appreciators bring their previous experiences of art, knowledge of art, and assumptions about the function and nature of art to bear on their appreciation of the object. This knowledge structures the viewer's appreciation of a work, and may also hinder more direct appreciation. This stage determines whether viewers will be able to sustain and develop an aesthetic encounter with a work of art: those viewers with inadequate knowledge may find it difficult to 'access' the work, and their encounter with it may be truncated. In the 'objectified knowledge' stage, art appreciators try to discern a given work's content: the work's message, what the artists is trying to communicate or make people feel, why the artist has used the materials, structure, style and subject matter that feature in the work. In the 'constructed knowledge' stage, the art appreciator brings their 'mediated knowledge' and the 'objectified knowledge' of the work together to come up with a more complete personal response to the work. In the final "reconstructed knowledge" stage, art appreciators enrich their response to the artwork with scholarly study of the work, from art criticism, art history and aesthetics. This information may be provided by e.g. wall texts in the museum, guides, or written texts. In this stage, viewers are able to 'stand back' from their own initial and personal response to an artwork, reassess this, and see the work in a richer, clearer and ultimately often more satisfactory manner. The authors suggest that art appreciation often, and ideally, takes place in the order they outline, but may occur in different orders. To test their model, twenty-six participants took part in a qualitative study, 17 of which had university-level training in the visual arts. Participants asked to choose 2 reproduced works from a set of 12 reproductions,

which were each accompanied by 100 words of descriptive text. Participants were asked to appreciate the works for 5 minutes, and then record a 5-minute video in which they described the steps they took to explore and understand the work. Discourse analysis of responses using a coding manual developed from the theoretical model revealed 92% of participants began their exploration in the 'mediated', 'objectified' or 'constructed' stages, and 88% of participants engaged in the 'reconstructed' knowledge stage one or more times. The average number of units of constructed knowledge was 17, and the average number of reconstructed knowledge units was 8. The most common sequence of phases was "Constructed Knowledge-Reconstructed Knowledge-Constructed Knowledge". The authors observed that participants with a high level of expertise did not tend to enter the 'reconstructed knowledge' phase and relied less on external sources in their interpretations of the works selected.

Russell, PA. (2003). Effort after meaning and the hedonic value of paintings. *British Journal of Psychology*, 94: 99-110.

In this article, Russell seeks to extend work on the relationship between meaning and art appreciation in two studies. Drawing on a number of findings and theories about the way artworks function, Russell proposes that that some of the pleasure derived from looking at a painting stems from successfully interpreting it and "picking up the artist's message". Russell predicts that providing information about a painting should make paintings more meaningful and increase liking, particularly in the case of paintings where the *prima facie* meaningfulness is relatively low. This paper intends to make two principal contributions to the literature on the effect of providing information on aesthetic appreciation: Russell intends to examine the effect of providing meaning over and above that provided by titles; and whether such information doesn't just increase meaning, but also increases the pleasure of aesthetic appreciation. One hundred and twenty students participated in study 1. Participants were split into three groups: a group that received 12 abstract and semi-abstract paintings with no information, a group that received the same paintings with titles, and a group that received the same paintings with titles and 50 words of descriptive information about the paintings. Half of the participants in each of these groups rated the paintings for their pleasantness, with the other half rating the paintings for their meaningfulness. The main results indicate that the effect of the different amounts of information on meaningfulness approached significance (p=.08)—with more information making the painting more meaningful; and no effect of information on the pleasantness of the paintings. In addition, there was a significant interaction between the individual painting and information condition on meaning, which indicate that the effect of information on meaning varies depending on the painting—which Russell suggests may be the result of differences in the interpretational challenge posed by a painting or the effectiveness of the information provided. Russell also notes that the fact that the information affected the meaningfulness but not pleasantness of the paintings confirm earlier findings (such as those of Russell and Milne, 1997). In a second study, Russell sought to determine whether the lack of effect of information on meaningfulness could be due to response-strategies: in particular, Russell suggests that the null finding in study 1 might be due to participants making relative judgements (relative to the set they've been asked to judge), rather than absolute judgements. To overcome this, the second study pursued a within-subjects design, in which participants rated the paintings in all three information

conditions. Forty-five students participated in study 2. Participants either asked to rate paintings on their meaningfulness or pleasantness of each of the 12 paintings on two occasions: first with no information, and then with information or no information once again. The main findings were that information increased both the meaningfulness and pleasantness of the painting. Moreover, repeated viewing did not have any effect on the pleasantness ratings, which indicates that the effect of providing more information could not be explained in terms of mere exposure. Russell concludes by suggesting that within-subjects designs may be more sensitive to the effects of information, and how this might indicate the importance of individual context in determining the effect of providing information.

Leder, H., Belke, B., Oeberst, A., & Augustin, D. (2004). A model of aesthetic appreciation and aesthetic judgements. *British Journal of Psychology*, 95: 489-508.

This article presents an influential and widely cited psychological model of aesthetic appreciation, particularly as it concerns modern works of art and the "art-specific cognitive experiences that give art such a prominent position in human culture". In the first stage of the authors' model, the artwork is analysed perceptually: with the authors variously noting that aesthetic pleasure is determined by properties such as colour, clarity, symmetry, order, and complexity. The artwork is then processed according to implicit memories: with artworks that are familiar, more prototypical, and those that exaggerate the "essence of an object" being preferred. At the stage of explicit processing—which is deliberate and can be verbalised and concerns content and style—an individuals' responses to an artwork are increasingly affected by their expertise and knowledge. The authors propose that with increasing expertise, this stage of processing becomes increasingly concerned with the style, artist, art school, and visual effects and less with the literal representational content of an artwork. It is also noted that this knowledge might also affect implicit processes by, for example, influencing prototypes. In the cognitive mastering and evaluation stage, which is particularly important in the case of modern art, the individual is required to invest effort to engage in perceptual problem-solving using visual properties of the artwork and their knowledge to extract meaning. That is, the appreciation of modern art involves "loops of processing in which hypotheses concerning the meaning of an artwork are continuously altered and tested until a satisfactory result is achieved".

Smith, LF., & Smith, JK. (2006). "The nature and growth of aesthetic fluency." In P. Locher, C. Martindale, & L Dorfman (Eds.), *New directions in aesthetics, creativity and the arts* (Amityville, NY: Baywood), pp. 47-58.

In this book chapter, the authors outline the concept of what they call "aesthetic fluency" and an instrument for measuring it. The authors characterise the concept as follows: "Aesthetic fluency is the knowledge base concerning art that facilitates aesthetic experience in individuals". The authors propose that it can be acquired through direct instruction or through experience: by visiting art museums, reading books, visiting galleries and on the internet. At times, the authors characterise "aesthetic fluency" as a recognitional ability, at other times, they characterise it as a body of declarative knowledge—noting for example, that aesthetic fluency is "understanding what *chiaroscuoro* means *and* being able to spot its use in a painting". The authors liken the development of aesthetic

fluency to the development of vocabulary in children. The authors present an empirical study to explore the concept of aesthetic fluency. Four hundred patrons of the Metropolitan Museum of Art were asked to complete a survey which included items on demographic variables, training in art history, museum visitation, and "aesthetic fluency". The measure of aesthetic fluency consists of items asking participants how much they knew about artists, schools and styles of art such as Isamu Noguchi, Mary Cassatt, Gian Lorenzo Bernini, Fauvism, and Egyptian Funerary Stelae. The scale ran from "I have never heard of this artist or term" to "I can talk intelligently about this artist or idea in art". Factor analysis revealed a one-factor solution (with an eigenvalue of 5.27) and the 10-item scale had a Cronbach's alpha of .90. Regression analyses showed that the best predictor of aesthetic fluency was museum visitation, followed by training in art history and age, with these variables together having an R^2 of .54.

Landau, MJ., Greenberg, J., Solomon, S., Pyzsczynski, T., and Martens, A. (2006). Windows into nothingness: Terror Management, Meaninglessness, and Negative Reactions to Modern Art. *Journal of Personality and Social Psychology*, 90, 879-892.

