

## Augmented Reality in Art: Aesthetics and Material for Expression

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*Cinematic Apparatus theory of the 1970s set the stage for an investigation of cinematic expression in avant-garde film art through a deconstruction of its materials. The material and production elements repressed in the normal ideological apparatus became the arena for new expression. Cinema accelerated the mechanization and sequence of its era to create the essential medium of that era; Augmented Reality is a similar acceleration of the electric image that first emerged with electric video installation. Using Jean-Louis Baudry's diagram of the cinematographic apparatus as reference, this essay excavates and diagrams the electric image apparatus to search out the repressed and revealed in viewers' perception. For AR, the first medium which fully realizes the electric image, a new way forward is proposed, towards an avant-garde AR(t).*

Stephen Heath begins his introduction to the collection of essays, *The Cinematic Apparatus*, with an observation on proto-cinema advertisements:

*In the first moments of the history of cinema, it is the technology which provides the immediate interest: what is promoted and sold is the experience of the machine, the apparatus. The Grand Café programme is headed with the announcement of 'Le Cinématographe' and continues with its description: 'this apparatus, invented by MM. Auguste and Loius Lumière, permits the recording, by series of photographs, of all the movements which have succeeded one another over a given period of time in front of the camera and the subsequent reproduction of these movements by the projection of their images, life size, on a screen before an entire audience'; only after that description is there mention of the titles of the films to be shown, the 'sujets actuels', relegated to the bottom of the programme sheet. (Heath 1980)*

The context here, in a compilation of essays inspired by Jean-Louis Baudry's essay "Ideological Effects of the Basic Cinematographic Apparatus," is that after sixty years of critics analyzing film on the basis of dramatic text, aesthetic composition, photographed subject, and psychology, Apparatus Theory in the 1970s had finally codified an analysis of cinema based on its essential unique elements— it's material for expression taken as a whole; what McLuhan would term the Medium not the Message. In Baudry's 1970 essay, he draws a diagram of the 'cinematographic apparatus' delineating the path that the spectators' perceptions normally travel, noting what is emphasized and what repressed. I redraw it here in Figure 1.

The text in the diagram notes elements of the apparatus: the cinema screen, the projector, the montage/cutting of the film, the principal production of sound and film, the screenplay, the photo-emulsion-captured objects in past reality. We could add many more: the dramatic acting, the framing, the soundtrack and sound looping, the business machinations which create the theaters and distribute the film... The solid line draws the path of the cinema information, from staged scene, to framed shot on film, to the editing room, projector, and cinema screen. The dotted line draws the spectators' perception of The Film— that of which the spectator is aware; many of the apparatus elements are repressed in favor of 'suspension of disbelief' and 'persistence of vision' in the cinema experience. In Baudry's diagram

