

Two Modes of Art Cognition

Anthony H. Thompson, MFA (painting), MA (cognitive psychology)
Independent scholar, former Asst. Professor, fine arts department, Cornell University.,
instructor in drawing and painting, Parsons/New School for Social Research.

[<thompspainter@gmail.com>](mailto:thompspainter@gmail.com)

Abstract

A twofold response to the arts is proposed: a conscious engagement with art's content, what it means or represents, and an automatic engagement with its actual perceptual complexity. Automatic denotes any of our thinking or behavior that we are unaware of. We engage most phenomena just long enough to identify them, but with artwork we look and listen longer. All art forms stabilize sights and/or sounds allowing them to be re-experienced and often use repetition in their structure. These longer and repeatable interactions with artworks allow more complete, accurate, and refined sensory processing than do normal interactions with more transient everyday experiences. The resulting ability to better absorb sensory experience generalizes to non-art situations and allows us to better process complex perceptual experiences outside the realm of the arts. These complex perceptual processes are automatic; we are not directly aware of their functioning. Gestures accompanying speech can express knowledge we don't know we have. In an elaborate form of gesture the artist's motor system can draw on automatic perceptual processes, thus Stravinsky's assertion that his fingers composed Petrouchka and the copious insistence from artists of all kinds that they often don't know what they are doing until they do it. The increased perceptual ability resulting from interaction with the arts gives us pleasure and makes us fitter.

Key words: Art, cognition, perception, automaticity.

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Introduction

The many subtle and important aspects of our conscious engagement with what art means or represents, art's content, have been and will continue to be extensively written about and discussed. This paper will draw on current psychology and neuroscience research to focus on a response to art that need not register in our conscious minds. My experience as a painter and studio teacher has contributed to my interest in this particular area and informed my study of cognitive psychology. Here I propose a twofold response to art: a conscious engagement with art's content, and an automatic engagement, one we are largely unaware of, with its actual perceptual complexity.

I will suggest that engagement with the arts has the ability to enhance perception and that this may be a large and important part of why art related behavior has evolved, been preserved for many thousands of years, and seems to exist in all cultures. A serious theory of art's utility should show how art activity confers a selective advantage on those who practice it. How well we register, remember and organize what we have sensed determines in large part the effectiveness of our behavior in the world. A less complete or poorly organized perceptual data-base results in poor or incomplete understanding and poor decisions. Anything that tunes, or improves perceptual processes makes us fitter. In interacting with works of art we may enhance our ability to see and hear and thereby increase our ability to interact effectively with our environment.

The nature of our engagements with all art forms

First consider our art related cultural habits. We engage most phenomena just long enough to identify them, but with works of art we look and listen longer. Our looking habits in a supermarket are quite different from our looking habits in a gallery or museum. In the supermarket our looking is driven by purpose and meaning. We look just long enough to separate the oatmeal from the bran flakes and distinguish the old fashioned from the quick oats. In the gallery the paintings are usually clearly separated from each other. When we look at paintings we look at them longer that it takes to know that they are paintings, and we often look without knowing what we are looking for. Whether or not our conscious minds are searching for meaning or recognizable objects in paintings we have a custom of looking longer at visual art, listening more carefully to music, and watching dance more closely, relative to our day to day auditory and visual engagement with what goes on around us.

The arts stabilize sight and sound relationships

A second aspect to consider is that if we come back to a gallery to see the same exhibition a week later the paintings will all look the same. We can re-experience them exactly as they were on our first visit and we will see more. Its a cliché when the owner of a painting says, "I see something new in it every day" but she may be sincere. Kerning is a clear example of seeing more and better each time you look at something that is visually complex. Kerning is spacing the letters properly in relation to each other in a word or line of type. Multiple adjustments and readjustments are made as one looks longer and becomes more and more sensitive to the spacing. A word whose letters look perfectly spaced one day may be seen to have obvious spacing problems on the next. For a graphic designer or typographer these reassessments can go on for quite a while.