This paper seeks to explore why it is the case that many people dislike meaningless art in four studies. The authors begin by highlighting a number of art theorists and empirical findings that show that people, and particularly artistically naïve people, do not like 'meaningless' paintings, and particularly those with impoverished subject matter. The authors propose that this aversion can in part be explained in terms of terror management theory. The authors outline the following logic: people defend against their awareness of the inevitability of death and reminders of their mortality by affirming their personal worth and significance, and the sense that the world is meaningful; mortality salience has been found to lead to a greater dislike for ambiguity and complexity in people with a greater personal need for simple and unambiguous structure; therefore, does mortality salience have any role in the dislike of 'meaningless' art (e.g. abstract and conceptual art)? In study 1, the authors propose that modern art is often disliked because it lacks meaning and thus is incompatible with the terror management-based desire to maintain a meaningful conception of reality; and so preference for modern art should be susceptible to mortality salience. Twenty-five students took part. Participants were either asked to write how they felt about what would happen after they died (mortality salience) or about an upcoming exam (control), and then rate how attractive they found two works of modern art. The results indicate that participants in the mortality salience condition found the art less attractive than those in the exam salience condition. In study 2, the authors sought to further extend these findings in two ways. First, they sought to establish whether differences in personal need for structure moderates the effect of mortality salience, with those high in personal need for structure disliking art especially after mortality salience. Second, they sought to establish that it was specifically the seemingly lack of meaning in modern art that is affected by mortality salience, rather than other aspects of art. Sixty-two students participated. All participants were asked to compete the Personal Need for Structure scale, and were then given either the mortality salience or control task, and asked to rank order examples of the following kinds of work by their preference: modern art, paintings that depict Christian themes (worldview consistent themes), paintings that depict non-Western iconography (themes that are not in mainstream American culture but are not inconsistent with it), and impressionistic landscape paintings (to distinguish stylistic departures from

realism from meaninglessness). The main results indicate that those high in PNS liked the modern paintings less, and morality salience decreased liking for modern painting for those high in PNS but not for those low in PNS. PNS and morality salience were not found to have any effect on liking for the other kinds of painting. The authors interpret this lattermost finding as suggesting that "meanings of various types are sufficient to diffuse the potential for the nonspecific threat of meaninglessness". In study 3, the authors sought to demonstrate whether imbuing modern art with meaning would attenuate the effect of morality-induced negative emotions. The authors suggest that this would show that the effect of morality salience is due to the perceived meaninglessness of modern art rather than its associations with elitism or pretentiousness. Ninety-five students participated. The procedure was similar to studies 1-2, with participants either being asked to rate how much they liked a modern painting with representational content and a modern painting which lacked representational content, with or without titles. The main results indicate that mortality salient high-PNS participants liked the untitled modern artwork with no representational content less than high-PNS participants in the control condition; and mortality salient high-PNS participants liked the untitled piece less than those who viewed the titled piece. There were no significant results for the modern painting with representational content. The authors interpret this as suggesting that only high-PNS participants' liking of 'meaningless' paintings was affected by mortality salience, and that this effect could be alleviated by giving those paintings meaning. In a final study, the authors sought to determine if the effect of morality salience on liking for meaningless art would be specific to chaotic and disordered—that is, visually meaningless—works, and whether the effect of mortality salience could be alleviated by making 'meaningless' paintings *personally* meaningful. The method was similar to studies 1-3, with participants also being assigned to an imagery condition in which they were asked to vividly imagine themselves in a chaotic world, or one in which everything makes sense. Participants were then asked to rate how much they liked a visually chaotic abstract painting (a Kandinsky) or an ordered abstract painting (an Albers). The main results indicate mortality-salient high-PNS participants who were asked to think about order liked the Kandinsky less than mortality-salient low-PNS participants who thought about order; and morality-salient, order-primed, high-PNS participants like the Kandinsky less than morality-salient, chaos-primed, high-PNS participants. There were no equivalent effects for the ordered piece. The authors interpret this pattern of results as suggesting that when people who need order are made to find personal meaning in an otherwise 'meaningless' painting, the effect of morality salience is mitigated. The authors close the paper by discussing whether denial of death, or the need for meaning, is the more fundamental psychological need; and includes speculations on the nature of art and meaning-making more generally.

Leder, H., Carbon, CC., & Ripsas, AL. (2006). Entitling art: Influence of title information on understanding and appreciation of paintings. *Acta Psychologica*, 121: 176-198.

This article contributes to the literature on the effect of presenting titles, focusing on the distinction between understanding and appreciating artworks, and the role of timing in moderating the effect of title. Based on Leder, Belke, Oeberst, and Augustin's (2004, see above) model of aesthetic appreciation, the authors predict that titles giving descriptive information should be effective at influencing people's aesthetic responses even when the artwork is available for a relatively

short time, whereas titles giving elaborative information should be effective at influencing people's aesthetic responses when the artwork is available for a sufficiently long period of time. Forty-eight students participated in study 1. Participants were asked to rate 48 abstract and representational paintings with regard to how well they thought they understood the artist's intention (understanding), how much personal meaning they found in the work (meaning), how much the work evoked their interest (interest), whether the work evoked emotions in them (emotions), and whether the artwork evoked thoughts in them (thoughts). The painting were either presented with no title, a descriptive title, or an elaborative title that explained the artwork or facilitated interpretation. The main results indicate that titles only had an effect on the understanding of abstract painting—with elaborative titles significantly increasing understanding of paintings compared to both descriptive titles and no title, and descriptive titles significantly improving understanding compared to no title. To examine the effect of duration of presentation, the authors conducted a further experiment. Forty-eight students took part. Participants were presented with 48 abstract paintings, with a mixture of descriptive titles (such as "Strokes of colour") and elaborative titles (such as "Speed of light") for 1 second or 10 seconds, and were asked to rate how much they liked and understood the paintings. The main results indicated that, with presentation times of 1s, the paintings were better understood with descriptive titles than elaborative titles (partial eta squared effect size=.19); but, with presentation times of 10s, the paintings were better understood with elaborative titles than descriptive titles (partial eta squared effect size=.18). Title had no effect on liking of the paintings in either timing condition. The authors interpet this as supporting Leder, Belke, Oeberst, and Augustin's (2004) model of aesthetic appreciation: at short presentation times, it was only possible for participants to accomplish the early stages of information processing (such as perceptual analysis and identifying content), and descriptive titles aided this; whereas with longer presentation times, participants were able to engage in higher-level processing—"cognitive mastering"—which was aided by the elaborative titles. (The findings in this paper were extended by Mullennix & Robinet (2018), "Art Expertise and the Processing of Titled Abstract Art" who obtained different results, and so readers are advised to refer to this paper).

Silvia, PJ. (2007). Knowledge-Based Assessment of Expertise in the Arts: Exploring Aesthetic Fluency. *Psychology of Aesthetic, Creativity and the Arts*, 1, 4: 247-249.

This article seeks to explore Smith and Smith's (2006) Aesthetic Fluency Scale, and in particular its relation to other constructs, such as personality constructs. Silvia notes that one of the advantages of this measure over other measures of expertise is that may be able to target what people know about art more precisely, rather than how much people like art or how good they are at making it. Two hundred and twenty-six students participated in the study reported. Silvia administered the Aesthetic Fluency Scale with items for two additional domains—a literary domain (that included items such as Carl Sandburg, The Black Mountain School and Beat Writing), and a decorative arts domain (which included items like Frank Lloyd Wright, Alvar Aalto, and Ludwig Miles van der Rohe). Silvia also administered measures of the Big Five, including the 60-item NEO Five Factor Inventory, the 50-item International Personality Item Pool Scale and the 10-item brief scale, as well as measures of fluid intelligence such as the Ravens progressive matrices. When Aesthetic Fluency was regressed onto the other measures, only Openness to Experience (*b*=.53) was a large predictor,

with extraversion, conscientiousness and gender being small predictors (*b*s of around .15).

Landau, MJ., Sullivan, D., & Solomon, S. (2010). On graves and graven images: a terror-management analysis of the psychological functions of art. *European Review of Social Psychology*: 21: 114-154.

In this review article, the authors present an account of the psychological function of artistic activity based on terror management theory. The authors suggest that art—understood, following the philosopher Anderson (1990) as that which encodes cultural meanings in a sensuous medium—"serve[s] to buffer death anxiety by transforming the meaning of death to make it less threatening, representing cultural beliefs and icons, and offering experiences that temporarily alleviate individuals' awareness of themselves as finite creatures". The authors provide a useful summary of research on terror management theory. The authors divide the literature into three broad kinds: (1) those articles examining the relationship between terror management and positive responses to art; (2) those articles examining the relationship between terror management and negative experiences of art; and (3) those articles examining the relationship between morality salience and creativity behaviour. Since some of the articles on (2) have already been covered elsewhere in this bibliography, I will focus on (1) and (3) here. With regard to (1), one of the ways that the authors suggest that artworks function to alleviate morality concerns is by providing "cathartic experiences that make death seem to be more than a brute biological fact". In support of this, they note findings by Goldenberg et al. (1999) which show that mortality salience made people appreciate tragic works more, but the same was not true of neutral works. The authors interpret this as demonstrating that tragic art provides a culturally sanctioned, cathartic but safe encounter with the idea of death. With regard to (3), the authors note that one way in which mortality concerns might be related creative behaviour is by decreasing the value of creativity in a certain way. Arendt et al. (1999) reason that people may shy away from creativity because creativity implies a shift towards individualism, but social connections provide a needed defence against thoughts of morality. Creativity may shift the balance too far in the direction of "standing out" rather than "fitting in", and so creativity should both give rise to guilt towards the collective, as well as undermining an important resource against mortality concerns. In testing some of these ideas, Arendt et al (1999) found that mortality salient people felt more guilty about their creative behaviour than people who were not mortality salient. The article closes with a discussion of whether the results outlined should be explained in terms of terror management theory, uncertainty management theory, or meaning maintenance theory.