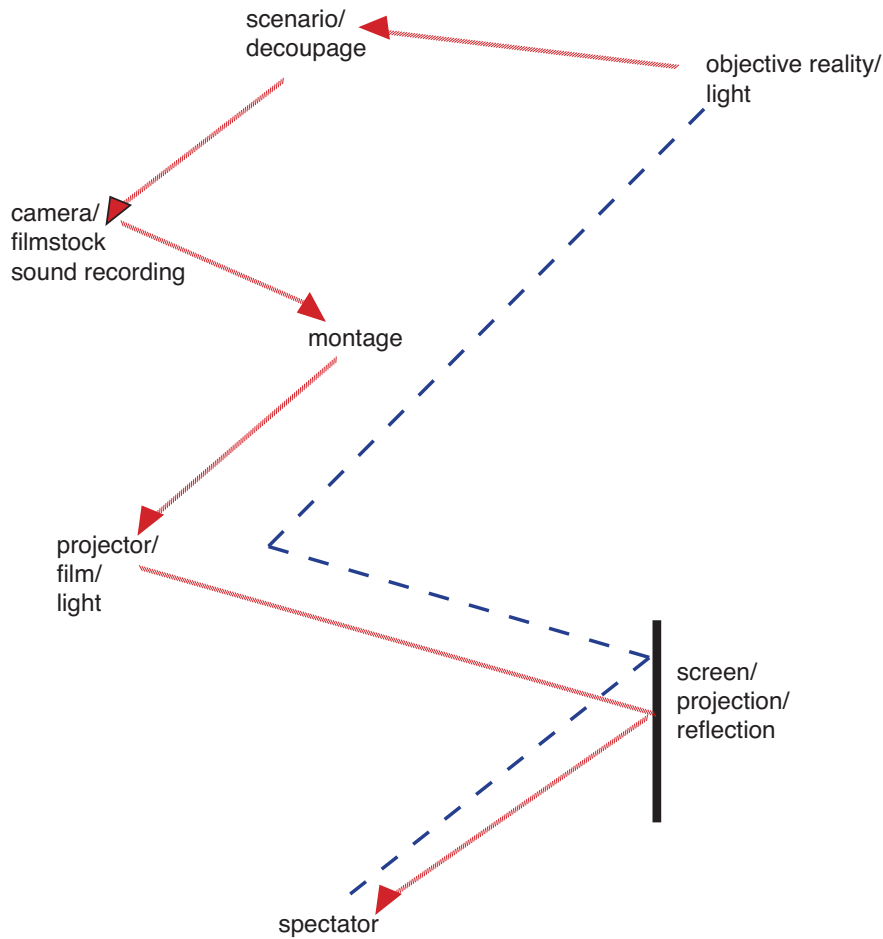


Fig. 1: Cinema Apparatus (Baudry 1974)

there is an emphasis on the analogic quality of cinema— the photographic actuality of it: the viewer feels like they are seeing the actual light reflected by the captured-objects, not seeing a picture of a car, of a beautiful face, of a camel crossing the dessert, but seeing a present car, face, camel. This is not an absolute cinema— the viewer is still conscious of the film-Making, but the dotted line represents the extent to which these different elements are present in the mind of the spectator. It is a sketch of the cinematographic ideology. The spectator remains aware of the screen— if not, then they might run from the theater when a dinosaur enters frame or a gun is shot. Less so are they conscious of the projector and the beam emanating from it— if dust or smoke obfuscates the beam, or if the film shakes in the projector gate or even burns up, then this drawing attention to the projector would be a failure that ‘takes us out’ of the experience of the movie. Though vaguely conscious of the editing, the spectator is almost completely unconscious of the filmstock and sound recording choices— if these things are noticed at all it is a failure of production (such as in cheap B-movies where there are jarring changes between film stocks with different grains or scratchy soundtracks). And the same can be said of the scripting and acting— once we notice the acting of the drama or the scripting of the drama we are no longer in the drama where we are supposed to be. Artists of the same decade subverted this standard perception through different techniques seeking in the elements repressed within the cinematographic apparatus a fresh material for

expression— a material essential to cinema capable of an avant-garde Acinema. Anthony McCall created films that emphasized the projector beam. Stan Brakhage made films that emphasized the interaction of the projector light and the material of the film strip itself. Flickerfilm makers like Tony Conrad and Paul Sharits created metrical montage films that emphasized the cutting and rejoining of film strips and their mechanical movement through the projector light. Filmmakers like Jonas Mekus, Kenneth Anger, and Jack Smith made avant-garde films that turned upside-down the emphasized and repressed areas of production, scripting, and performance. Avant-garde film sought to rupture the ideology inherent in the cinematographic apparatus, to create a fresh image capable of inspiring new thoughts, emotions, and politics.

This movement seeking a phenomenology of cinematic apparatus arose in the television era. With the newly wired world, a media philosophy that could encapsulate the connections and circuits of contemporary technology into a conceptual whole was attractive and maybe necessary for survival. McLuhan's analogy, a decade earlier, in *Understanding Media* of sound waves becoming visible just as a plane approaches the sound barrier seems prescient—like much of his book—of the networked age:

*The sudden visibility of sound just as sound ends is an apt instance of that great pattern of being that reveals new and opposite forms just as the earlier forms reach their peak performance. Mechanization was never so vividly fragmented or sequential as in the birth of the movies, the moment that translated us beyond mechanism into the world of growth and organic interrelation. The movie, by sheer speeding up the mechanical, carried us from the world of sequence and connections into the world of creative configuration and structure. (McLuhan 2003)*

We can transpose this analogy to another age and transition— to the networked electric image which began with live video and has been accelerated in AR. Augmented Reality, in all its permutations of live manipulated media, is the first truly network-age screen media— not just movies broadcast over electric wires, or recorded on to digital media, or enhanced through computer-calculated effects, but a medium which takes live media manipulation as its essence and material. With this acceleration, we can look back to excavate the material shift from the filmic image to the electric one.