The perceptual complexities are stabilized in most art forms. The color relationships in a painting, for example, will be the same each time you look at them. The same melody and rhythm can be sung repeatedly, so that the identical or close-to-identical musical experience can be heard again and again. A poem can be recited over and over, rhyme helping to ensure more exact repetition. By keeping their perceptual complexities constant, the arts allow us to absorb subtle perceptual configurations that

we could not master in a single exposure. It often takes repeated visits to the museum before our increasing sensitivity to the repeated particulars of a painting enables us to take pleasure in it. We may have to hear a piece of music a dozen times or more before it becomes a favorite.

Structural repetition

In addition to the ability to re-experience a work of art as a whole, smaller visual, movement or sound passages are often repeated within the structure of the total work. A characteristic of our auditory system is an enhanced brainstem response to the repeated parts of a stimulus (Skoe 2010). We become more sensitive to sounds when they occur again and again and this sub cortical repetition enhancement builds over time. This supports the idea that the characteristic use of repetition in all the arts helps us to achieve a more complete assimilation of their form. The use of repetition in choreography, music and the visual and decorative arts suggests that all the arts take advantage of this. Consider the repeated classic movements in ballet, the repeated motifs in wallpaper, Andy Worhol's reiterated Coke bottles and the multiple repetitions in Scarlati's Sonata in E major K.380. This is just the tip of the iceberg.

(accompanying images and music illustrating importance of repetition in all the arts)

Duration, stability and repetition in encounters with works of art allow us to perceive and organize sensory data at the peak of our abilities.

In engaging a painting we exercise, sharpen and refine perception to a degree far beyond that which is required for finding oatmeal. When we spend extra time watching dance, looking at painting, or listening to music, we are assimilating perceptual complexities. *Assimilation* refers to the process of refining perception of an experience, establishing it in memory, and relating it to previous experience. Among other things, music is a pattern of often complex rhythms and unexpected tonal sequences. Painting may present illusionistic, sometimes unconventional spaces that are contradicted by the painting's physically flat surface. These overt examples are easily spoken about, but many perceptual complexities that exist in music and painting are more subtle, difficult or impossible to describe.

When we experience art, our brains are working largely unconsciously to assimilate the perceptual complexity of the work, subtle or otherwise, while consciously we may be dealing with other issues such as meaning and what is represented. It may seem counterintuitive that much of our behavior and feeling is the result of processes we are unaware of but experimental psychology seems to have proven it beyond doubt. Nobel laureate Daniel Kahneman put it this way in his book *Thinking Fast and Slow*, "The notion that we have limited access to the workings of our minds is difficult to accept because, naturally, it is alien to our experience, but it is true: you know far less about yourself than you feel you do. ...your subjective experience consists largely of the story that your system 2 (conscious mind) tells itself about what is going on" (2011, p. 52).

While we are taking time to focus our attention on Mona Lisa's smile, our brains are also processing information about the shape of her hands, the folds in her clothing and the illusion of space between her and the elements of the background landscape. According to Mack (1998 p. 249), "... many different avenues of evidence ... point to a theory of perception that must allow for the deep processing of a great deal of visual input that is not generally available to consciousness."

The ability to deal with greater perceptual complexity through the arts generalizes to non-art situations.

Engagement with art allows us to better process complex perceptual events outside the realm of art. Nina Kraus at the Auditory Neuroscience Laboratory at Northwestern has explored this in musicians. The auditory system involves the representation or encoding of all ambient sound in the brainstem. The audio cortex then sends signals to the brainstem thereby strengthening the brainstem's acuity for particular sounds that are important. Salient sound can be anything from a repeated note to a particular baby's cry or the first few notes of the Goldberg variations. Kraus has found that musicians' top down cortical processes are better able to select what is important from more complete and complex sound representations they have in their brainstems.

This increased sound representation and processing ability carries over to proficiency with language. Musicians are better at learning foreign languages and show stronger activation to pitch patterns in their native language. They show an advantage in every day speech and language tasks, better vocabulary and reading ability. They exhibit enhanced cognitive and sensory abilities that allow better speech processing in high noise to speech situations. (Kraus 2010)

It should be noted that all this does not result from a casual brush with music but reflects early, serious and long-term training and practice.