Proulx, T., Heine, SJ., & Vohs, KD. (2010). When is the unfamiliar the uncanny? Meaning affirmation after exposure to absurdist literature, humor and art. *Personality and Social Psychology Bulletin*, 36, 6: 817-829.

This article contributes to the literature on the meaning maintenance model as it relates to art in three studies. According to the meaning maintenance model, following a meaning threat, people will affirm any meaning frameworks available to them, even if the content of the available meaning frameworks have nothing to do with the content of the meaning threat. The authors seek to determine whether absurdist art, literature and humour arouse an uncanny

feeling—which the authors characterise as a feeling of unfamiliarity arising in a familiar situation—and provoke compensatory affirmation efforts. The authors offer an interesting outline of what the uncanny is drawing on philosophers such as Kierkegaard, Camus, as well as thinkers such as Freud; as well as a discussion of an array of compensatory mechanisms following threats to meaning such as affirmation of social justice beliefs (Jost et al., 2004), affirmations of beliefs in a controlling supernatural power (e.g. Kay et al., 2008). Fifty-two students participated in study 1. Participants were asked to read an absurd parable with a paradoxical conclusion (by Kaska) or a meaningful parable with a sensible conclusion (by Aesop). Participants were then asked to complete a three item Cultural Identity Scale. The main results indicate that participants more strongly affirmed their cultural identity after reading the absurd parable, compared to those who read the meaningful parable (partial eta squared effect size=.13). To further examine the idea that the effect might depend on the stimulus being familiar but provoking feelings of unfamiliarity, two further experiments were conducted (only one of which will be summarised here). One hundred and twenty-four students participated. Participants were asked to contemplate either their own death, their preferences for different types of entertainment, or one of three works of art (which they were told they would be asked the meaning of): A landscape by Constable (familiar), an abstract work by De Kooning (simply unfamiliar), and an absurdist painting by Magritte (unfamiliar familiar). Participants were then asked to complete the Personal Need for Structure Scale (Thompson et al., 2001). The main results indicate that participants in the absurd art and reminders of death conditions reported significantly higher scores on the personal need for structure scale (partial eta squared effect size=.19).

Belke, B., Leder, H., Strobach, T., & Carbon, CC. (2010). Cognitive fluency: high-level processing dynamics in art appreciation. *Psychology of Aesthetics, Creativity and the Arts*, 4: 214-222.

In this article, the authors build on the literature on processing fluency—according to which aesthetic experience is in part a function of the fluency of the processing dynamics—by examining "higher-order processing fluency". The authors note that this kind of fluency depends on ease of meaning assignment, stimulus interpretation and cognitive evaluation, rather than the perceptual features of the stimulus such as figure-ground separation and symmetry; and that it may be especially important for the appreciation of modern and contemporary art, which often provokes processing of conceptual, complex, and ambiguous information. Based on the Winkielmann et al.'s (2003) studies, the authors examine the effect of manipulating higher cognitive fluency on art appreciation through semantic priming by presenting artworks with semantically related titles, semantically unrelated titles, and no titles. Twenty students participated in the study. Participants were asked to rate how much they liked 24 paintings (8 representational, 8 cubist and 8 abstract) on 3 occasions: once with a semantically-related title, once with a semantically-unrelated title and once with no title, totally 72 trials. The results indicated that title affected liking (partial eta squared effect size=.24)—with trials with semantically-related titles being preferred to trials with semantically-unrelated titles or no titles. The effect of titles on liking was also shown to depend on the kind of artwork presented: with title affecting liking for representational paintings (partial eta squared effect size =.21) and cubist paintings (partial eta squared size=.37) but not abstract paintings (partial eta squared effect size=.04). Overall, the authors conclude that

the semantic relation of titles to paintings was found to facilitate or inhibit processes related to the initial categorisation of and search for meaning in the paintings; and that aesthetic appreciation is partly grounded in higher-order processing dynamics.

Bordens, KE. (2010). Contextual information, artistic style and the perception of art. *Empirical Studies in the Arts*, 28: 111-130.

This article explores how contextual information about an artwork—including the historical circumstances in which it was produced—affects art appreciation. In motivating the study, Bordens notes that one reason why unconventional artworks such as Duchamp's 'Foundation' elicit a negative response from naïve viewers is because they lack knowledge about the historical context in which it was produced, and so may not be able to attach meaning to it, or indeed even identify it as an artwork. Two of the most important predictions Bordens makes for aesthetic cognitivism are: (1) providing information on the historical context for a style will increase how well examples of this style fit a person's concept of art, and therefore will increase liking for the work; (2) information about historical style will have the greatest effect on how well unconventional art styles match internal standards. One hundred and seventy-two students with little art training or experience of the arts participated. Participants were presented with four works of dada, impressionism, 'outsider' art, or art from the renaissance either with information about the historical context for the art (including several definitions of art, and a history of the origins, goals, and fate of the style), or information about art in general (including just the definitions of art). The participants rated each artwork in terms of how closely the artwork matched what they considered to be a work of art, how much they liked the work, 13 perceptual characteristics (dark/light, fast/slow, powerful/powerless, short/long, dry/wet, little/big, rich/poor, few/many, quiet/noisy, awful/nice, beautiful/ugly, interesting/uninteresting, and calming/stimulating), and expressive qualities (happy/sad, angry/calm, clear/confused, bored/excited). The paper contains a great number of interesting results concerning the effects of order and type of artwork on liking, category membership, perceptual and expressive properties. The main result concerning the effect of contextual information indicated that, contrary to Bordens' predictions, contextual information made the artworks match the participants' concept of art less than general information, and did not affect liking of the paintings. The authors consider various explanations of this, including the idea that providing concrete contextual information may have narrowed the participants' concept of art. Nonetheless, Bordens concludes that the results provide support for the idea that people like artworks that are more prototypical of art.

Jucker, JL., & Barrett., JL. (2011). Cognitive Constraints on the Visual Arts: An Empirical Study of the Role of Perceived Intentions in Appreciation Judgements. *Journal of Cognition and Culture*, 11: 115-136.

The authors of this article examine the nature of art from an anthropological and empirical perspective—arguing that works are intuitively processed as acts of non-verbal symbolic communication. In connection with this, the authors review a large amount of literature on the psychology of artefact categorisation. They note, for example, that the form and function of an objects are usually good indications that a given instance is of a particular kind; whereas the same is not

true of artworks, which do not usually have functions. Moreover, the authors draw on research by Bloom, Gelman and colleagues, showing that children are sensitive to the intentions of the creator in categorising objects; and Sperber and Wilson's Relevance Theory of communication—according to which to communicate is to make explicit an intention. On this basis, if artworks are means of communicating, then people should think that artworks will be expected to communicate something worth processing, and successful artworks will be those where the artist's intention can be successfully recovered from the art object. The authors test specific predictions suggested by this concept of art in one study. Five hundred and twenty-eight visitors to Tate Britain took part in the study. They were asked to rate 1 of 4 sets of 15 or 12 artworks (57 works in total), covering a range of styles, periods, and genres. Participants were asked to rate the images in terms of two of the following scales (1) liking, (2) familiarity, (3) effort (how much effort do you think went into making this work of art?), (4) skill, (5) intention (i) (how easy is it for you to understand what this work is about?), and (6) intention (ii) (how successfully do you think the artist was in conveying what this work is about?). The main results indicate that ratings of liking were significantly correlated with ratings of all other measures; and that a composite rating of 'deliberateness' which consisted of effort, skill, intention (i) and intention (ii) was a stronger predictor of liking than familiarity. (For further work in this vein, see e.g. Hawley-Dolan & Winner (2011), see below; and Jucker, JL., Barrett, JL., Wlodarksi, R. (2014). "I just don't get it": Perceived artists' intentions affect art evaluations. *Empirical Studies of the Arts*, 32, 2: 149-182.)

Pepperell, R. (2011). Connecting art and the brain: an artist's perspective on visual indeterminacy. *Frontiers in Human Neuroscience*, 5, 84: 1-12.

