Liminal Perspective: Still-Life and Interactive 3D Animation

Adam Eddy

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R. Weaver, Committee Chair

Z. Duer

A. Lechner

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Abstract

Liminal Perspective refers to an alternative theoretical framework for understanding the interpretation of pictorial space in visual art when influenced by new technologies. Creating the illusion of depth on a two-dimensional surface has relied on the theory of linear perspective created in the renaissance. Leon Battista Alberti, in his landmark work *De Pictura*, created a geometric system for the illusion of deep space that uses orthogonals and a vanishing point to allow objects to diminish as they move backwards in space. This theory placed humans at the center of perception and the singular vantage point of pictorial space. Alberti's theory marked a huge philosophical shift from a god-centric worldview to a human-centric one.

Technology, however, is rapidly changing our functional relationship to perspective and allows an expanded understanding of perception. Humans are no longer single vantage points but rather exist in tandem with technological augmentations like smart phones. The body of work discussed in this paper imagines alternative artwork-viewer relationships to what have been historically proposed by still-life painters in classical history such as those in the Dutch Golden Age. Using 3D animation in combination with computer vision and physical computing, *Liminal Perspective* explores new interpretations of pictorial space and how our perceptual philosophies might evolve to keep up with technology's evolution.

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General Audience Abstract

Liminal Perspective is a paper and body of visual art that uses interactive 3D animation to examine the historical genre of still-life painting. Creating the illusion of depth on a two-dimensional surface has relied on the theory of linear perspective created in the renaissance. This theory placed humans at the center of perception and the singular vantage point of pictorial space. Technology, however, is rapidly changing our functional relationship to perspective and allows an expanded understanding of perception. Humans are no longer single vantage points but rather exist in tandem with technological augmentations like smart phones. The body of work discussed in this paper imagines alternative artwork-viewer relationships to what have been historically proposed by still-life painters in classical history such as those in the Dutch Golden Age. Using 3D animation in combination with computer vision and physical computing, *Liminal Perspective* explores new interpretations of pictorial space and how our perceptual philosophies might evolve to keep up with technology's evolution.

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Committee Members

Zachary Duer

Rachel Weaver

Amanda Lechner

SOVA Faculty

Les Duffield

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Table of Contents

Introduction

Liminal Perspective is meant to explore the ways computational technologies expand our perceptual faculties and pose important existential challenges to our traditional concepts of embodiment, perception, and illusion. What does it mean to be human when our perceptual and intellectual capabilities have been augmented by artificially intelligent machines? How do we interpret perception in a new light when our vision has been fundamentally altered by our new 'seeing' technologies? My approach to analyzing these questions is to enter through a historical perspective as opposed to a futuristic one. In the West, our philosophies of perception and the construction of pictorial space have been largely informed by the theory of linear perspective developed in the renaissance. This geometric approach to depicting space uses a horizon line, vanishing point, orthogonal lines, occlusion, shifts in scale, and atmospheric color gradation to create a logic-based illusion of depth. This approach to creating 3-dimensional spaces on a 2-dimensional surface has been fundamental to not only our understanding of illusionism but also to our philosophical understanding of *vantage point.* Before Leon Battista Alberti's *De Pictura*, our understanding of space was from a kind of God's-eye-view. When Alberti introduced the rules of linear perspective, a new structure placed humans at the center. My goal is to explore the traditional genre of Still-Life as a platform for deconstructing this default mode of conceptualizing pictorial space.

Machines have given us new eyes, literally and figuratively, and it is imperative that we ask questions about how we will choose to see with them. What will this new *liminal perspective* look like? Still-life is all about perception: the perception of space, the passage of time, sensorial experience, and history. Using computer vision algorithms and physical computing in conjunction with 3D animation, I am developing a group of still-life works that *look back at you.* By analyzing the historical approach to western pictorial illusionism with new media technologies, I'm seeking to challenge the human-centric philosophy that has grown up with these perspectival structures. In my view, questions surrounding spatial perception have important implications for how we see our species' role in the natural world. Is there an alternative way to define vantage point outside of God and Human? What would a non-human centered perspective look like and what would it mean for the current hierarchy of life on Earth?

Historical Background

     In 1435, Leon Battista Alberti, an important renaissance artist and thinker, published *De Pictura* (or *On Painting*) in which he laid out a geometric and logic-based approach to depicting pictorial space. This system was composed of four main parts: horizon line, vanishing point, orthogonal lines, and what he called 'visual rays'. These are illustrated in the diagram bellow:
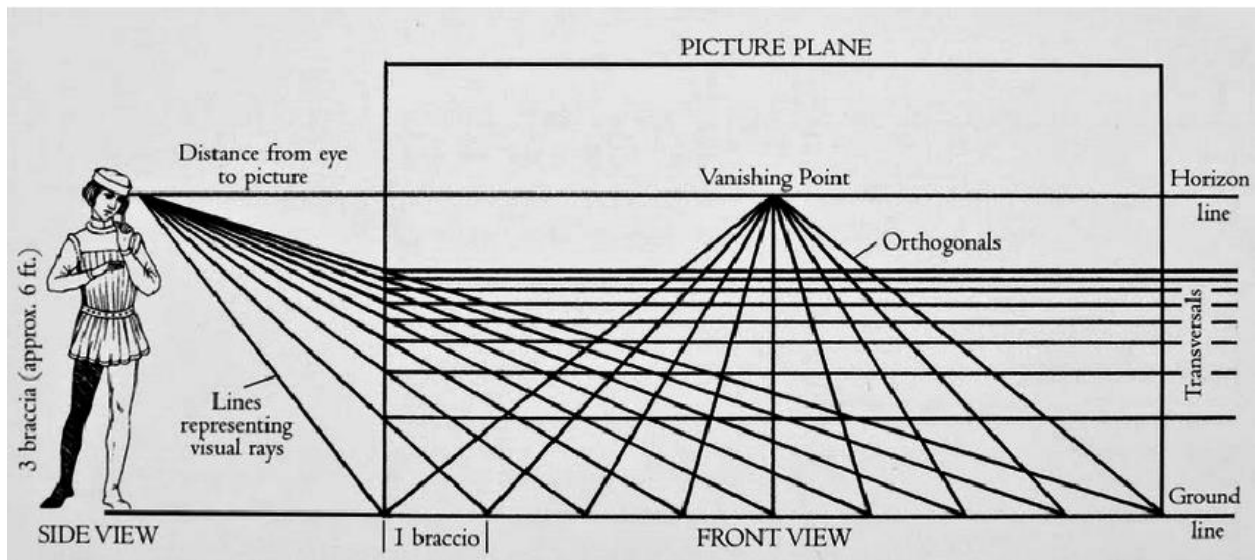
Leon Battista Alberti, *Perspective Diagram,* 1435

