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2018

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Bridging Aesthetic Theory: Comparing Scottish Enlightenment Theories to Modern Neuroscience Evidence

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Introduction

Artistic disciplines burgeoned in Scotland during the eighteenth century. As fields such as sculpture, painting, literature, and music thrived, so did philosophy. Responding to the advancements of the fine arts, philosophers such as Hume, Reid, and Hutcheson began to write about the philosophy of art—aesthetics. Though they addressed a variety of themes in their writings, aesthetic theory can generally be characterized by three main questions: does beauty originate internally (person) or externally (object), are there universal traits that create beauty, and lastly, what is the role of the critique (expert) in recognizing and interpreting beauty? Three hundred years later, academic fields have progressed to apply empirical methods (keeping with the hopes of Scottish empiricists) to the questions of enlightenment philosophers. The rising field of neuroaesthetics applies the methodologies of neuroscience and psychology to the philosophical questions raised by Scottish thinkers and their contemporaries.

Neuroaesthetics is accredited to Gustav Fechner's, *On Experimental Aesthetics*, though Scottish Enlightenment philosophers sought to apply empirics to theory far earlier (Seeley, 2011). Modern neuroscientists prefer to focus on Immanuel Kant as a source of inspiration, particularly because Kant focused on a universal base of beauty (Conway & Rehding, 2013). The universalist approach of Kant is appealing to neuroscientists because neuroscience research focuses on the commonalities of neural transmission, as opposed to individual differences. In this case, neuroaesthetics focuses on the common threads in the neural processing of 'beauty' (Conway & Rehding, 2013). It is ignorant to focus solely on Kant though, as Kant, writing during and after the Scottish Enlightenment, drew from Hume and potentially other enlightenment writers (Robinson & Surprenant, 2017).

Because modern neuroscientists draw much of their inspiration from empiricist philosophers, the validity of those philosophers is important to analyze. Thus, this paper will use neuroscience research as a comparison to validate Hume, Reid, and Hutcheson's ideas on aesthetics. Neuroscientific evidence will function as a modern standard for validity in much the way that enlightenment philosophers' social standing validated their own ideas. I will not attempt to characterize which philosopher was the most correct regarding neuroscience evidence because Scottish philosophers' writings are too nuanced to collapse to singular scientific findings. Additionally, all were correct on some level. Since the field of neuroscience did not exist during the eighteenth century, philosophers and modern neuroscientists use too dissimilar vocabulary and paradigms to draw direct comparisons.

What is Neuroaesthetics?

Neuroaesthetics is a subset of cognitive neuroscience as it investigates many of the

traditional areas of cognitive sciences (perception, attention, emotion, etc.), but uses art as the stimuli (Munoz, 2015; Pearce et al., 2016). Ultimately, the goal of neuroaesthetics is to understand what makes art 'beautiful' (Huang, 2009). Thus, neuroscientists and philosophers have similar motives in the field of aesthetics; they both seek the origin of 'beauty,' just using different methods. Neuroaesthetics isn't set on defining what creates 'beauty' but rather on what causes the perception of beauty. If neuroscientists try to define beauty, then artists are in a sense rudimentary neuroscientists as they seek to create the neural perception of beauty (Hyman, 2010). Artists, neuroscientists, and philosophers are all trying to answer the same question by examining different components. To artists, the answer to what is beautiful lies in the art; neuroscientists suppose it is in perception; and philosophers look for maxims to help define the relationship of the art to the viewer. Neuroaesthetics is not a revolutionary field—it is the application of new methods to questions artists and philosophers have been investigating for centuries.

Internal vs External Source of Beauty

From a neuroscience perspective, the easiest way to delineate the source of beauty is to investigate whether certain characteristics of an object elicit similar neural responses (characterized as beauty) across individuals. This question heavily relates to individual vs universality. Research has been careful thus far to distinguish art from beauty, as they are not synonymous. Conway and Rehding (2013), modern neuroscientists, note, "artists have created deeply moving artwork that is emphatically not beautiful; Goya's *Saturn Devouring One of His Sons* provides a famous historical example" (1). Because of this problem, research participants are often required to characterize the beauty of a stimulus in experiments (in addition to the task).