In this article, an artist who has collaborated with psychologists and neuroscientists working on art and aesthetics, discusses indeterminacy in the context of art, psychology and neuroscience, and interdisciplinary work between artists and scientists generally. Pepperell claims that visual indeterminacy tends to occur when viewers are presented with a seemingly meaningful stimulus that nonetheless denies easy and immediate identification. Pepperell offers an interesting outline of the use of perceptual indeterminacy in the history of art: including, for example, the case of Joseph Wright of the Derby's 'Experiment on a Bird in An Air Pump', which is rendered in perfect detail but contains a strange object floating in the a backlit jar prominently positioned in the foreground of the scene; and many of the paintings of Turner, and impressionist works. In discussing the role that visual indeterminacy plays in art, Pepperell cites the artist Gerhard Richter, who claims that a good picture "demonstrates the endless multiplicity of aspects, it takes away our certainty, because it deprives a thing of its meaning and its name. It shows us the thing in all the manifold significance and infinite variety and precludes the emergence of any single meaning or view". Pepperell offers a discussion of related perceptual phenomena that are studied in psychology—such as ambiguous images, illusions, and hidden figures—as well as visual agnosia. Finally, Pepperdell offers some reflections on his collaborations with scientists (as reported in Ishai et al., 2007), such as the fact that the longer it took for participants to rate an image—that is, the more they struggled—the more powerful the image was thought to be. (For the work on which the latter part of this paper is based, see

Ishai, A., Fairhall, SL., & Pepperell, R. (2007). Perception, Memory and Aesthetics of Indeterminate Art. *Brain Research Bulletin*, 73, 314-324.)

Hawley-Dolan, A., & Winner, E. (2011). Seeing the mind behind the art: People can distinguish Abstract Expressionist painting from highly similar paintings by children, chimps, monkey and elephants. *Psychological Science*, 22: 435-441.

> This article examines the question of whether people can tell the difference between visually similar abstract works created by artists, children, and animals, and if they can, how they justify their assessment. Seventy-two students participated: 40 non-art students and 32 art students. Thirty abstract expressionist paintings were paired with a visually similar work by a child or an animal. Ten pairs of paintings were presented without labels, followed by 20 pairs with an equal proportion of pairs with correct and incorrect labels. Participants were asked which they liked more, which they thought was better, and why in each case. Results indicate that in the case of both kinds of judgements, participants chose the work by an artist more often than the work by a child or animal. Looking at the groups of participants specifically, participants with art training were more likely to prefer and judge the works by artists as better, and naïve participants were more likely to prefer the works by children and artists but judge the professional works as better. Moreover, there was a significant interaction between labelling and participant group on judgements of the quality of the artworks—with correct labels only affecting the non-arts students. Finally, looking at the justifications, it was found that participants gave more mentalistic justifications for works by artists than those by humans and animals, and non-art students gave more mentalistic judgements (those framed in terms of the artist's skill, planning or intentions) for their quality judgements more than their preference judgements (with no such difference present for art students). Apart from the differences in expertise noted, one important aspect of this study for aesthetic cognitivism is that one important reason why participants thought works were better was because they were products of the intentions of the artist: "they perceived more "mind" behind the artists' images". (For further work in this vein, see Nissel, J., Hawley-Dolan, A., & Winner, E. (2016). Can Young Children Distinguish Abstract Expressionist Art From Superficially Similar Works by Preschoolers and Animals? *Journal of Cognition and Development*, 17, 1: 18-29.)

Moore, KM. & West, AN. (2012). Global Perception, Meaning, and Aesthetic Appreciation. *Empirical Studies of the Arts*, 30, 1: 23-38.

> This article contributes to the literature on the relationship between meaningfulness and the appreciation of art. The authors motivate the study by giving an overview of a range of findings that are relevant to the factors that determine our preferences for art—including prototypicality, meaningfulness and style of art. Based on studies suggesting that people can identify the broad characteristics or 'meaningfulness' of natural scenes such as naturalness using coarse-grained information (which is processed even at very short exposures), and the findings that meaning is a strong determinant of liking, and liking can arise quickly in response to visual images, the authors predicted that meaningfulness would still be the best predictor of preference even when only coarse-grained information is available. Forty students participated. Participants were asked to rate 40 paintings—10 works of romanticism, impressionism,

cubism and abstract impressionism—in terms of their meaningfulness, complexity, variety, preference, and unity. Participants were assigned to four conditions, which differed in terms of the amount of high frequency information that was removed. The main results indicate that meaningfulness was the strongest predictor of preference, even when only low-frequency information was present.

Bullot, NJ., & Reber, R. (2013). The artful mind meets art history: Towards a psycho-historical framework for the science of art appreciation. *Behavioral and Brain Sciences*, 36-123-180.

In this article, the authors seek to bring about a rapprochement between psychological and historical approaches to studying the appreciation of art. The authors offer a summary of research in the psychology of art and aesthetics and the history of art, and of the tensions between them. They note, for example, that some psychologists, such as Martindale (1990) and Pinker (2002), have suggested that artistic appreciation can be understood in terms of ahistorical laws; whereas some art historians and philosophers have argued that "historical and societal contingencies play an essential role in the production and in the appreciation of particular artifacts as works of art". They offer an account of three modes of aesthetic appreciation: 'basic exposure' to an artwork, the artistic design stance, and artistic understanding. Basic exposure refers to the set of mental processes that are triggered by perceptual exploration of a work without any knowledge of its art-historical context: these can include the elicitation of emotions and mind-reading of fictional characters. The artistic design stance, which the authors claim is a prerequisite for artistic understanding, is an attitude whereby appreciators develop their sensitivity to art-historical contexts by learning about how artworks are made, what functions they perform, and facts about their authors, such as their intentions. The authors identify a number of empirical papers which, to their mind, successfully bring together the two perspectives, and make a number of recommendations as to how empirical studies should be designed in the future. The authors suggest that the processing fluency account of aesthetic pleasure can be modified to accommodate this kind of knowledge-based appreciation. The authors note, for example, that by adopting the artistic stance, we may overcome otherwise disfluent aspects of an artwork, or we may treat disfluency as a cue that we need to elaborate on our processing of the artwork in a way that generates meaning. (Like all articles in Behavioral and Brain Sciences, the article is followed by a large number of short commentaries, in this case from scholars working in psychology, philosophy, art history and anthropology, as well as a response from the authors themselves).

Leder, H., & Nadal, M. (2014). Ten years of a model of aesthetic appreciation and aesthetic judgements: The aesthetic episode—developments and challenges in empirical aesthetics. *British Journal of Psychology*, 105: 443-464.

In this article, the authors seek to build upon Leder, Belke, Oeberst and Augustin (2004) by updating the model and addressing conceptual issues such as the relation between art and aesthetics, the relationship between traditional and conceptual art, and what makes an experience aesthetic. Their update of the model particularly concerns (1) the time-course of the aesthetic episode, (2) the inter-relation of cognitive and aesthetic processes, and to a lesser extent (3) the relative role of style and content in the appreciation of art. Concerning (1) they note that studies suggest that the representational content of a painting is

processed even with 10ms presentations, and style with presentations of 50ms, but that the median time spent in front of a painting is 17 or 11 seconds (depending on the study). They propose that this suggests that aesthetic experiences may involve "cycles of feedback and feedforward influence among processes related to perception, cognition and emotion". Concerning (3), the authors point out a number of findings, including evidence that experts' initial emotional responses—as indicated by facial EMG—was not reflected in their summary evaluations. The authors also highlight a number of areas which they anticipate will increasingly be the focus of research in empirical aesthetics over the next decade, including the importance of context, the neural foundations of art appreciation, and the evolutionary foundations of art and aesthetic experience.

Newman, GE., Bartels, DM., & Smith, RK. (2014). Are artworks more like people than artifacts? Individual concepts and their extensions. *Topics in Cognitive Science*, 6: 647-662.

This paper examines the question of how artworks differ from artifacts. The authors note that, unlike artefact concepts such as HAMMER, our concept of ART is similar to the concept PERSON in being dualistic. Just as people do not think that a molecule-for-molecule copy of a person is the same person (provided the original person is destroyed on copying), people do not think that a molecule-for-molecule copy of an artwork is the same artwork. But people do tend to think that a molecule-by-molecule copy of a hammer would be the same hammer. In the case of both persons and artworks, and unlike artifacts such as hammers, the same physical stuff is important in conferring continuity. In two studies, the authors further examine how determining the continuity of an artwork differs from determining the continuity of an artefact: they hypothesise that "observers may place special emphasis on original artwork, because the original is thought to physically contain some part of the person who created it (which cannot be duplicated)." Thirty-seven students participated in study one. Students were asked whether an identical replica of a tool or sculpture that had been destroyed after replicating was the same object. To test the idea that artworks might, unlike artifact objects, be thought to be imbued with the essence of its creator, the vignettes also included information about whether the identical replica had been made by the same person as the original or a different person. The results indicate that there was a significant effect of kind of object on continuity judgements—with replicas of tools being more strongly judged to be identical with their originals than replicas of sculptures. There was also a partially significant interaction between object type and creator—with duplicate sculptures that are created by the same person as the originals being more strongly judged to be identical than duplicates created by a different person. The same interaction was not present for artifacts. Three-hundred and three adults took part in study 2. Participants were shown a picture of a painting, told that it had been duplicated (with the original destroyed), and given three pieces of additional information: its creator was either physically involved with its creation or gave instruction to others (degree of imbuement); its creator had either put a lot of thought into its production or used another person's design (degree of creativity of creator); its creator considered it to be his finest achievement, or it was a commission (personal involvement). Participants were asked to what extent the duplicate was the original and were asked to justify their responses. The results indicate that the only manipulation to be significant was the degree of imbuement. The

authors note that the justifications provided by participants included statements such as ‘art is a manifestation of the soul’.