Alberti's system of depicting space was a radical shift in logical thought not only in an aesthetic sense but also in a philosophical one. Alberti describes the phenomenon of objects appearing smaller in the distance:

*"*Here is a rule: as the angle within the eye becomes more acute, so the quantity seen appears smaller. From this it is clear why a very distant quantity seems to be no larger than a point." (Alberti)

     Where he refers to "the eye" a seismic shift has occurred. The vantage point has become where *our* vision originates, not where God's does. This was different from all other artistic disciplines up to this point. Bellow we see the early renaissance artist Giotto exhibiting a typical pre to early-renaissance concept of space:

Giotto, *Lamentation,* 1306

This pictorial structure exhibits no vanishing point and henceforth no hierarchy of scale based on relation to the viewer. There isn't an attempt to simulate the way we see 'real' landscapes. It has an *omniscient* perspective as if God is the viewer. He can see all equally both near and far away. Understanding this pictorial structure is essential also for understanding the philosophical shift towards enlightenment that happened concurrently in renaissance Italy. Theology was slowly being replaced with science, math, and philosophy. God wasn't the progenitor of wisdom anymore, people were. Alberti's 'visual rays' can also be seen as an attempt to understand vision as a *scientific* theory instead of a religious one. Renaissance thinkers were not yet aware of photons or light waves but still managed to conceptualize a somewhat similar explanation for how light travels to the eye. Enlightenment thinking entirely innovated the way people considered their place in the hierarchy of existence. Each person became a unique point of reference, a vantage point, or, in a sense, the center of their own universe.

What then should we say about the expansion of human cognition when augmented by computers? Are we still each an isolated vantage point from which our perception of space is created? Or does the hybridization of sensorial input through machines complicate the singularity of this aging theoretical structure? The term liminal refers to a transitional stage in a process or occupying both sides of a boundary simultaneously. The expanded perceptual

capacities granted to us through technology have created a *liminal perspective* in which vanishing points and our own vantage point have been combined by a kind of persistent trompe l'oeil mediated by screens. The experience of 'real' space is often mediated by the flat space of the screen creating a kind of hybrid visual experience.

The longstanding genre of still-life painting offers us a visual laboratory for exploring the perception of space. Depicting space and the experience of time can even be said to be *the content* of this tradition. "I believe that what still lifes communicate is not a story, but a theory, that is, a form of thinking in visual terms." (Grootenboer p.25)

My investigation of Still-Life painting in relation to new media will focus primarily on the subgenre of trompe l'oeil. This tradition is reliant on a kind of visual trickery in which the viewer is momentarily fooled into believing the image is made up of real objects. In the Dutch Golden Age, artists like Samuel Von Hoogstraten became famous for paintings that could fool the viewer; one frequent example being the letter rack motif exemplified below:


Samuel Von Hoogstraten, *Letter Board,* 1678

Trompe l'oeil painting approaches linear perspective in a somewhat different way to more straightforward explorations of 'deep space' like landscape painting. Below is a basic diagram of how simple one-point linear perspective works in a landscape painting:
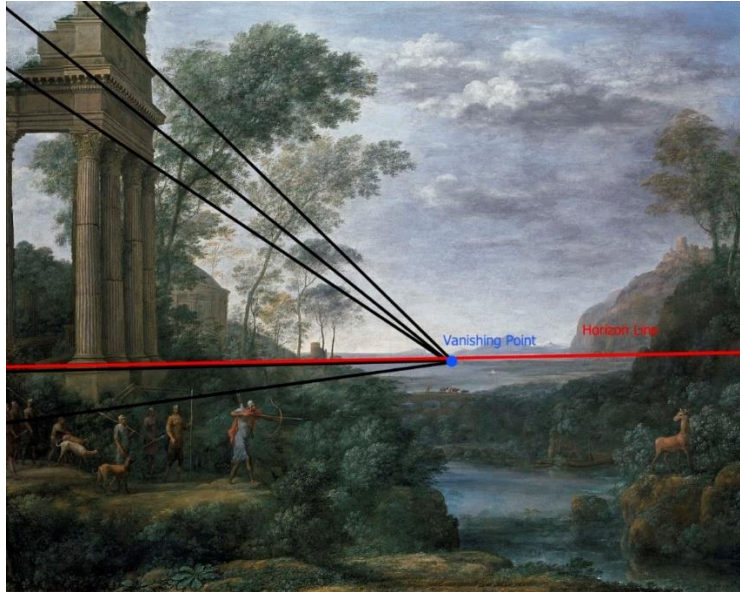
Here we see a horizon line following where the landscape meets sky, orthogonal lines that guide the shrinking of architecture backwards in space, and a vanishing point where all orthogonals converge and 'vanish'. Below is another simple diagram showing the perceptual illusion taking place where the painting is, in a perceptual sense, a window:
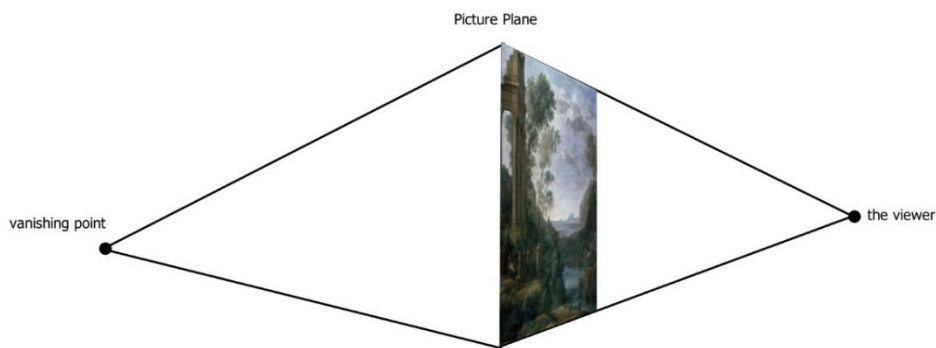
In this traditional approach to landscape, the **vantage** point is where the viewer stands, and the **vanishing** point is in an imagined place somewhere beyond the canvas's surface on the horizon line.