I consider the video art of the 70s, proto-AR. Like the proto-cinema program cited by Stephen Heath, video art in the gallery is defined by its apparatus— the apparatus locates the genre. A Bill Viola video work, represented on James Cohen Gallery's website, describes the artistic material, "Color High-Definition video triptych, two 65" plasma screens, one 103" screen mounted vertically, six loudspeakers (three pairs stereo sound)" (for the work, *Ocean Without a Shore*, 2007). SFMoma, in their web catalogue, gives the genre or medium of Peter Campus' 1975 video art work 'Dor', "closed-circuit color video installation," but to truly locate the work below they note, "A discreet video camera is placed near the entrance, filming visitors entering and exiting the space; their live image is projected onto an adjacent wall." Then it goes on to the "sujets actuels." In description, these are not video works made of light, subjects, scenes, or even images, instead they are configurations of wires, capture devices, and rendering screens. In 1976, as video art came on the scene, Rosalind Krauss wrote the well known essay, "Video and the Aesthetic of Narcissism," which addressed many of the new video works, including the above mentioned 'Dor' by Peter Campus, and hypothesized a fundamental shift in the practice of art and its material for expression. In it, Krauss theorizes that these artists' expressions must be worked through "an object-state, separate from the artist's own being, through which his intentions must pass," like the pigment bearing substances of painting and the matter through space of sculpture: a material for expression that was the artist enmeshed in the media apparatus— a psychological state as material. She defines the crucial element of the looping electric video circuit images of Acconci and Campus as the instantaneity of the communication from notion to message: "This is why it seems inappropriate to speak of a physical medium in relation to video. For the object (the electronic equipment and its capabilities)

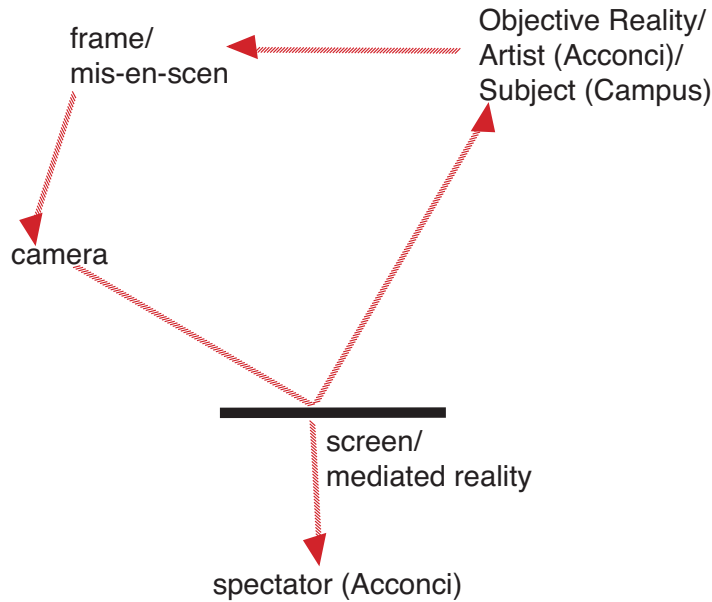


Fig. 2: Video Art Apparatus as described by Krauss

has become merely an appurtenance. And instead, video's real medium is a psychological situation, the very terms of which are to withdraw attention from an external object—an Other—and invest it in the Self." The object is bracketed out, and instead the artist is creating within a psychological state invoked by the mapping of the mind onto this network; the medium becomes the nervous system. In her analysis this self-gazing video art, such as Vito Acconci's long-take videos, are for the spectator like viewing an electronic and psychological loop between the artist, camera, and screen. Krauss differentiates the video works: installations like Campus' 'Dor' which install the narcissistic circuit within the gallery, and works like Vito Acconci's 'Centers' (a looping pre-recorded video in which Acconci, watching himself in his live video monitor, repeatedly points at the center of the screen, coincidentally at the viewer and the focal point of the art work) which use the narcissistic circuit as a stage for performance that is then played back in the gallery. One is documentation of an apparatus and the other installation of apparatus in which the viewer is immersed. Like avant-garde film, these works seek to reveal the apparatus to the spectator—the perception and the construction are identical. In the fashion of the Baudry diagram, we could draw the video art apparatus like I have in Figure 2.