Leder, H., Gerger, G., Brieber, D., & Schwarz, N. (2014). What makes an art expert? Emotion and evaluation in art appreciation. *Cognition & Emotion*, 6: 1137-1147.

In this article, the authors examine some of the differences in how art experts and artistically naïve people respond to artworks. In motivating the study reported, the authors note that Leder, Belke, Oeberst, & Augustin (2004) propose that lay viewers rely heavily on their gut responses in evaluating artworks; and previous work on the strength of the intercorrelations among emotional and cognitive variables involved in aesthetic appreciation decreases with expertise. The authors seek to understand the cognitive and emotional changes that occur with the acquisition of expertise. They propose that those more frequently exposed to art may be less responsive to artworks’ direct affective valence than lay-people and that this may extend to other emotionally-charged stimuli. Sixty-two students participated: 18 in the low expertise group, 18 in the middle expertise group, and 20 in the high expertise group. Participants were presented with 64 artworks (32 positively valenced, and 32 negatively valenced) and 40 International Affective Pictures Set pictures (20 positively valence and 20 negatively valenced pictures of events, people and objects). Participants were presented with these images and asked how much they liked the paintings, how positive or negative the IAPS images made them feel, and how familiar and positively or negatively valenced the paintings were. Facial EMG was used to record activity in the *M. zygomaticus major* (the “smiling muscle”), and *M. corrugator supercilii* (the “frowing muscle”). The main results are as follows. For the IAPS images, there was a significant interaction between expertise, time of recording and valence (partial eta squared=.11)—with corrugator (frowning) activity being slightly lower for art experts for negatively valenced IAPS images, but no effect of expertise for positively valenced IAPS images. By contrast, there was no effect of expertise on zygomaticus activity for either positively or negatively valenced images. In the case of the artworks, there was a significant interaction between valence and expertise (partial eta squared=0.2)—with corrugator activity being less strong for art experts in response to negatively valenced works (indicated a less negative response) and stronger in response to positively-valenced works. By contrast, there was no effect of expertise on corrugator activity. While expertise had no effect on ratings of the IAPS images, there was a marginally significant interaction between valence and expertise for ratings of the paintings (partial eta squared=.11)—with participants with higher expertise feeling less positive in response to the positively-valenced artworks and more positive in response to the negatively-valenced artworks. For the liking rating, there was a significant interaction between valence and expertise (partial eta-squared effect size=.17)—with those with expertise liking the negative-valenced artworks more than those low in expertise (but no differences for positively-valenced artworks). The authors conclude by suggesting that the results generally show that experts attenuate their emotional responses more than lay people to both art and non-art stimuli. They suggest that this might be the result of the expectations of art experts—art experts are more likely to expect and be accustomed to negatively valenced artworks; or higher-order cognitive processes—experts might focus more on the execution rather than the content. To explain the diminished responses to the negative IAPS images, they also suggest that this detached frame of mind might also extend beyond art to visual

stimuli in general. (For more work in this vein, with slightly different results, see, Wagner, A., Menninghaus, W., Hanich, J., & Jacobsen, T. (2014). Art Schema Effects on Affective Experience: The Case of Disgusting Images. *Psychology of Aesthetics, Creativity and the Arts*, 8, 2: 120-129.)

Gerger, G., & Leder, H. (2015). Titles change the aesthetic appreciations of paintings. *Frontiers in human neuroscience*, 9: 464.

The authors highlight two models by which titles might affect aesthetic appreciation of a work: (1) by increasing the fluency with which a work is processed: with higher ease of processing "through semantic match or reduced mental effort lead[ing] to positive affect"; or (2) by increasing cognitive effort and "dis-fluency" by making appreciation "an effortful process toward classification, understanding, and from a transition of a state of initial ambiguity and uncertainty toward a state of increased predictability and certainty". The authors note that the different models for the influence of titles might vary as a function of the kind of artwork concerned: artwork-title matching may be less important in appreciating more modern art. Given the complexity of the models and the potential relations between them, the authors don't make strong predictions. Thirty-nine students participated. Each participant was presented with 63 representational, semi-abstract and abstract works with different kinds of title—semantically matching (fluent), semantically non-matching (dis-fluent) and an "untitled" condition (control). Participants were asked how much they liked and how interesting they found the paintings, as well as having their facial muscle activation (*M. corrugator supercilia*—the "frowing muscle," and *M. zygomaticus major*—the "smiling muscle") recorded. Results indicate that titles increased liking (partial eta squared effect size=.08)—with matching titles leading to greater liking than non-matching titles, and a partially significant trend for "untitled" leading to higher liking than non-matching titles. Looking specifically at the different kinds of art, the effect of title was only significant for liking of the abstract painting, but not the representational or semi-abstract works. There was no effect of title on interest. Partially reflecting these self-report measures: titles had a significant effect on *M. corrugator supercilii* activation (partial eta squared effect size=.23)—with non-matching titles leading to stronger activation; and titles had an effect on *M. Zygomaticus major* activation in the later stages of participants' aesthetic appreciation of the works (partial eta squared effect size = .026)—with matching titles leading to significant more activation than non-matching titles. Overall, the authors interpret these findings as showing that high levels of dis-fluency and cognitive effort reduce liking; and that fluency as well as moderate levels of effort contribute to more positive aesthetic experiences.

Snapper, L., Oranç, C., Hawley-Dolan, H., Nissel, J., & Winner, E. (2015). Your kid could not have done that: Even untrained observers can discern intentionality and structure in abstract expressionist art. *Cognition*, 137: 154-165.

This article builds on the literature on the role that perceptions of intentionality and "mindedness" play in appreciation of abstract art in three studies. In motivating the studies reported here, they draw on Kirk and Varnedoe (2006), who characterise abstract works (like all artworks) as "vessels of human intention" that "generate meaning before naming"—that is, "non-representational meanings—e.g. energy, space, depth, repetition, serenity,

discord". The authors include a helpful outline of the literature on the role of intentionality in the value, meaning and nature of art. One of the questions that the authors seek to answer in this set of studies is: "what is it that tells those with no training in looking at abstract expressionism that they are in the presence of a work by an artist rather than a work by a child or animal?" Based on the art historian Claude Cernuschi's (1997) analysis of abstract expressionist paintings in terms of their structure, their metaphorical meanings, and the effect they have on viewers, the authors hypothesise that six characteristics might distinguish works by artists from works by children: (1) degree of visual structure, (2) intentionality, (3) relative importance of negative space (i.e. space that seems deliberate and important in its own right); (4) a sense of harmony or conflict (which the authors call metaphorical meaning), (5) capacity to inspire and elevate, and (6) the extent to which the artwork communicates. One hundred and seventy-three participants who were either not at all or only a little familiar with abstract expressionism took part in an online study through MTurk. Participants were presented with the 60 paintings by artists, children and animals used in Hawley-Dolan and Winner (2011)—though participants were not informed who the artists were. Participants were assigned to one of 6 conditions, in which they were asked to rate a scale relating to the one of the 6 aforementioned characteristics. The main results indicate that ratings of intentionality and structure were significantly higher for works of artists compared to works by children and animals (Cohen's *d* effect sizes=.96 and 1.26 respectively). Comparing the results of the studies reported in this article to those in their previous published work, the authors also found that those artworks that were easily recognisable as being by artists, and those works by children and animals that were easy to mistake as being by artists tended to be higher in structure and intentionality. (For complementary work on the folk concept of art, informed by philosophical theories of art, see Pignocchi, A. (2014). The intuitive concept of art. *Philosophical Psychology*, 27, 3: 425-444; empirical work on this issue is summarised in Meskin, A., Robson, J., Ichino, A., Goffin, K., & Monseré, A. (2018). Philosophical Aesthetics and Cognitive Science. *WIREs Cognitive Science*, 9, 1: e1445.)

Ostrofsky, J., & Shobe, E. (2015). The Relationship Between Need for Cognitive Closure and the Appreciation, Understanding, and Viewing Times of Realistic and Nonrealistic Figurative Paintings. *Empirical Studies of the Arts*, 33, 1: 106-113.