Trompe l'oeil, however, operates very differently to achieve the perceptual trickery the artist intends. Hanekke Grootenboer, in her 2005 book *The Rhetoric of Perspective* describes with great accuracy the innovation of trompe l'oeil in manipulating linear perspective's basic structure:

> "After Alberti wrote down the procedures for creating linear perspective, the illusion of depth was produced by a separation of the vanishing point and viewpoint and never again by means of their fusion. One of the very few instances, however, where the vanishing point does collapse with the point of view, just as in Brunelleschi's panels is trompe l'oeil easel painting. In Van Hoogstraten's *Feigned Letter Rack*, there is barely any illusion of depth. The vanishing point toward which our eye would be directed in all other kinds of painting is here significantly absent. Notwithstanding the absence of depth, perspective is not absent but is, so to speak, *turned inside out.*
>
> A schematic diagram illustrating the basic idea of perspective may illuminate the complexity of the perspectival organization of the trompe l'oeil. In the classic construction of perspective, the sense of space is rendered through the use of two symmetrically determined points: the vanishing point located on the horizon of the picture and the point of view outside of the image where the beholder is presumed to stand. Ideally, these two points are connected by means of orthogonals, which fan out from the vanishing point into the picture plane, and from there converge in the point of view. In the diagram, the picture plane forms the axis linking the bases of two so-called visual cones or pyramids that mirror each other. Whereas the triangle lying "in" the picture depicts a truly mathematical space, the second triangle that actually should exist outside the picture has to be imagined within it.
>
> In trompe l'oeil painting, these two triangles or pyramids are subjected to reversibility. The mathematical space that is supposed to be depicted *in* the picture has been hollowed out in a forward direction and has to be imagined *outside*, the space of the actual viewer. In terms of the diagram, we can understand this operation by imagining the two visual triangles being folded onto one another until the vanishing point and the viewpoint merge with each other. The gaze of the viewer is no longer able to look "into" the painting but instead ricochets off the surface of

the picture, bouncing back to the viewing eye, the place from
which it originated. The blind spot of linear perspective, that is,
the vanishing point to which the viewer's eye is directed, can
never be reached – or, for that matter, seen – and collapses with
the point view from which seeing is made possible. The dialectic
of possible and impossible moments of seeing that coincide
outside of the frame, in the beholder's eye, produces the optical
effect of deception." (Grootenboer p.54)

The diagram below illustrates Grootenboer's theory for the perspectival construction of trompe
l'oeil:
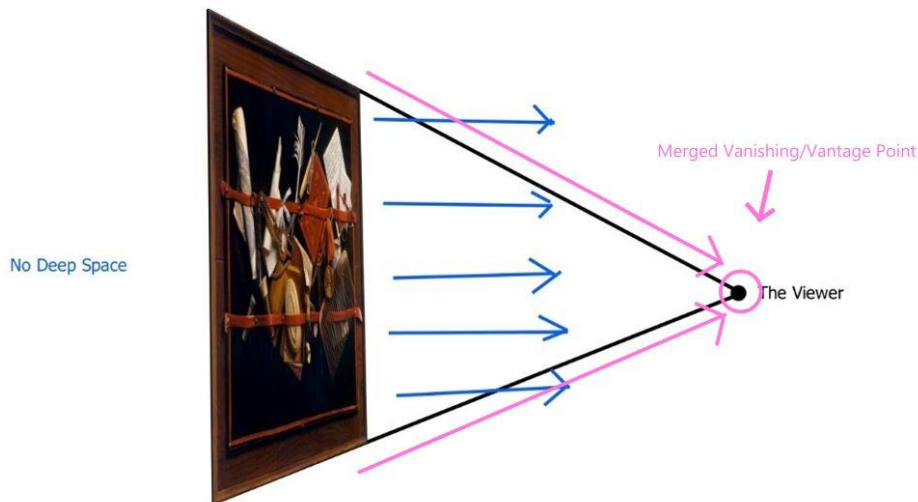
Here we see that the imagined vanishing point of our earlier example of landscape painting is
no longer in an implied space beyond the surface. Instead, the vantage point (spot from where
the viewer is looking) and vanishing point are one in the same. Alberti would have described
this as the 'visual rays' bouncing off the surface of the picture and back to us. The picture is
trading the ambitious illusion strategy of deep space for a space that is maybe only inches deep
in our perception. The result is such that the materiality of the painted surface can momentarily
take the place of *real* materiality depending on the technical skill of the artist. The effect is to
briefly trick the brain into believing the material properties of the image to be made of cloth,
metal, fruit, glass, etc. instead of oil paint. "The trompe l'oeil offers us the reverse side of our
visual field, of the things that we do perceive. The things "look back" at us from a position we
ourselves cannot occupy in order to see ourselves seeing." (Grootenboer, p. 56)

7

Grootenboer's dialectic of possible and impossible moments of seeing has profound implications for our understanding of pictorial illusionism in the digital space. The perspectival merging of the vanishing and viewpoint creates a singularity of perception that merges the consciousness of the viewer with the implicit consciousness of the image. The image in a sense *watches you.* In the history of still-life painting, this was a relatively innocuous phenomenon resulting in 'believable' images that tricked the eye and greatly entertained viewers. A painting existed in one place and time and the dialogue between art object and viewer happened in an instant and was only experienced by the viewer. In other words, the exchange was a closed system, a private experience.

The ancient Greek story of Zeuxis and Parrhasius illustrates the cultural fascination with trompe l'oeil:

> "The two were said to be the best painters of the fourth century BCE. The elder Pliny recorded a myth surrounding a competition between the two painters. It is said that Zeuxis created grapes that were so realistic that birds saw the image and attempted to eat them. Shortly after he went to view Parrhasius's painting, and asked that the curtain be lifted so he could look at the image only to discover that the curtain was itself the painting. Zeuxis acknowledged his defeat, because while he had tricked birds the curtain of Parrhasuis had deceived a man and fellow artist." (Whitley)

This oft recounted story captures the playfulness of the genre and the ways it was employed as a demonstration of technical mastery. However, our relationship to trompe l'oeil changes entirely when there are a real set of eyes (or an artificially intelligent viewer) on the other side of the image. Convincing illusionism becomes a space of potential collaboration and also deception. The experience of a single trompe l'oeil painting might trick the mind for an instant before the viewer becomes aware of the trick. What happens when a computer produces illusionistic images at 60hz (or 60 frames per second) or more? The result is prolonged illusion on a scale that can fundamentally alter an individual's actual perception. Likewise, the power of the image maker in this case which might be a programmer, artist, government, algorithm, etc. is elevated far beyond the status of entertainer or even communicator to an active architect of thought. Furthermore, the prolonged experience of illusion complicates our assumptions about what a real space is.