Origin of Beauty

The main divide regarding the origin of beauty comes from Reid and Hume. Hume believes that beauty is a sentiment (Hume, 1997; Osborne, 1967). Conversely, Reid (1997) argues that that beauty (aesthetic value) is a 'quality of mind' (143). Hume and Reid therefore have opposing views, because a sentiment would be a subjective quality (related to feelings) while Reid believes there is something innate about the object that is beautiful (Robbins, 1942). Similar to Hume and Reid, opposing paradigms exist in the neuroscience literature regarding the internality of beauty. Chaterjee, a renowned neuroscientist, believes that beauty is self-referential, in line with Hume (Chaterjee & Vartanian, 2016). Chaterjee notes in a review of relevant research that when research participants view artwork, strong neural activation is found in the insular cortex, a region associated with emotional experiences (Chaterjee & Vartanian, 2016). Chaterjee's notions of self-referential beauty are supported because insular activation is not consistent across individuals.

Conversely, experiments by Samir Zecky found that beauty has some 'objective' basis (Kaufman, 2014). In the research, participants (non-mathematicians) rated the beauty of mathematic equations. Participants consistently rated similar equations as beautiful and statistically significant neural activity was found in the medial orbitofrontal cortex (mOFC) (Kaufman, 2014). The uniformity of beauty ratings and neural activity across backgrounds suggests that beauty may be a product of the object (in line with Reid). Despite his belief that

beauty is a sentiment, Hume (1757) yields that principles may govern the arousal of sentiments: “there are certain general principles of approbation or blame, whose influence a careful eye may trace in all operations of the mind” (“Of the Standard of Taste,” para. 12). Thus, enlightenment philosophers, like neuroscientists, recognize the complexity of aesthetics and don’t limit aesthetics down to absolutes. Perhaps this is why Scottish theories on aesthetics have stayed so relevant, because they allow for variability even within their own theories.

Perhaps the sense of beauty found in equations is a result of Hutcheson’s belief that beauty arises from ‘uniformity amidst variety’ (Michael, 1984; Hutcheson, 1997). Hutcheson may have been onto something with this belief, as specific neurons are responsive to different ‘forms.’ Specialized neurons fire based on color, orientation, direction of movement, etc. (Purves et al., 2001). Similarly, ‘single view cells,’ are responsive to facial features but also fire in response to cubist paintings (Huang, 2009). We may be biologically predisposed to seek out ‘uniformity’ (faces) in stimuli that lack coherence (cubist paintings).

Sensation vs Perception of Beauty

It is important to note that the question of sensation vs perception of beauty is similar, though not the same, as the question of the origin of beauty. It is possible to conflate a sensational view of beauty with saying the source of beauty is in the object, as perception would be to an internal view of beauty. However, the question of sensation and perception is more so recognizing that beauty is a product of the human rather than the object. Thus, the sensation and perception debate presupposes that beauty is a product of the human mind but rather focuses on whether it is an automatic (sensation) or delayed (perceptual) response. Though the philosophers of the enlightenment would not have had the vocabulary and background to discuss sensation and perception in the way modern neuroscientists do, they successfully investigated this question through the relationship of pleasure to beauty.

Hutcheson believes that beauty and pleasure are the same thing, in that they arise at the same time (Michael, 1984). Hutcheson (1726) states that beauty is another name for pleasure: “there are vastly greater Pleasures in those complex Ideas of Objects which obtain the Names of Beautiful, Regular, Harmonious” (22). Hutcheson (1726) also states that the converse is true; that which we find deformed is something that ‘gives no pleasure to our sense’ (61). Hutcheson’s view is a sensation based view because pleasure is an automatic response to the stimuli. Hutcheson (1997) sums this up by defining his use of sense: “Determination of the Mind, to receive any Idea from the Presence of an Object which occurs to us, independent on our Will” (110). Pleasure in beauty is not the result of higher level processing; it is another sense, like sight, scent, or hearing. Hutcheson’s views should be apparent as he titles his work ‘A Sense of Beauty.’ A positron emission tomography (PET) study found that dopamine pathways are activated in response to listening to our favorite music (Hughes, 2018). This suggests that beauty (of the song) is involuntary and beauty cannot be characterized without the pleasure aspect. Because the researchers were using participants’ “favorite” songs, participants already had associations with the songs. In the future, it would be insightful for researchers to play novel songs, measure dopamine activity, and have participants rate the beauty of the songs. This would allow researchers to see if finding pleasure (dopamine) in beauty (song) is independent of existing associations with the song. Like Hutcheson, Hume describes beauty and pleasure as synonymous. Distinctly, Hume believes beauty to be a sentiment, so pleasure may be the name

for that sentiment. Hume does not discuss pleasure explicitly like Hutcheson or Reid, but his writings use ‘pleasure’ as a common word for what he would describe as beauty. For example, “[some objects] be naturally calculated to give pleasure” (Hume, 1757). This receiving of pleasure from an object would be synonymous with beauty. Hume is not distinctly sensationalist or perceptual in his paradigm. Because Hume believes beauty is a sentiment, it is an immediate response to the stimuli, which would signify a sense based approach. However, sentiments are not necessarily senses, but rather emotions, which would be categorized as perceptual. Hume falls somewhere in-between paradigms. Under a modern neuroscience context, Hume would most likely be categorized as perceptual because sentiments, which Hume characterizes as emotions/feelings, are a tertiary characteristic of an experience, i.e. they aren’t the direct result of the form of the object (sensation) (Hume, 1757; Ciccarelli et al., 2016).