This paper contributes to the literature that examine the relationship between the need for cognitive closure—a trait characterised by a preference for order and predictability, decisiveness in information processing, and intolerance of ambiguity—and the appreciation of abstract works of art. Fifty-eight students participated. They were presented with 12 images of realistic paintings (including realist, mannerist, and baroque works) and 12 images of non-realistic paintings (including surrealist, cubist and modernist works), and asked to indicate (1) how much they liked the painting, (2) the degree to which they thought that they had understood the paintings, and (3) how confident they were that they had seen the paintings before. Participants were also asked to complete Webster and Kruglanski's (1994) Need for Closure Scale. The main results indicate that the need for cognitive closure was significantly associated with participants reported degree of understanding and liking of, and time spent looking at, non-realistic works (but not-realistic works)—with those higher in the need for closure understanding and liking the non-realistic works less

(Pearson's correlation co-efficients *r*=-.41 and -.43 respectively) and spending less time looking at the works (*r*=-.29). Based on the fact that viewing time was positively related to understanding, and understanding with liking, the authors suggest that these findings (correlational though they are), suggest that people who are high in the need for closure do not like unrealistic works because they do not take sufficient time to understand them. (For similar work in this vein, see Wiersema, DV., van der Schalk, J., & van Kleef, GA. (2012). Who's afraid of red, yellow and blue? Need for cognitive closure predicts aesthetic preferences. *Psychology of Aesthetics, Creativity, and the Arts*, 6: 168-174.)

Kreuzbauer, R., & Keller, J. (2017). The Authenticity of Cultural Products: A Psychological Perspective. *Current Directions in Psychological Science*, 26, 5: 417-421.

In this theoretical article, the authors offer a psychological account of what makes cultural products—including works of art. The authors include a brief discussion of the distinction between authenticity and originality. Principally using the example of authentic food, the authors propose that authenticity is a matter of "truth-seeking"—something is authentic if: it represents its object, there is what the authors call "agency control over knowledge extraction and transformation" and the reproduction doesn't deviate from that the relevant cultural knowledge related to its production.

Mullennix, JW., Pilot, KM., Steeves, TA., & Burns, JC. (2018). The Effects of Cognitive Load on Judgments of Titled Visual Art. *Psychology of Aesthetics, Creativity, and the Art*, 12, 2: 166-176.

This article contributes to the literature on the role of cognition in art appreciation, and specifically research on the effect of providing information on different aspects of art appreciation. The articles main contribution lies in the way it uses a paradigm from cognitive psychology to cast light on the issue. In motivating their study, the authors note that much of the theoretical work on aesthetic appreciation in psychology propose a dual-process model (e.g. Belke, Leder, Strobach, & Carbon, 2010; Graf & Landwehr, 2015; and Leder, Belke, Oeberst & Augustin, 2004): aesthetic appreciation is driven by a set of implicit, automatic, low effort, rapid processes which do not compete for mental resources (often termed system 1 processes) and a set of conscious, controlled, high effort, analytic processes which compete for mental resources (often termed system 2 processes). The motivating sections of the article also include a brief discussion of different senses of what understanding an artwork means, which may be particularly relevant to aesthetic cognitivism. The authors reason that since system two processes compete for mental resources, any judgements that rely on these processes will be affected by a task which uses these resources, whereas any judgements that involve system one processes, which do not compete for mental resources, will not be similarly affected. One hundred and eight students participated. Participants were presented with 24 paintings (20 of which were used by Leder et al., 2006), and asked to rate how much they liked and understood the paintings. Participants were either asked to rate the images while trying to remember 8 letters of the alphabet they were shown immediately prior to each trial (preload condition), or with no memory task (non-preload condition). Half of the paintings were given with a descriptive title and half with an elaborative title. Participants were either presented with the paintings for 1 second, 5 seconds, 10 seconds, or 15 seconds. The main results indicated that

preloading affected judgments—with ratings of both understanding and liking lower under preload conditions (partially significant in both cases, $p = .075$, and .054 respectively, and partial eta squared effect sizes of .03 and .04 respectively). There was also an effect of title type on understanding (partial eta squared effect size=.09)—with paintings with descriptive titles understood more. In discussing the data, the authors note that the findings were not what was expected. While the results for understanding judgements are consistent with understanding being driven by "higher level cognitive mastering and evaluation processes", the authors did not expect the paintings to be more liked under preload conditions. One possible explanation that the authors tentatively suggest for the latter finding is that when viewer are put in a state of heightened attentional focus, they are better able to focus on those aspects of the artwork that generate pleasure and interest. (For a more controversial article on the influence of titles on appreciation of art—and in particular meaning-making of a sort—see, Turpin, MH., Walker, AC., Kara-Yakoubian, M., Gabert, NN., Fugelsang, JA., & Stolz, JA. (2019). Bullshit makes the art grow profounder. *Judgement and Decision Making*, 14, 6: 658-670).

Chamberlain, R., Mullin, C., Scheerlinck, B., & Wagemans, J. (2018). Putting the Art in Artificial: Aesthetic Responses to Computer-Generated Art. *Psychology of Aesthetics, Creativity and the Arts*, 12, 2: 177-192.

This article contributes to the literature on why people value art. Building on findings such as those of Mofatt and Kelly (2006), Hawley-Dolan and Winner (2011), and Snapper, Oranç, Hawley-Dolan, Nissel, and Winner (2015), which suggest that participants preferred the art of artists because they perceived mind or soul behind the art, this article examined how knowing that a work is produced by a computer influences appreciation. Sixty-five individuals took part in study 1: twenty art-educated participants, and 45 non-arts-educated participants. Participants were shown 60 images of paintings: 30 computer-generated artworks (15 representational, 15 abstract), and 30 artworks produced by humans (15 representational, 15 abstract) that were matched for method of production and content. Participants were assigned to two conditions: a "rate first" condition, in which they first reported how much they liked each work before indicating whether they thought that it was manmade or computer generated; and a "categorize first" condition in which the order of judgements was switched. Participants were also asked to provide free responses in which they were asked to justify their responses. The main results revealed that categorisation affected liking (partial eta squared effect size=.3)—with artworks judged as having been made by humans being preferred to those judged as having been made by a computer—and this was not affected by order or the expertise of the participant. In contrast to the previous findings—such as those of Hawley-Dolan and Winner—justifications for categorisation mentioned intentionality rarely, and tended to focus instead on surface and structural content. In discussing these findings the authors note that, in contrast to studies such as those of Kirk et al. (2009) and Moffat and Kelly (2006), there was no bias against computer generated art (as indicated by the fact that order did not affect liking). In a second study, three hundred and forty-nine participants took part: 145 participants were asked to rate the aesthetic quality of portraits produced by robot artists (which seem to have their own distinctive artistic style, and mimic the behaviours of a portrait artist by looking at the subject and pausing) after observing these robots 'at work', 97 participants were asked to rate the drawings after being told that

they were produced by robots (and given information about how they work), and 107 participants were not given any information about how the drawings were produced. An overall aesthetic quality rating was calculated from the ratings of "like drawings", "fetch money", "visually pleasing", "clear intentions", "time and effort", "appreciated", "hand-crafted", "willing to pay", "interesting", "objective quality", "creative", and "thought provoking". Participants in the interaction condition were given additional questions to measure their thoughts about the robot artists—including whether the robots were "human-like", "conscious", "life-like", "moving elegantly", "intelligent", "drawing from observation", "individual style", "robots creative", and "robots authors". The main results indicate that there was a significant effect of condition on judgements of aesthetic quality (partial eta squared effect size=.20)—with participants in the no-information condition judging the paintings to be aesthetically better than those in the source condition, and those in the interaction condition judging the paintings to be aesthetically better than those in both the source and no information condition. Analysis of the additional data collected about the perceptions of those in the interaction condition indicated that aesthetic quality tended to correlate with ratings of what the authors label anthropomorphism (composed of ratings of being "human like", "conscious", "life-like", "moving elegantly", and "intelligent", Pearson's correlation co-efficient r =.35), "robots creative" (r=.51), "robots authors" (r=.36), and "drawing from observation" (r=.25). In their discussion, the authors suggest that these findings suggest that the expression of human capacities affects the perceived quality of an artwork. In the more specific case of robot art, they note that their data indicates that even interacting with the artworks did not make participants believe that the robots were creative or authors of their works—where creativity has been shown to be an important determinant of aesthetic value (Newman & Bloom, 2012).

Bimler, DL., Snellock, M., & Paramei, GV. (2019). Art expertise in contrueing meaning of representational and abstract works. *Acta Psychologica*, 192: 11-22.