Technical and Theoretical Exploration of Work

      The body of work that accompanies this paper consists of interactive animations that pair 3D computer graphics with computer vision and physical computing. Using Processing, a Java-based ide and coding language, OpenCV, an open-source library for computer vision, and other software/hardware platforms, I have developed custom software works that pose an alternative viewer-artwork relationship in the still-life genre. There are eight pieces in the accompanying exhibition. Two are projected at large scale using webcams to detect motion. Two are shown on monitors and detect human faces using webcams. One piece uses an Arduino microcontroller installed behind an oil painting that receives input through pressing on its face. The remaining three pieces are looping animations that can either be projected or shown on monitors.

      In one of the pieces titled *Exfoliation,* the viewer is confronted with a still life composition very much inspired by Jacob De Gheyn ll's famous *Vanitas* work from 1603 seen below:

Vanitas, Jacob De Gheyn II, 1603

      In *Exfoliation,* we see a niche, a crumpled letter, a branch, a browning leaf swaying in the breeze, and a pile of unidentified debris. When the program detects the presence of a human face, the pile of debris floats into the air and forms a human skull. The skull, a common

motif in Dutch Vanitas imagery, then turns to face the viewer relative to their location in front of the camera. When a face is no longer detected, the skull shatters back into debris and falls. A looping animation in the upper right corner shows a brown leaf blowing in the wind, apparently stuck to a spider web, creating the illusion of constant motion. Below we see the animation state when a face is and isn't detected:

Exfoliation – example screenshots

The following code example and illustration give us a peak into how this illusion works. First, animations are created and rendered into image sequences (jpeg if there are no transparent sections, png if an alpha channel is necessary). These image sequences are loaded by the program into an array of images (or frames) with a length that corresponds to the animation's length (example: 30 second animation at 24fps = 720 images in the sequence). These individual frames can then be displayed dynamically by the program and different animations can be displayed simultaneously in different regions of the composition. This is what allows the leaf and skull animations to happen independently from one another. For *Exfoliation,* the skull has a turning animation that is associated in the code with the x-location (point in space from the left to right side of the screen) of a tracked face. Illustration below:
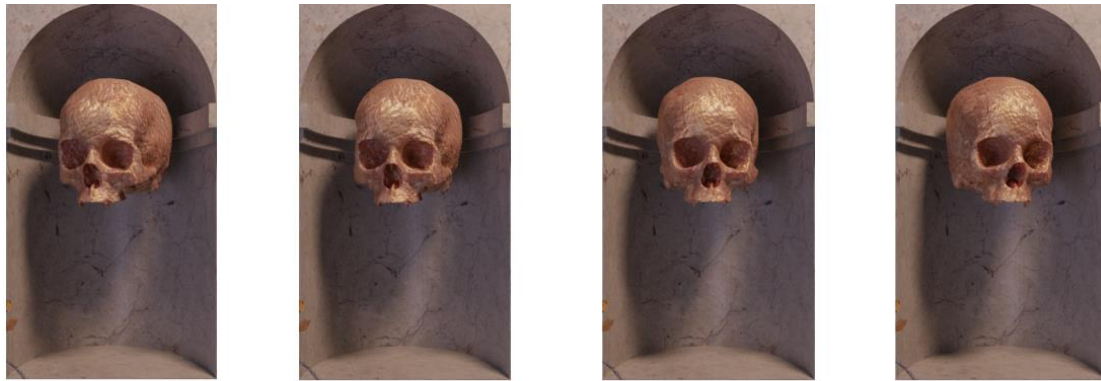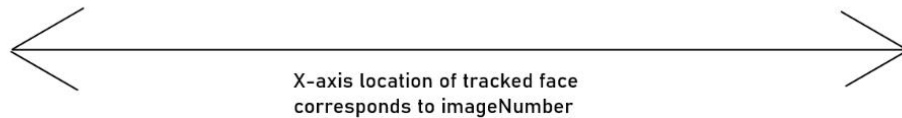
image001   image050   image100   image150