Making works of art

I have proposed that the structure of works of art and the personal and cultural habits of our interaction with them combine to promote automatically, that is without our awareness, the enhancement of our perceptual abilities. If this is indeed the case it would seem that automatic perceptual processes should also play an important role when artists are producing works of art. The serial/parallel distinction characterizes a major difference between conscious and automatic processing abilities in our brains. Unconscious thoughts can run in parallel taking account of many things at once while conscious thought must proceed serially, one thing at a time.

Readings from the human brainstem indicate that it is registering ambient sound continuously even when the person is asleep. (Skoie 2010) This is part of the brain's automatic ongoing monitoring of the organism's total situation. Keeping track of this total situation, visual, spatial, auditory, homeostatic, and kinesthetic, requires parallel

processing, processing more than one thing at a time. The ability of automatic processing to deal with simultaneous complexities can be important in making art.

Automatic gestures accompanying speech can express tacit knowledge.

Serial conscious thought is more or less efficiently expressed in speech. Thought involving the simultaneous consideration of multiple dimensions, is not. Unlike conscious linguistic expression, the motor system that causes our muscles to move is able to respond to many simultaneous considerations at once. When we successfully move to catch a ball we don't consciously take into consideration its distance, speed, probable weight, the wind velocity that may affect its trajectory etc. Automatically considering all these things and more, the motor system makes the necessary calculations and produces the required motions directly without the mediation of conscious thought. We have in our heads knowledge of the particulars of the ball's trajectory but we are not aware of having all this knowledge.

A similar thing occurs when the motor system expresses other kinds of knowledge we are not aware of having or knowledge that cannot be expressed in a serial manor. Trying to describe a circular staircase without the use of gesture is the classic illustration. Gesture that is based on multiple simultaneous considerations is able to indicate what cannot be easily expressed in sequential speech. (Broaders 2007)

The use of gesture to explain knowledge we don't know we have is illustrated in children's performance on Piaget's conservation tasks. Here is an example of simple gesture expressing knowledge the gesturer has, but is not aware of:

When faced with the same amount of water in a tall thin glass and in a short fat one, children at a certain stage of development will point to the top of the water in the tall thin glass and say that there is more water in it. The gestural and the verbal answers are the same but incorrect.

A little farther along in development the child will still insist verbally that there is more water in the tall glass while demonstrating with gestures that the width of the glasses is important. The gestural and verbal answers are different from each other.

Still later the child will again gesture that the width of the glasses is crucial and say that because of this the amount of water in the glasses is probably the same. The verbal and gestural answers are consistent and correct.

(figure illustrating conservation task)

In addition to its ability to express tacit knowledge gesture has other interesting characteristics:

It seems to arise whenever there is difficulty speaking, whether simply from a necessity to express a number of things at once, as in the staircase, or from aphasia, a loss of speech through brain damage.

While speech uses commonly accepted grammatical structure and words most gesture is personal improvisation without any agreed upon conventions.

Children produce more explanations based on perception when they are allowed to gesture. (Goldin-Meadow 2003)

When participants in an experiment are asked to describe a still life painting they use gesture. When asked to describe it from memory they use a greater amount of gesture. (Wesp et al 2001)

The arts as elaborate gesture

Making a work of art is a problem that requires the simultaneous consideration of many dimensions, much more than height and width, the two involved in Piaget's conservation problem. We might consider the placing of paint on a canvas as a kind of elaborate gesture carried out by the painter's motor system not always under the complete control of conscious directives.

In painting a single brush mark may require consideration of shape, relative size, both two and three dimensional position, the three dimensions of color, its hue, value, and saturation, a sense of motion, direction and speed, the degree of physical presence (impasto) etc. And each gesture must place paint on the canvas with reference to all the other marks in the composition and their properties. Each note in a musical composition embodies a similar complexity (Levitin 2006). The automatic processes that underlie simple gesture also enable complex spontaneous action at the keyboard, on the dance floor, or with paper and pencil.

I have not written much about literature. Its entanglement with speech, the primary medium of conscious thought, makes it even more difficult to tease apart the contributions of conscious and automatic processing in writing. However, Raymond Mar and Keith Oatley describe functions of literature which go beyond conscious entertainment and must in some part be automatic. (Mar and Oatley 2008)

To what extent speech and thought itself are generated by a motor system acting on simultaneous factors is too complex a discussion to address here. However, there is evidence that suppressing gesture affects working memory, word recall, and speech fluency (Morsella 2011).