This article examines the influence of expertise on meaning generation in aesthetic appreciation. In motivating the study presented, the author discuss a number of ways in which art experts and artistically naïve differ in their appreciation of artworks with a particular focus on differences in abstract and representational works. They note for example, that existing findings suggest that art experts focus on non-denotive sensory qualities and higher-order semantic properties of artworks. To explore further how experts and non-experts respond to abstract and representational works, the authors presented sixty-three participants (30 fine art students and 34 artistically naïve students) with 12 abstract and 12 representational works, and asked them to judge them in terms of how boring-interesting, ugly-beautiful, annoying-pleasing, uninformative-informative, cool-warm, and naïve-sophisticated. The authors perform an extremely large number of analyses, but their main finding is that art experts tended to appraise both kinds of artworks in a similar manner—focusing on their collative (informational) properties.

Van Hedger, Nusbaum, HC., Heald, SLM., Huang, A., Kotabe, HP., & Berman, MG. (2019). The Aesthetic Preference for Nature Sounds Depends on Sound Object Recognition. *Cognitive Science*, 43, e12734.

This paper explores whether the aesthetic preference for nature sounds is the result of intrinsic auditory features of the natural environment, as might be expected if our preference for the nature developed by evolution by natural selection, or the result of acquired associations with the concept of nature—that is, by knowledge of what those sounds are. In study 2a, one hundred and forty-nine participants were asked to either rate their preference for natural or urban soundscapes that had either been unaltered or altered in a way that preserved the soundscapes spectral properties while making identification of the nature of the soundscape difficult. The results indicate that there was a main effect of nature of soundscape on preference—with natural soundscapes being preferred—and importantly, a significant interaction between the nature of the soundscape and whether the soundscape was altered or unaltered—with natural soundscapes being preferred where the soundscape was unaltered, but not where the soundscape was altered so that it could not be recognised as such. In study 3b, forty-eight participants were asked to rate whether they thought 75 computer-generated soundscapes were either from a natural or urban environment and how much they like the soundscapes. The results indicate that sounds that were rated as natural were liked considerably more than the same sounds when rated as being urban. The authors conclude that the aesthetic preference for natural sounds is due to its conceptual associations, rather than its aural properties per se.

Atari, M., Afhami, R., & Mohammadi-Zarghan, S. (2020). Aesthetic Fluency: The Roles of Personality, Nature Relatedness and Art Activities. *Psychology of Aesthetics, Creativity and the Arts*, 14, 1: 125-131.

The authors of this article seek build on the work of Silva (2007) to explore Smith and Smith's (2006) aesthetic fluency scale further, and in particular its relationship with other constructs related to aesthetic appreciation and personality. Two hundred and fifty-three students in Iran participated in the study, with 69% studying art-related fields. Participants were asked to complete the Aesthetic Fluency scale with additional items that were specific to the Iranian context, the Nature-Relatedness scale, and the Ten Item Personality Inventory to measure the Big Five. The main results were that Openness to Experience and Nature Relatedness were correlated with Aesthetic Fluency (*r*s = .21 and .17 respectively), though a regression analysis indicated that nature relatedness was not a significant predictor of Aesthetic Fluency once Openness to Experience, demographic variables, and art activities were taken into account. In a mediation analysis, the authors also demonstrated that the art-related activities partially mediated the relationship between Openness to Experience and Aesthetic Fluency. Unlike Silvia (2007) the authors found that having an art major was significantly related to aesthetic fluency.

Dolese, MJ., & Kozbelt, A. (2020). Communication and Meaning-Making Are Central to Understanding Aesthetic Response in Any Context. *Frontiers in Psychology*, 11, 473.

The authors of this theoretical article argue that the arts provide affordances to find meaning and involve communicative processes. The authors note that we interact with art objects with an implicit awareness that they were created by other people. The authors highlight that an important question guiding research on art is how to characterise the nature of artistic communication. They propose that Gricean maxims not only govern everyday acts of communication, but also

govern artistic communication. The authors outline Grice's four conversation maxims which, when satisfied, allow meaningful communication between co-operative parties: quality (be truthful), quantity (be informative), relation (be relevant), and manner (be clear). The authors suggest that artworks can be thought of as a conversation between the creator of the art and their audience, where the Gricean maxims should be understood in the artistic context in the following manner: quality can be understood as the artist's sincerity and skill in expression; relation as the sense that an artwork is relevant to one's experience; quantity as conveying an appropriate level of visual complexity; and manner as the compositional and stylistic aspects of a work that convey intended meaning. The authors then go on to trace a number of implications of this framework for practically enhancing aesthetic communication: For example, the authors suggest that making an artwork's manner of communicating clearer with information about the work will provide "common ground" and allow help viewers to "get" the work. The authors also suggest that displaying artworks that are relevant to people, and particularly diverse groups of people, will help less frequent museum-goers to engage.

Studies on Creativity, Art, and Aesthetic Appreciation

Pérez-Fabello, MJ., & Campos, A. (2011). Dissociative Experiences and Creativity in Fine Arts Students. *Creativity Research Journal*, 23, 1: 38-41.

This article contributes to the literature on the relationship between personality and creativity by examining the relationship between the tendency to have dissociative experiences and creativity. The authors provide a pithy summary of the literature on the relationship between psychopathology and creativity. In motivating the study reported here, the authors note that a relationship between dissociative experiences and creativity might be expected given that the former involves a full commitment of cognitive recourses, less susceptibility to external distractions, and loss of reality and critical thinking—all of which seem likely to aid in creative endeavours. One hundred and thirty-two fine arts students participated in the study reported here. Participants were administered with the Creative Imagination Scale (Wilson & Barber, 1978)—which measures how like reality certain imagined experiences are; the Dissociative Experience Scale (Bernstein & Putnam, 1986)—which includes items on having no memory of important past events (autobiographical amnesia), finding familiar places strange and unfamiliar (derealisation), feeling as if one's body is not one's own (depersonalisation), becoming so absorbed in TV or movies that one is aware of one's surroundings (absorption), and feeling as if one is two different people (identity alteration); and the Creative Experiences Questionnaire (Merckelbach, Horselenberg & Muris, 2001)—which measures proneness to fantasy and daydreaming. The main results indicate that there was a significant association between creative imagination and the tendency to have dissociative experiences (Pearson's correlation coefficient r=.31), and between creative experiences and dissociative experiences (r=.56). In discussing these findings, the authors suggest that dissociation may facilitate "temporary healthy flights to alternative universes and a degree of commitment that enhances optimum performance". (For more work on the relationship between trait absorption and participation and interest in the arts, see, Cameron Wild, T., Kuiken, D., & Schopflocher, D. (1995). The Role of Absorption in Experiential Involvement. *Journal of Personality and Social Psychology*, 69, 3: 569-579.)

Abdulla, AM., Hyeon Paek, S., Cramond, B., & Runco, MA. (2020). Problem Finding and Creativity: A Meta-Analytic Review. *Psychology of Aesthetics, Creativity and the Arts*, 14, 1: 3-14.

> This meta-analysis examines studies on the relationship between problem finding and creativity across a 55-year period (from 1960-2015). The authors highlight that theoretical reasons for examining the relationship between problem finding and creativity include the fact that real-world problems are often ill-defined and require creativity to formulate, and creativity requires sensitivity to deficiencies and gaps in order for the need for creative solutions to arise. The meta-analysis includes 40 studies and 6,649 participants. The results indicate that the relationship between problem finding and creativity was small (Pearson's correlation co-efficient r=.22), with a great deal of heterogeneity, suggesting that moderating variables are important. Effect sizes varied by age, divergent thinking indices (which were included as measures of creativity), and problem finding domain. In the case of divergent thinking indices, problem finding was found to be more highly correlated with fluency (r=.31), and originality (r=.29) compared with flexibility. The authors suggest that problem finding tasks might elicit more free association of ideas in virtue of being more interesting and ill-structured. In the case of problem finding domain, the authors note that problem finding tended to be more highly correlated with creativity when problem finding was assessed in the writing domain (r=.36) than when assessed in art (r=.2), science and maths (r=.16) and social and humanities (r=.09) domains. Finally, in the case of age, the relationship between problem finding and creativity was higher in children (r=.3) than adolescents (r = .11) and adults (r= .21).

The Cognitive Function of the Arts

Beit-Hallahmi, B. (1983). Understanding Religion Through the Psychology of Art. *Leonardo*, 16, 3: 237-240.

> This theoretical article seeks to examine the relationship between the psychology of religion and the psychology of art. Unlike previous work on the psychology of religion at the time this article was written, which largely seeks to characterise the capacities that are unique to religion, Beit-Hallahmi argues that the psychological processes involved in religion are similar to those involved in art—"religion is not unique in terms of process, but rather in terms of content." Beit-Hallahmi suggests, for example, that both art and religion: involve systems of shared meaning, are based on the imagination, and involve emotional arousal and catharsis.