X-axis location of tracked face
corresponds to imageNumber

Exfoliation – illustration of skull turning animation mechanic

In the code, this is written as: mapNum = map(faces[0].x, min x value, max x value, min frame number, max frame number);. By using the map() function, the program passes the x-location values to a variable that controls the image number (frame number) to display. Below is a screenshot of code containing this algorithm:

```
opencv.loadImage(cam);

PImage img = stillLife[imgNum];
PImage leafImg = leafImgs[leafImgNum];
PImage skullTurn = skullTurnImgs[turnNum];

image(img, 0, 0);
image(leafImg, width - leafImg.width, 0);
image(cam, 20, 50);
image(mirrorFrame, 0, 0);
tint(255, 125);
image(mirrorGlass, 0, 0);
tint(255, 255);

Rectangle[] faces = opencv.detect();
for (int i = 0; i < faces.length; i++) {
  stroke(255);
  noFill();
  rect(faces[i].x + 20, faces[i].y + 50, faces[i].width, faces[i].height);

  mapNum = int(map(faces[i].x, 5, 130, 80, 20));
  if (imgNum == 0) {
    if (turnNum < mapNum) {
      turnNum++;
      if (turnNum >= 80) {
        turnNum = 80;
      }
    }
    if (turnNum > mapNum) {
      turnNum--;
      if (turnNum <= 20) {
```
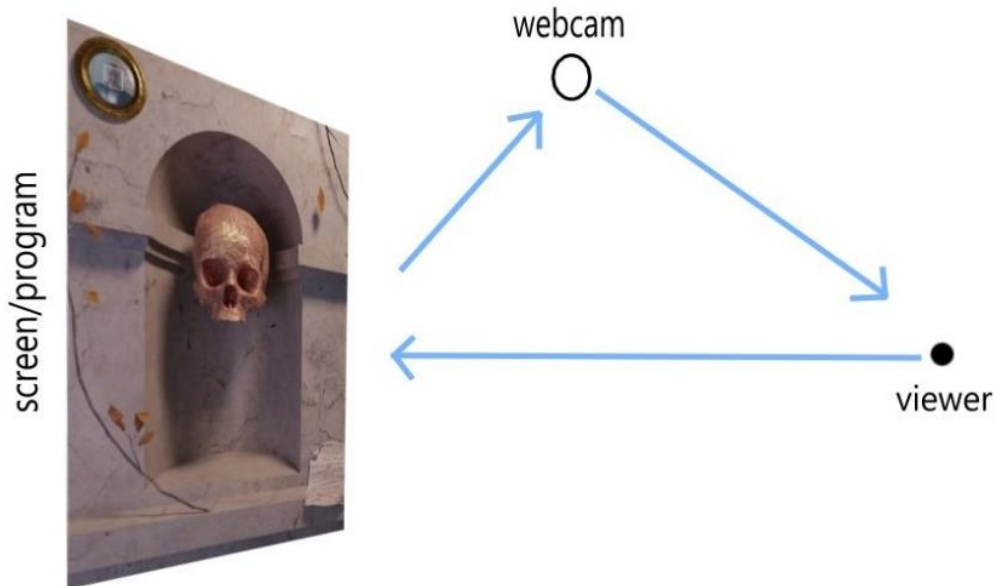
Exfoliation – code screenshot

Exfoliation poses an alternative interaction between artwork and viewer that complicates Alberti's perspectival diagram. The image below shows how this relationship has changed:

Exfoliation – perspective diagram

Here we see that there are now **two** vantage points influencing the interaction of artwork with viewer, the viewer and the webcam. The computer is now an active participant in pictorial dialogue. If we compare this to the Albertian diagram mentioned earlier, we see that there is no longer a singular source of 'visual rays' but multiple sources working in tandem with the viewer. This could be expanded to include many other technological vantage points such as audio recording, motion sensing, heat detection, physical interfaces, etc. that all interpret sensory information using a computer. In the case of this still life, how the image looks changes dynamically over time when aware of the viewer's presence. Where in painting we have the implication of a window, i.e., an imagined vanishing point somewhere beyond the picture's surface, we now have something that exists in the liminal space between illusion and reality. Grootenboer's "dialectic of possible and impossible moments of seeing" referenced earlier describes a dialogue between the viewer's perception and their own interpretation of that perception. When non-human vantage points are added to the equation, we now have a dialectic between the viewer's senses, the computer's analysis of input, and the viewer's resulting interpretation of that interaction. Like the window becoming some degree of 'real', the dialogue between picture and viewer expands beyond the imagination alone to include real world interaction.

The implications of this phenomenon grow the interpretation of pictorial space to include the perception of time as well. De Gheyn's painting alludes to the brevity of life indirectly through the symbolism of certain objects. These include the skull (death), money (the futility of effort), tulip (phases of life), and the bubble (a symbol of brevity). *Exfoliation,* however, offers an *experience* of time passing through animation. The skull shatters and the leaf blows in the wind. Regardless, the animations always have a beginning and end that they return to. They are flexible and reactive but ultimately unchanging thereby still communicating directly with the still-life genre. The introduction of interactivity through computer vision adds a level of perception not possible in a still image. Technology, in a sense, expands the perceptual faculties of the viewer. This is the importance of multiple vantage points in liminal perspective and why computer graphics have fundamentally changed the way we relate to illusionistic imagery. For instance, change can be *experienced*, or at least simulated, as opposed to *described.* Before moving image technology, pictures were an artefact of experience that relied on the material qualities, surface facture of the artist's mark-making strategy, and narrative structures to guide the viewer's mind into an experience of change they had developed previously through their own personal experience. Vermeer's light points to our own understanding of light and the similarity between the two is what we refer to as his 'mastery'. Animation's ability to show change over time, however, begins to blur the artist's description of change with a 'real' experience of change. Subsequently, moving-image technologies are beginning to produce experiences that are increasingly indistinguishable from non-mediated experiences. Emergent technologies like augmented and virtual reality are already compromising traditional interpretations of real space.

Here it becomes necessary to distinguish between 'illusion' and 'reality' because the debate surrounding those words is amplified in the digital space. One can easily make the argument that our phenomenological experience of 'real' space is a mental construction just like experiencing a painting. The eyeball works a lot like a projector by taking in visual information and processing it in a way that is understandable to our brains. Light passes through the pupil and becomes a two-dimensional projection on our retina. Photoreceptors then translate the information into electrical signals which are then sent to the brain and translated into images (National Eye Institute). 3D space is simply how we conceptualize the information our brain is given by these signals. Subsequently, one could argue that a painting is in some ways just as 'real' as looking out on an actual landscape. However, I think painting specifically defines its own experience as an 'illusion' because of historical and social conventions. Especially in a museum or gallery context, looking at a painting is always the experience of oneself looking at a painting. Don DeLillo, in his 1985 novel *White Noise,* gives a perfect example of this phenomenon (paraphrased):

> "THE MOST PHOTOGRAPHED BARN IN AMERICA. We
> counted five signs before we reached the site…. "No one sees the
> barn," he said finally…. "Once you've seen the signs about the
> barn, it becomes impossible to see the barn." …. "We're not here

to capture an image, we're here to maintain one. Every photograph reinforces the aura. Can you feel it, Jack? An accumulation of nameless energies."…."Being here is a kind of spiritual surrender. We see only what the others see. The thousands who were here in the past, those who will come in the future. We've agreed to be part of a collective perception. It literally colors our vision. A religious experience in a way, like all tourism."…."They are taking pictures of taking pictures." (DeLillo)

Like the "most photographed barn in America" the painting has control over its own interpretation. In some ways, it's seen before it's actually seen. The rarified experience of 'fine art' is illusion because it has pitched itself that way. We approach a trompe l'oeil painting with the predefined understanding that we're witnessing illusion as a theory. With that in mind, 'illusionistic' space could be interpreted as pictorial space which has the viewer's awareness of their own seeing built into it. Subsequently, an interactive digital piece that observes the viewer in a literal way is a seeing entity - seeing an entity - see itself - seeing. That's where the "looking back at you" idea becomes meaningful.