The Autonomous Hand

In 1934, the French art historian Henri Focillon wrote, "The hand contrives astonishing adventures in matter. The most delicate harmonies, evoking the secret springs of our imagination and sensibility, take form by the hand's action as it works with matter" (Focillon 1989). More recently J., D. Salinger in one of his stories has his hero, Seymour Glass, tell his younger brother not to aim so hard when he's playing marbles, to let his hand do the shooting. And Stravinsky asserts that his fingers played a large part in composing Petrouchka (Jourdain 1997). We have copious insistence from artists that they do not always know what they are doing until they do it. The internationally

prominent painter, Gerhard Richter, says of realizing his work, "I am more and more aware of the importance of the unconscious process that has to take place while one is painting - as if something were working away in secret. You can almost just stand by and wait until something comes. It has been called 'inspiration' or or 'an idea from heaven'" - but it's far more down to earth and far more complicated than that." (Richter 1995) Art making seems to draw on perceptual memories that the artist is not aware of. Voss and Paller (2009) describe an unconscious perceptual recognition memory system more accurate than conscious recall, recollection and familiarity memory. In fact, though it may seem counter intuitive this system performs better when study participants are distracted during the memorization process.

The artist is able to use this perceptual knowledge in creative action not always moderated by consciousness. Though unaware of the automatic processes behind his/her actions, the artist can often take great pleasure and sometimes surprise in the results. In this way to some extent, works of art can be, for the artist, a kind of extra cortical communication with automatic processes of his or her own mind.

Familiarity

Most people like a good meal but are not aware of the biological chain of events that occurs as their body processes the food and produces a feeling of satisfaction. Similarly, we get pleasure from our encounters with the arts without being aware of how the brain is processing the perceptions involved in our pleasure.

The painter is not aware that seeing a particular red and orange next to each other has stayed in his brain, but there seems to be no question but that it does. Further, he is not aware of why reproducing this automatically remembered red orange relationship on his canvas gives him pleasure.

When the participants in a psychology experiment by R. B. Zajonc experienced familiar shapes or sounds scattered among unfamiliar shapes or sounds they tended to like the shapes and sounds they encountered previously, even when they didn't recall ever having experienced them before (Zajonc 1980). This positive response to the familiar goes back to an ancient and crucial approach/avoid decision process that is based on the simple principle that the organism has survived what has been previously experienced, but may not survive the unfamiliar.

Likewise, when red and orange are put on the canvas and adjusted to match the previous unconsciously experienced relationship the result is a positive response. The pleasure generated by the reiteration of a familiar experience is consciously noted but its source remains largely below the level of consciousness. Painters need an ability to automatically absorb subtle visual impressions and an ability to recognize them, albeit unconsciously, when they reoccur.

To enjoy paintings in a museum we also need to be able to recognize subtle configurations that we have seen before in the environment, books, or past museum

visits. When we consistently like an artist's work it is because each work recreates many of the same relationships found in the artist's other paintings and they are familiar when we see them in a new painting. An artist's body of work tends to do the same things in different ways. Something familiar found in a new context produces the greatest pleasure. Silvan Tomkins puts it this way in his book *Affect, Imagery, Consciousness*, "Complex stimuli are extremely attractive to the human organism if they possess both sufficient novelty and sufficient familiarity so that both positive affects are reciprocally activated, interest -excitement by the novel aspects of the stimulus and enjoyment-joy by the recognition of the familiar and the reduction of interest-excitement. (Tomkins 1962).

The same scenario holds true for music. The pleasure generated by the reiteration of previous experience is consciously noted but its source remains largely below the level of consciousness.

Do all the arts sharpen the senses involved?

Though each art form involves a different sense or set of senses they have much in common. As mentioned above we spend more time perceiving all kinds of art than we do ordinary experiences and all art forms may be experienced repeatedly. All of the arts in both appreciation and production involve automatic processing. Do the other arts sharpen other senses as music does for hearing?