Zaidel, D. (2013). Cognition and Art: The Current Interdisciplinary Approach. *WIREs Cognitive Science*, 4: 431-439.

> This article provides an overall summary of a range of literatures with connections to the topic of cognition and art. Zaidel focuses on the literature on the archaeological record with respect to the emergence of art—with a particular focus on the psychological abilities that enabled art-making—and a summary of research in the neuroscience of art and aesthetics (which is the subject of another bibliography, and so will not be discussed here). With regard to the former,

Zaidel considers a number of hypotheses, such as the idea that the function of ornaments is to signal rank and group membership, that art-making capacities may be due to the emergence of abstract cognition, and that art-making abilities may be an honest signal of genetic fitness.

Sherman, A., & Morrissey, C. (2017). What is Art Good For? The Socio-Epistemic Value of Art. *Frontiers in Neuroscience*, 11: 411.

In this theoretical article, the authors argue that empirical research on the arts should turn away from examining art in a more formalistic manner—in terms of the stimulus features that tend to be liked—to investigate the socio-epistemic value of art, including "its communicative nature, its capacity to encourage personal growth, its ability to reveal deep aspects of the human condition, to challenge preconceptions, to help us reconceptualize a question we are grapping with, and to provide clarity on ambiguous concepts or ideas". Although published in an empirical journal, the article contains a useful discussion of some of the philosophical literature related to the social nature of art (Wolterstorff), how art cultivates "excellences of character" (Kieran), and different conceptions of self- and other-understanding and their relation to art (Gertler, Carroll, Lopes and Cohen). A number of findings that are related to some of these claims are described, including Leder et al.'s (2012) finding that we covertly simulate actions produced by a visual artist while we engage with their work (for example, "stippling" our hands when we look at a pointillist work), and Kotovych et al (2011)'s finding that challenging works helped readers to feel more connected to a character, and understand them more deeply. The paper closes by highlighting a number of outstanding research questions in this broad area of research.

Brown, S. (2019). A Unifying Model of the Art: The Narration/Co-ordination Model. *Empirical Studies of the Arts*, 37, 2: 172-196.

In this paper Brown tries to resuscitate interest in the idea that the different arts can be compared with one another to identify what they have in common and how they differ in order to arrive at unifying classifications of the arts. In this spirit, the author proposes that the arts fit into two broad functional categories: the narrative arts and the co-ordination arts. The narrative arts include oral storytelling, poetry, literature, painting sculpture and photography, and these arts function to tell sorties, often to facilitate social learning and the acquisition of prosocial behaviours. Brown suggests that that narrative arts are engaged with cognitively through a simulation of the scenarios presented in works. The co-ordinative arts, by contrast, include music and dance, and function to facilitate collective participation and group affiliation and stabilisation of group hierarchies through synchronised action. Brown suggests that the co-ordinative arts are engaged with behaviourally through collective participation. Brown suggests that what unifies the two branches of the arts generally is to promote social cooperation. Brown excludes a number of arts from this taxonomy, including the decorative arts, architecture, gardening, and chemical arts such as gastronomy or perfumery.

Rabb, N., & Brownell, H. (2020). Art is Metaphor. *Empirical Studies of the Arts*, 38, 1: 111-118.

In this brief theoretical article, the authors argue that metaphor and art play a similar role in cognition in that they are both forms of communication that (a) are not strictly true or false, and (b) cast light on their subject matter in a way that allows for ambiguity. As a result, the authors suggest that both art and metaphor may 'tune' domain-general capacities for counterfactual reasoning and pattern detection. In support of this, the authors make a number of observations: The success of a metaphor is not a matter of being true or false, but rather a matter of goodness of fit between the source and target domains of the metaphor. Similarly, the authors suggest (following Ellen Winner) that art is a non-literal form of signalling, and that we often treat the subject matter of artworks as fictional. In the specific case of visual representational art, the authors suggest that the artworks are similar to what they represent, and so encourage reflecting on the similarities between the target and source. To accommodate the difficult cases of non-representational works such as instrumental music and abstract visual representations, the authors propose that these are similar to emotional states. It is suggested that in virtue of their ambiguity, both metaphor and art allow for the exploration of many points of connection between source and target (in the case of metaphor), and representation and subject matter (in the case of art). (For work relevant to this line of thinking, and concerning how providing information about artworks affects aesthetic appreciation, see Jakesch, M., & Leder, H. (2009). Finding meaning in art: Preferred levels of ambiguity in art appreciation. *The Quarterly Journal of Experimental Psychology*, 62, 11: 2105-2112.)

Articles that are important for designing studies of aesthetic cognitivism generally

Pelowski, M., Forster, M., Tinio, PPL., Scholl, M., & Leder, H. (2107). Beyond the lab: an examination of key factors influencing interaction with "real" and museum-based art. *Psychology of Aesthetics, Creativity and the Arts*, 11: 245-264.

The authors of this review paper seek to outline the evidence concerning three factors that might influence the experience of art in the museum and which might differ in the laboratory: (1) Features of the artwork, including its physical and conceptual features, (2) characteristics of the viewer, including personality and demographic characteristics, and (3) characteristics of the presentational context, including the manner in which the artworks is presented. The authors summarise a number of studies that have looked at differences in evaluations of copies of artworks in the laboratory and originals in a museum or gallery context: viewers generally evaluated original artworks as higher on measures of interest, pleasantness, surprise, immediacy, and rarity. In terms of differences in features of artworks between originals and reproductions, the authors note that reproductions often lack the tactile features of the originals (which may contribute to features like balance and variety, and capture attention), are often smaller (which may reduce the works power to hold participants' attention, or diminish the power of large works), lack the physical remnants of the artists touch (which may contribute to the pleasure people derive from artworks), may not be perceived as authentic or even as "art" (which may e.g. cause people to think that something has meaning even when this cannot be grasped). In terms of differences in demographic variables, the authors note that those who attend museums tend to be female, white collar professionals from middle to upper social classes, with higher levels of education and income; whereas undergraduate students are younger, possess less wealth, and have less art-

relevant knowledge. The authors note that the difference in age may be a crucial difference: with studies showing that college age students have less set opinions, stronger cognitive skills, more willingness to comply with authority, and so may be more willing to engage fully with art, to find it interesting, and to continue to engage with a work that is challenging. With particular relevance to aesthetic cognitivism, the authors note that experts may expect that artworks have layers of meaning to a greater extent than non-experts.

Callaway, K., Schnitker, S., & Gilbertson, M. (2020). Not all transcendence is created equal: distinguishing ontological, phenomenological, and subjective beliefs about transcendence. *Philosophical Psychology*, 33, 4: 479-510.

The authors of this article distinguish a number of senses of transcendence, critically assesses a number of measures of transcendence, and propose a foundation for future scale construction based on theology and philosophy. With regard to the problems present in existing measures in particular, the authors note that they suffer from conceptual loss (leaving out substantive features of transcendence), confound transcendence with other constructs, or treat all kinds of transcendence in the same manner. In the case of Piedmont's Spiritual Transcendence Scale, for example, the authors note that it makes no explicit reference to entities that stand outside of the material world, and it confounds items that pick out aspects of transcendence with other constructs such as meaning in life, and the interconnection between humans and the nonbiological human order. In the case of the Spiritual Transcendence Index (STI), the authors note that this measure aggregates scores across different domains of transcendence—including items that make reference to a "spiritual peace within" and a "deep communion with god". The authors suggest that transcendence scales should turn to theology to make the operationalisation of transcendence more precise. To contribute to that research programme, the authors of this article offers a description of transcendent belief systems. Three kinds of transcendence are described. 'Ontological transcendence' beliefs refer to relations to a Being or beings in a supernatural realm, and carve the world into material and immaterial substances. 'Phenomenological transcendence' beliefs refer to beliefs about transcending the boundary of the self to others, or something larger than the self, where this is not a metaphysical being but the grounds for being itself. 'Subjective transcendence' beliefs do not refer to any supernatural entity or being, but rather to a move from the mundane self to a more meaningful existence. The authors note that this kind of transcendence belief is commonly found in the arts: "think here of the modern artist whose work is understood to be (and experienced as) transcendent, not because it has anything to do with a supernatural being or religious subject matter, but because it prompts views to wade through the depths of their interiority—what C. Taylor (2007) calls a vast "inscape" of meaningfulness". The authors close the paper by discussing how existing measures—such as the self-transcendence subscale of the Cloninger et al. (1994) Temperament and Character Inventory (TCI)—might be reformulated in light of the theoretical model of transcendence that the authors propose, and outline their current attempts to create a new scale. The authors close by outlining future avenues for research: including how transcendence beliefs develop, and how they can be co-opted for nefarious ends.