However, the ubiquity of technology makes it a more passive experience than looking at a painting. We look at screens more often than out the window. Technology is attempting to become indistinguishable from 'real' experience which I would define as the passive sensory experience of our surroundings. This dichotomy of 'real' and 'illusionistic' space, in my definition, relies not on the physical situation or mode of visual input, but on the conceptual context of the experience. In the history of Dutch Golden Age still-life painting, pictures were an opportunity for the viewer to experience their own culturally defined interpretations of symbolism. Underneath these obvious contents, the artists developed sophisticated geometric structures of perspective that I would argue contain just as much 'content' as any historical or personal imagery. Like DeLillo's barn, the way we conceptualize 3D space in a picture is an assumption created by those who came before us. Technology, however, does not rely on norms to construct its interpretive theories. It relies on hardware. There is then no meaningful reason we can't see through walls or see in more than 3 dimensions if our understanding of space is a conceptual and cultural activity, not a 'real' one. Our hardware might just be evolving more rapidly than our philosophies.

Another piece called *Surface Tension* illustrates a possibility for expanded perception through hardware. A Vanitas painting of my own making is made into a pressure-sensitive physical interface using an Arduino micro-controller and a force sensitive resistor installed in the frame behind it. The viewer can press on the face of the painting like a pressure plate which sends serial data out to a computer. On a monitor, an animation showing the reverse side of a canvas appears to show the viewer press on the painting from the opposite side. A similar algorithm to our previously discussed example maps the serial data to frame numbers of the

animation. The harder the viewer presses, the further through the animation the program displays. The result is a hardware-mediated expansion of perception to allow the vantage point of the viewer to exist both in front of, *and* behind, the painting.
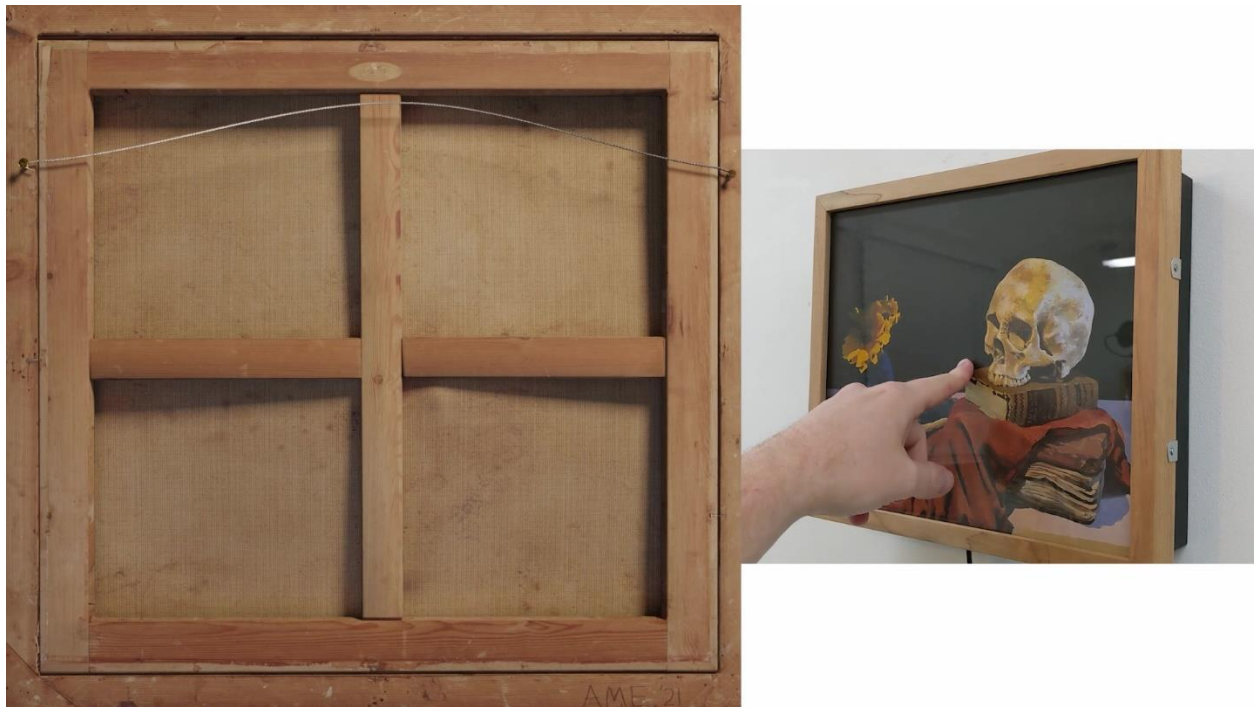

Illustration of *Surface Tension*. Pressing on the painting's face triggers animation on left

Surface Tension is a kind of homage to Cornelis Gijsbrechts's *Reverse Side of a Painting* from 1670 (pictured below). He was a well-known trompe l'oeil painter in the Dutch Golden Age who playfully disrupted traditional interpretations of pictorial space by presenting visual paradoxes such as these. His piece essentially gives us two simultaneous vantage points: in front of, and behind the painting. Our two stages of perceptual interpretation happen as follows: First, we see what appears to be a dimensional, albeit shallow, rendering of a painting surface from behind. Second, after we realize the trick, we perceive the surface of the painting itself (i.e., the canvas or wood the picture is painted on). This isn't, however, an actual manifestation of multi-perspectival perception. Stage one happens entirely in the mind and stage two happens through 'literal' sensorial input.

Cornelis Gijsbrechts. *Reverse Side of a Painting.* 1670

Surface Tension seeks to allow stage one of this perceptual process to last indefinitely (or at least a little longer) by allowing the viewers 'real' physical interaction to be registered by the image. The false materiality of the canvas (cotton, wood, hardware, etc.) is made more 'real' by its ability to respond dynamically to the world. The animation is not a video capture of what's actually happening on the reverse side of the painting. In fact, the painting is made on panel and the animation appears to show canvas! Regardless, the boundary between 'realism' and 'illusion' is disrupted because the interaction of artwork and viewer happens in *real time*. The viewer can 'see' the manifestation of their interaction happen in a space inaccessible to the visual field of their eyes. In effect, their perceptual faculties are expanded when their vantage point merges with that of the program.