Modern neuroscientists agree with Hume and Hutcheson synonymizing pleasure and beauty because the neural substrates of beauty cannot be studied without the association of pleasure (Pearce et al., 2016). Beauty in neuroscience research is quantified by how much pleasure it gives the participants. Even aesthetic theory draws on this concept. Beardsley (1969) writes, “A person is having an aesthetic experience during a stretch of time if and only if the greater part of his mental activity during that time is united and made pleasurable by being tied to the form” (5). Thus, it is impossible to quantify an aesthetic experience (beauty) without tying it to pleasure. Reid sets himself apart from Hutcheson and Hume with a distinctly perceptual view. Despite Reid’s repeated use of the word ‘sense,’ what he describes is much more of a perception. Reid (1997) states, “When a beautiful object is before us we may distinguish the agreeable emotion it produces in us, from the quality of the object which causes that emotion” (144). To distinguish qualities that make an object beautiful suggests a perceptual understanding of the art. Additionally, Reid’s ‘internal sense’ relies on the perception of the ‘nature and structure’ of the stimuli (Robbins, 1942).

Neuroscience evidence suggests that perception of ‘beauty’ is also separate from pleasure. Though beautiful stimuli may give an automatic emotional response in the insular cortex, the finding that the labeling of beauty occurs in the mOFC suggests a perceptual basis of beauty recognition. Activities in the frontal cortex are generally higher level processing. Thus, despite an initial emotional response, beauty is created by reasoning the characteristics that make the object beautiful (Conway & Rehding, 2013).

Universality of Beauty

The question of whether beauty is universal or individual relates heavily to the previous section, because if beauty is the product of an external force (the object) then a universal view of beauty would be true—all people would respond to the properties of the object; the converse would also be true. The works included in this section will be limited to Hume and Hutcheson, as Reid mostly addresses the origin of beauty. Hume and Hutcheson believe that beauty has a universal base, despite providing evidence that beauty is internal. This paradigm is in line with modern neuroscience evidence as well. Though certain forms/characteristics elicit universal neural patterns, contextual factors such as culture and individual differences cause different perceptions of beauty.

Hutcheson outlines ‘rules’ for beauty such as conformity among variety; additionally,

according to Hutcheson (1726), “variety increases the beauty in equal uniformity” (29). Hutcheson’s work suggests that ‘simple qualities’ (quantity, motion, duration), when arranged in the correct way, excite the senses, thus creating beauty (Michael, 1984). Hutcheson then believes that the traits of an object create beauty. Hutcheson acknowledges that not all things are equally recognized as beautiful. He believes that because objects are repetitive, the lack of beauty is due to a lack of uniformity between the object and an ‘original’ (Hutcheson, 1997). Hutcheson uses the example of Hercules. If a painting maintains what the viewer expects (unity with past experiences) of Hercules, then it is deemed beautiful (Hutcheson, 1997). Our perception of beauty is dictated by not only what we are viewing but what we expect of it. Hume, like Hutcheson, says that beauty is universal but proposes reasons why it is not equally perceived. Hume (1757) notes that:

Though all the general rules of art are founded only on experience and on the observation of the common sentiments of human nature, we must not imagine, that, on every occasion the feelings of men will be conformable to these rules (“Of the Standard of Taste,” para. 10).

Hume offers two main reasons for differences in perception. First, Hume recognizes that culture effects perceptions of beauty (Osborne, 1967). Hume states that even people ‘educated under the same government’ have differences in opinion (Hume, 1757). Secondly, related to his beliefs on critiques, Hume believes that many people’s sensation mechanisms are defective. According to Osborne (1967), Hume believes a few of the reasons for subpar evaluation of beauty are, “defective endowment; lack of experience; abnormality of the ‘organs of internal sensation’; mood; external circumstances; [and] prejudice” (53). Hume believes that these defects are ‘many and frequent,’ and thus there is a diversity of opinion (Hume, 1757).