Although a great deal is known about the visual system, brain areas involved in visual processing, take up at least half the brain (Changizi 2009). Understanding them and all their connections and interaction is a daunting task. James Haxby at Dartmouth and his signal processing colleagues at Princeton, have discovered a common code the brain uses to recognize objects. Haxby thinks his methods "can now be used to see how brain codes vary across individuals because of differences in visual experience due to training" (Haxby 2010). Should this be the case proficiency in vision for visual artists may be found to parallel the audio proficiency of musicians. More research is needed.

Pleasure and fitness

Generally, our brain/body is a self-rewarding system that gives us pleasure when we behave in ways that are beneficial to us. The brain may release the appropriate pleasure inducing chemicals before, during and after such behaviors. This helps to insure that the beneficial activity will reoccur. In 1928, Karl Buhler (1928) coined the term "funktionslust," referring to the pleasure we get from exercising our skills and abilities. More recently Martin Seligman (2004) has described a state of personal wellbeing, eudaemonia, that results from utilizing our strengths. Acuity of perception is a distinguishing characteristic of the human brain.

I propose that an important portion of the pleasure we get from our interactions with the arts stems from the exercise of homo sapiens extraordinary perceptual abilities. These feelings of pleasure and satisfaction reinforce a beneficial activity, the

assimilation of the complex perceptual events that are embodied in the arts. And this assimilation is a largely unconscious process. It follows then that much of art's pleasure and satisfaction comes from assimilating the perceptual complexity found in a work of art rather than from the artwork itself. Though we feel the pleasure of our interaction with works of art, we cannot be aware of the perceptual exercising for which we are being rewarded.

Towards the end of her book, *Hearing Gesture*, Susan Goldin-Meadow describes a hypothetical conversation, "Speakers are not always aware of the ideas they express in gesture. Listeners pick up on these ideas, but may not themselves be aware of having done so. An entire exchange can take place without either speaker or listener being aware of the information passed between them." (Goldin-Meadow 2003) If we think of the arts as elaborate gesture, might we consider whether communication between the artist and the viewer/listener goes on without either being conscious of what is communicated, only aware of the pleasure of the conversation?

AFTER WORD

The artist as researcher

I have tried to use empirical studies to establish the foundation of my proposal and to be sure that what I posit does not contradict any well established findings. Some may feel that I have gone well beyond the support these studies offer. Where is the research supporting many of my propositions? Artists have been experimenting with perception and cognition since the first artist made an image or a tune and asked, "What do you think of that". (Lehrer 2007) Margaret Livingstone has written an interesting book describing how painters have experimented with the biology of the visual system. (Livingstone 2002)

(accompanying images and music)

One informal study has been underway for a long time. It has a huge sample, or number of participants. A few hundred years ago painters experimented with the tacit hypothesis, that paintings with reduced content or meaning can produce positive affect. That is they can make people feel good. They painted the first still lifes and the first landscapes without human figures, landscapes where there is no narrative, where nothing is going on. The results support the hypothesis. Paintings that do not tell any story have proven very popular.

More recently abstract painters suggested a more radical hypothesis, not only a painting with out any story but even a painting with no representation at all, no recognizable objects, can produce a positive affect. The sample is also very large and although the results may not be quite as robust they seem to confirm the hypothesis.

The results of these experiments support the proposition that we may not be aware of all the factors in a painting that give us pleasure. In other words, we know a lot about art but we may not know what it is about art we like.

Pursuing this further, artists have used the same hypothesis testing themselves and others to see if very different kinds of art, or stimuli in psychology terms, can produce positive results.

Composers have written music without repetition and music with almost nothing but repetition. There is dance without stories, no costumes, and even without music. French new wave novelists have written novels using only one of the many traditional constituents of a novel, just dialog or description for example. Like these writers, painters have experimented with reducing the usual constituents of a painting. Color field painters have asked if a painting eliminating all but color, having as little else as possible in it, can produce positive affect.

Response to the arts is subjective and artist's comments about their working processes are introspective. None the less, studying these processes and the response to works of art can make significant contributions to to an understanding of the brain.

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Possible Appendices

Some other scientific research supporting action without awareness

Reber

Gazzaniga

Weiskrantz

Mack

Artist's descriptions of action without awareness.

Richter

Hodgekin

Leonard Cohen

The Midnight Disease