The idea of our consciousness merging with technology is well-explored in the realm of science fiction but isn't largely recognized in mass culture. In fact, this previously imagined reality is *already happening.* When many of us leave our smart phones in another room, there is often a phenomenological sense of loss much like phantom limb syndrome. We feel only partly physically present without this technological appendage. Likewise, much of our knowledge (especially factual, geographical, and mathematical) has been outsourced to these devices. Works like *Surface Tension* seek to give physical and aesthetic form to this phenomenon and contextualize a relatively novel experience through the lens of art history.

Contemporary Artists Influential to My Practice

The artists represented in this section are meant to give context to my practice from a contemporary perspective. While the works in *Liminal Perspective* focus mainly on Dutch Golden Age artists, these practitioners have influenced my work in many areas relevant to this paper. These areas include still-life, creative coding, sculptural painting, site-specific installation, historicization, and institutional critique among others.

Tishan Hsu –

      The multi-media artist Tishan Hsu's work focuses on the ontological challenges posed by the development of new technologies and specifically approaches those questions through the lens of painting and sculpture. Hsu openly identifies as a cyborg but not in the way we typically define the term. He believes our physical and perceptual experiences are already fundamentally altered and guided by our devices. They don't necessarily need to be surgical implants or augmentations like we see in science fiction. Google, for instance, keeps track of factual knowledge and occupies a space similar to that of an external brain. Many kinds of intellectual processing have already been outsourced to semi-intelligent devices like smart phones.
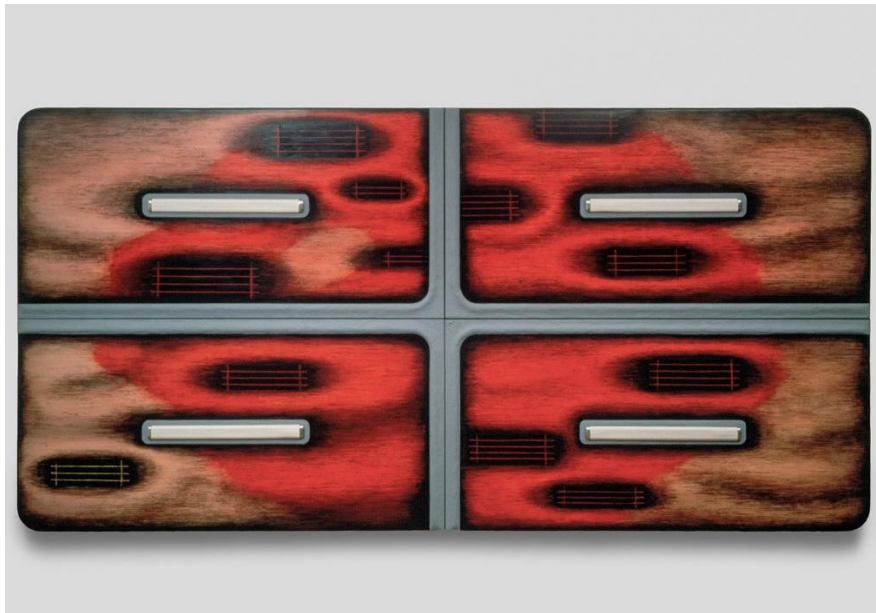
Tishan Hsu – *Cell.* 1987

      In Hsu's influential work from the 1980's, He explores a visual language for describing the intersection of circuitry and biology. In *Cell,* we see a grided composition that fluctuates equally between regularity and organic forms, imagining a kind of hybrid figurative and

geometric formalism. The aspect ratio of the image also predicts smart phone screens decades in the future. Through the language of painting, Hsu creates a highly original formalist language for considering the intervention of technology with our bodies. His work has influenced mine by creating a sculptural vocabulary that pulls equally from the world of computers and of painting.

Ian Cheng –

The digital artist Ian Cheng uses live simulation to explore alternative definitions of natural systems. Using game engines like Unity in conjunction with artificial intelligence, Cheng's work evolves over time and is never the same from one moment to the next. His worlds are filled with humanoid and animal characters who navigate interpersonal conflict and communication in evolving landscapes that use the visual language of video games. My work has been highly influenced by the fluidity of Cheng's. The idea that a piece can change over time or respond to its surroundings calls our traditional concepts of pictorial space into question. My analysis of still-life is very much indebted to his analysis of landscape.

Ian Cheng. *Emissaries Forks at Perfection.* 2015-17

In Cheng's body of work *Emissaries* is a "trilogy of simulations about cognitive evolution, past and future, and the ecological conditions that shape it. It is composed of three interconnected episodes, each centered on the life of an emissary who is caught between unraveling old realities and emerging weird ones." (Cheng. Web)

Using artificial intelligence to approximate human evolution, *Emissaries* creates an entire ecosystem that exists purely in a virtual space. The possibility of human evolution's

interconnectedness with virtual spaces has huge implications for the future of our biological development.

Jordan Wolfson –

    The conceptual and multi-media artist Jordan Wolfson uses installation-based works to challenge ethical issues like complicity and the gaze within mediated experiences. In his virtual reality work *Real Violence*, exhibited at the 2017 Whitney Biennial, viewers are confronted with a realistic depiction of the artist himself assaulting someone with a bat. Regularly making eye contact with the viewer, we are challenged to think about our own role in this experience. What responsibility or connection do we have to *real violence* when we witness it in this virtual context? Wolfson's controversial explorations get to the heart of our need for more evolved ethical theories in light of emergent tech. In an age when many of us passively consume violent or exploitive imagery on a daily basis, we must question our role in the proliferation of this violence for our consumption. Wolfson's foregrounding of these ethical questions is hugely influential to my exploration of 'seeing' technologies.

Jordan Wolfson. *Real Violence.* 2017

Josephine Halvorson –

      Halvorson is an accomplished painter who was an influential teacher of mine at Boston University. Her work is all made *en plein air* in the span of usually a single day, directly from observation. The series titled *Night Windows* made while at the French Academy in Rome explores interpretations of the same subject night after night. The result is a kind of ultra-durational animation unfolding at roughly one frame per 24 hrs. Subtle changes in light and the artists own psyche are documented as a kind of seeing through painting. Her exploration of trompe l'oeil in relation to plein air and still life excavates the power of image making to operate as a lens through which to observe her surroundings. Halvorson's emphasis on duration in her painting practice has helped blur my personal concepts of still and moving image.