As noted previously, one of the goals of neuroscience (and science in general) is to establish universal trends across human neural activity. It is unsurprising, then, that neuroscience has discovered universal trends in aesthetics. Like Hume and Hutcheson, neuroscientific evidence recognizes individual differences, too. Regarding the base of universal evidence, neuroscientists found that when listening to a novel piece of music, participants displayed synchronous neural activation, suggesting a universal listening experience (Hughes, 2013). Additionally, though sex differences affect many aspects of behavior, researchers found little difference of activation in response to art across the sexes (Chatterjee & Vartanian, 2016). Universal activation trends are found across a variety of research techniques and neural areas, too. OFC, dorsal striatum, and nucleus accumbens activations are consistent across participants using PET and fMRI scans (Chatterjee & Vartanian, 2016; Jacobsen, 2010). Additionally, electroencephalography (EEG) suggests that people universally have neural activity 300-400 ms after the onset of an aesthetic judgment (Jacobsen, 2010). Thus, regardless of whether beauty is universal, humans have a similar neurological experience when deciding if something is beautiful.

Despite evidence suggesting that certain characteristics within art and music elicit universal responses, research also recognizes individual differences in beauty perceptions and offers insight into why differences exist. Conway recognizes the danger in universal aesthetics, as it ignores the effects of culture and erases individual experience (Conway & Rehding, 2013). First, Conway notes that many of the commonly believed universal elements such as the ‘golden

ratio' are not actually universal; different cultures and time periods prefer bodily proportions different than the 0.7 waist to hip ratio (Conway & Rehding, 2013). Chatterjee affirms Conway's observation, stating, "education, exposure, and personal experiences set up framing effects that deeply influence our evaluation of objects" (Munoz, 2015). Research by Kawabata and Zeki showed that unlike still life or landscape paintings, abstract paintings did not exhibit localization of neural activity (Aviv, 2014). This may be because abstract art has no template to compare to; thus, differences in beauty (and neural activity) result, supporting Hutcheson's theory.

As Hume stated, 'defects' are common. All humans both sense and perceive differently. From colorblindness to attention to detail, we all vary in how we take in information. Neuroscience evidence has investigated how individual differences affect aesthetics, too. Chatterjee notes that individuals with dementia and/or Alzheimer's sometimes exhibit heightened abilities to produce realistic art despite losses or impairments of many aspects of cognition (Chatterjee & Vartanian, 2016). Thus, individual differences do indeed affect the pathways related to art, though, unlike Hume believed, sometimes they affect artistic abilities positively.

Experts of Beauty

Hume was the main writer that discussed the critic (expert on beauty). The existence of the critic presupposes that certain criteria exist to critique or, as Hume would suppose, standards of taste. Indeed, Hume (1757) highlights that "it is natural for us to seek a Standard of Taste; a rule, by which the various sentiments of men may be reconciled" ("Of the Standard of Taste," para. 6). As outlined previously, Hume believes that true critics are extremely rare 'even during the most polished of ages' (Hume, 1757). Potentially one of the reasons the critic is so rare is the defect of sensory organs discussed previously, as very few people have 'delicacy of taste' (Hume, 1757). Additionally, Hume maintains that critics must be unbiased, evaluating art 'free from all prejudice' (Hume, 1757). From a neuroscience perspective, we know every judgment is tainted by personal biases and past experiences; thus, no decision is free from prejudice. The standards Hume sets for what a critic is makes it near impossible to find an analogous research participant in the modern day. Because nearly everyone is tainted with some defect of sensation and all people are prejudiced, there is no true critic. However, Hume states that critics are 'easily to be distinguished in society' (Hume, 1757). Hume does not underestimate the power of practice, though. Drawing from Hutcheson, Hume asserts that experience is what sets critics apart with true standards of taste (Osborne, 1967). Since Hume believes practice is associated with taste (critiques), an analogous research subject for critiques is an established artist. Thus, a trend in neuroscience is to compare the neural activity of 'experts' against 'novices.'

To begin, one easy way to distinguish a critic from a novice using empirical data would be to compare the taste preferences of known artists and novices against the so-claimed critic. Novices tend to prefer realist art over abstract works (Chatterjee & Vartanian, 2016). Conversely, trained artists have no preference for abstract or representational art; Chatterjee interprets this finding to mean that artists have been trained to find equal meaning and pleasure across genres. Thus, genre preference is not a sign of a critic (Chatterjee & Vartanian, 2016). Relating to Hume, a true critic is unprejudiced to genre, as they have learned to appreciate art across boundaries. Hume maintains that critics have superior functioning organs of sensation. Neuroscience evidence does not support this claim. Across multiple research tasks investigators found no difference in visual cortex activation between artists and novices (Perdreau and Cavanagh,

2013). This evidence suggests that artists and novices do not sense art differently. Thus critics' superior organs must take place in a different part of the brain. In fact, research employing multiple forms of neurological measurement has found neural differences between critics and novices in perceptual areas of the brain. When evaluating twentieth-century art, artists had enhanced waveforms shortly after making aesthetic judgments relative to non-artists. This suggests that artists may be devoting more neural resources to aesthetic judgments (Chatterjee & Vartanian, 2016).