Josephine Halvorson. *Night Window (series).* 2015

Susan Philipsz-

      The sound artist Susan Philipsz explores the interconnectedness of architecture, sound, and history. Creating site-specific audio installations, Philipsz encourages listeners to consider how the physical experience of sound influences the phenomenological interpretation and historicization of public and personal space. In her 2015 work *War Damaged Musical Instruments,* Philipsz recorded musicians attempting to play instruments that have been damaged in conflicts throughout history which she borrowed from museums. The resulting piece is a haunting ambience that creates a presence through an absence: loss of life, damage to the body and mind, or lost histories that we'll never fully recover. Philipsz work exemplifies restorative applications for audio technology and has important implications for our concepts of memorialization and historical documentation. Her emphasis on the interaction of artwork with architecture has profoundly influenced the way I think about installation art. Basic aspects of an artwork like geographic location can profoundly influence the viewer's interpretation of the piece.
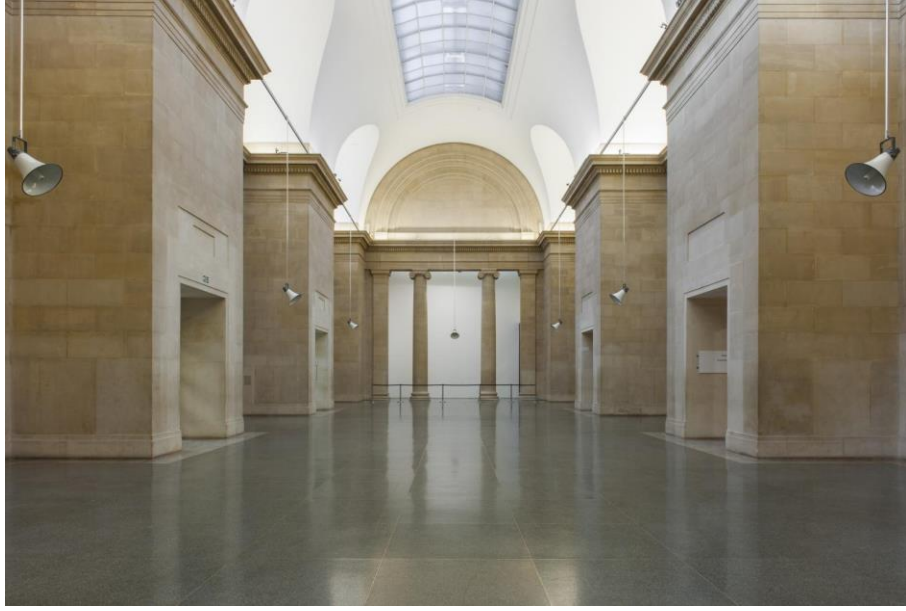
Susan Philipsz. *War Damaged Musical Instruments.* Installation view. 2015

Conclusion

Expanded perceptual experiences like those explored in *Liminal Perspective* happen all the time through our daily interactions with technological interfaces. Usually without consciously realizing it, our perception is expanded by new technologies in ways that fundamentally challenge our assumptions about the body and what it's capable of. One common example are Ring doorbells or other household surveillance tech. Our perception is no longer restrained by basic phenomena such as occlusion, or objects closer to us visually blocking those behind them. These devices allow us to see through walls in real time. Google Earth, likewise, allows us to see geographic locations on other continents instantly and in a kind of pseudo-3d. Our traditional notions of embodiment are being continually stretched as these technologies improve to include greater levels of 'presence' through visuals, yes, but also sound, touch, interaction, etc.

In the relatively comfortable context of still-life painting, we can consider the implications of this augmentation under the conceptual umbrella of perceptual philosophy that still-life often addresses. Like the barn, we can see ourselves seeing and might be enabled to think critically about that experience. The realm of visual art is a kind of laboratory for imagining new possibilities for human creativity and community, and for challenging the potentially problematic applications of new ideas and technologies on culture.

However, the development of these new seeing devices seems to be happening much more rapidly than our arts, philosophies, and ethics are keeping up with. Corporations and governments alike have wielded the power of these devices to great effect. If a trompe l'oeil painting can fool the brain for a moment, illusionistic imagery fed to a personal screen at 60+ frames per second can shape the mind itself. Social media companies especially have developed sophisticated platforms for creating a simulacrum of lived experience that goes so far as to replace in-person social interaction for many people. Never in human history has pictorial space been such a battle ground for the manipulation of human thought.

Bibliography

Alberti, Leon Battista. *De Pictura*. 1435.

Delillo, Don. *White Noise*. Viking Press, 1985.

"Emissaries." *Ian Cheng*, iancheng.com/emissaries. Accessed 19 Apr. 2022.

Grootenboer, Hanneke. *The Rhetoric of Perspective: Realism and Illusionism in Seventeenth-*
    Century Dutch Still-Life Painting. University of Chicago Press, 2006.

"How the Eyes Work | National Eye Institute." *National Eye Institute*, www.nei.nih.gov/learn-
    about-eye-health/healthy-vision/how-eyes-work. Accessed 19 Apr. 2022.

"Ian Cheng: Emissary Forks At Perfection." *Pilar Corrias*, www.pilarcorrias.com/exhibitions/48-
    ian-cheng-emissary-forks-at-perfection. Accessed 19 Apr. 2022.

"Night Windows." *Josephine Halvorson*, www.josephinehalvorson.info/night-windows.
    Accessed 19 Apr. 2022.

Tate. "'War Damaged Musical Instruments', Susan Philipsz, 2015." *Tate*,

www.tate.org.uk/art/artworks/philipsz-war-damaged-musical-instruments-t14843.

Accessed 19 Apr. 2022.

"Tishan Hsu: Liquid Circuit | Hammer Museum." *Liquid Circuit*,

hammer.ucla.edu/exhibitions/2020/tishan-hsu-liquid-circuit. Accessed 19 Apr. 2022.

Whitley, James. *The Archeology of Ancient Greece*. United Kingdom, Cambridge University

Press, 2001.

"Whitney Biennial 2017." *Whitney Museum of American Art*, whitney.org/exhibitions/2017-

biennial?section=62#exhibition-artworks. Accessed 19 Apr. 2022.