Structurally, artists (art students) have more prefrontal cortex white matter than non-artists (Schlegel, 2015). Such structural differences, the authors suggest, are the result of increased neural plasticity in neural pathways that enable creative behaviors (Schlegel et al., 2015). Most interestingly, architects, who could be considered artists, have greater activation in the mOFC than non-architects when making aesthetic judgments (Chatterjee & Vartanian, 2016). As discussed previously, the mOFC is associated with making judgments about the beauty of an object. Thus, artists have a greater amount of neural connections in this area and higher activation when making aesthetic judgments. Hume is right, then, as artists/experts have higher functioning 'organs of internal sensation.' The mOFC, though, is not necessarily defective in the non-critic. Rather, critics have practiced their craft so long that their organs (mOFC) have specialized to make aesthetic judgments.

Conclusion

It is easy to dismiss the importance of neuroaesthetics when neuroscience as a whole addresses issues such as mental illness and social bias. However, as Hume argues, it is natural to try to find a standard of taste, and thus it is natural to explore why a standard of taste exists—a question neuroaesthetics is uniquely suited to answer (Seeley, 2011).

Because aesthetics is associated with pleasure, art is not going anywhere. Neuroaesthetics tells us how art works, how form, function, color, depth, etc., can be applied to make more pleasing artwork (Seeley, 2011). Because of the questions that neuroaesthetics asks, in the future it can prove to provide better art and potentially even more effective tools like art therapy (Munoz, 2015).

As artistic creation boomed during the Scottish Enlightenment, Hume, Hutcheson, and Reid examined the nature of art. Today, neuroscientists have continued the work of Scottish philosophers using modern methods. The field of aesthetics starts with the question of where beauty comes from; this question can be boiled down to whether beauty is inherent to the object/art (external) or comes from within the evaluator (internal). Both Hutcheson and Hume believed that humans were responsible for beauty, thus adopting the internal paradigm; Reid adopted an external view of beauty. Neuroscience literature most closely confers with Hutcheson and Hume's views, as evidence suggests that factors like culture, emotion, and relationship to the art affect the value of beauty. However, like Hutcheson and Hume's standards and Reid's belief that something within the objects makes it beautiful, there are certain forms that could be considered beautiful. Evidence suggests that specialized cells respond to specific formations and some things like math equations can be perceived as beautiful across cultural and personal backgrounds. Reid did understand part of the nature of beauty; he just underestimated the human element.

The internality or externality of beauty carries the connotations of universality or individuality of beauty. If beauty is bound to an object, then hypothetically all people should experience it similarly. It is common knowledge that this is not true; even Reid offered explanations for different tastes when he wrote about acquired taste. Neuroscience often aims to find universalities among cognitive experiences—art is no exception. Similar neurological areas are activated when making aesthetic judgments, but personal factors that affect taste can also affect the aesthetic value assigned to art/objects. Hume’s organs of sensation are akin to areas of the brain. Hutcheson was correct in establishing rules of beauty. Humans do respond similarly to art and have specialized cells for it, so concepts like preferring uniformity among variety are not far off.

Lastly, if standards and rules of beauty do exist, then there must be a way to judge them. Hume maintains that not everyone is qualified to determine these standards and sets forth a variety of criteria. Contrary to Hume’s belief, the true critic does not exist because humans have prejudice. However, like Hume stated, critics can become specialized through practice. Artists’ development of heightened abilities on a neural level suggests that the defects of senses Hume accredits for the lack of critics is the lack of specialization through experiences.

Because of the works put forth by Scottish philosophers, modern neuroscientists have a basis for what questions to ask. Neuroaesthetics advances the work of philosophers, as it accounts for commonalities during aesthetic experiences (Pearce et al., 2016). No philosopher was more correct regarding the evidence that neuroscience has brought to aesthetics, as the disciplines don’t have a similar vocabulary or background to draw direct comparisons. However, neuroaesthetics would not be where it is today without the work of Hume, Hutcheson, and Reid.

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