There is no need for a dotted line because the perception of the viewer travels the same route as the wires. Both types of works are loops, one presented as an object in the gallery, the other actually installed so that it can be stepped within (and frustrated in the case of Campus' 'Dor'). In 'Dor', the viewer's perception should grasp equally the presence of the screen and the camera and the wire between them; this is the point. In Acconci's 'Centers', the viewer is to be aware of Acconci watching both the camera and the screen attached to it and performing within that circuit. In both works, the frame of the camera is the context of the conceptual statement—the framed square of the gallery canvas for Acconci, the frame that separates the narcissistic projection from reality for Campus. Augmented Reality uses cameras streaming live to screens in a similar way, but, as in the cinematographic apparatus, there are additions to the stream.

Ronald T. Azuma in an early 1997 survey of the Augmented Reality medium drew the diagram I have redrawn in Figure 3. Missing in this diagram is the line of perception—what the spectator expects and ignores—but the similarity to Baudry's 1970 diagram of the cinema apparatus is obvious. In place of the manipulation of live objects through scripting, set design, dramatic direction, here there is a direct live stream from the camera, the 'reality' that is being augmented. In place of the screen there is the possibility for glasses—an invisible immersive screen that is not framed within a theater but is the theater enveloping the spectator. In place of montage is the 'scene generator' that creates the augmentations, those virtuals not truly present in the live video capture, and in place of the projector, a 'combiner' that renders together the augmentation and the mediated-reality of the video stream. After the style of Baudry, we could redraw Azuma's diagram like I have in Figure 4. Here, again, the solid line draws the path of AR information from the objective reality captured by the live video camera, run through a tracking process, augmented with special processing and graphics, then rendered out to a screen or AR goggles (I note goggles off to the left of screen because, as described above, goggles are meant to be an 'invisible screen' that envelops the viewer). The dotted line draws the normal spectator perception. They are aware of the screen as an image not reality; they are aware of the augmentation being done—such as the addition of graphics, animations, models, or other filters on the video stream— but are largely unconscious of the actual computational processing being done to the video; any severe tracking issues such as jitter in the augmentation, or render issues such as bad aliasing would be considered a failure of the medium and would 'take us out' of the experience. Most significant is the final destination of viewer perception, a mediated reality. Unlike cinema effects, where digital computation and compositing are used to create a simulacrum of reality (real looking dinosaurs attack the real flesh-and-blood actors on the screen), Augmented Reality plays with the combination of the evidently unreal and the real. It's essence and *raison d'être* is that juxtaposition and border between two epistemologically diverse universes, the live mediation and the virtual augmentation, and that border must be evident. AR doesn't attempt to embed the viewer in an objective reality, the spectator identifies with a mediation— the mediation that stands-in for reality. It is supposed to be a mediated universe.

The cinema screen is a window that lets on to another objective world. The AR screen is a media screen performing the tricks of which it is able: manipulation, juxtaposition, combination of live stream images and generated virtual. Augmented Reality is about combining live mediation with live computational augmentation, a medium whose essential material is not captured objective reality like cinema, but electric mediation itself. Media Art, as the media philosopher Lars Qvortrup has noted, could all be described as ready-mades where instead of R. Mutt's urinal there is now a computer, a projector, a screen, a camera (Qvortrup 2004). But AR art has complicated the ready-made; it is an art of apparatus but not of the objects themselves, instead the objects are plugged in to each other, broadcasting to each other and constantly looping in real live time. It is an art of circuits. We are no longer seeking to grapple with mediation, but have embodied it. We are, instead, grappling with our relationship to the interface and machine.

So here the question arises, what would be an avant-garde AR?

Augmented Reality art has traded off of its novelty, but as industry establishes AR experiences for commercial purposes such as Google Glass or the proposition of AR advertising flashing to our screens and glasses in department stores, AR(t) is challenged to advance the expressive potential of the electric image. Returning to our diagram, the repressed elements of computational tracking and video compositing can be mined for expressive potential. This is not, necessarily, 'glitch art'. There are multiple works, like the AR(t) collective Manifest.AR's inaugural project 'We ARE MoMA', that emphasize the synthetic nature of the compositing (Fig. 5). In 'We ARE MoMA', Manifest.AR virtually placed a set of 3D

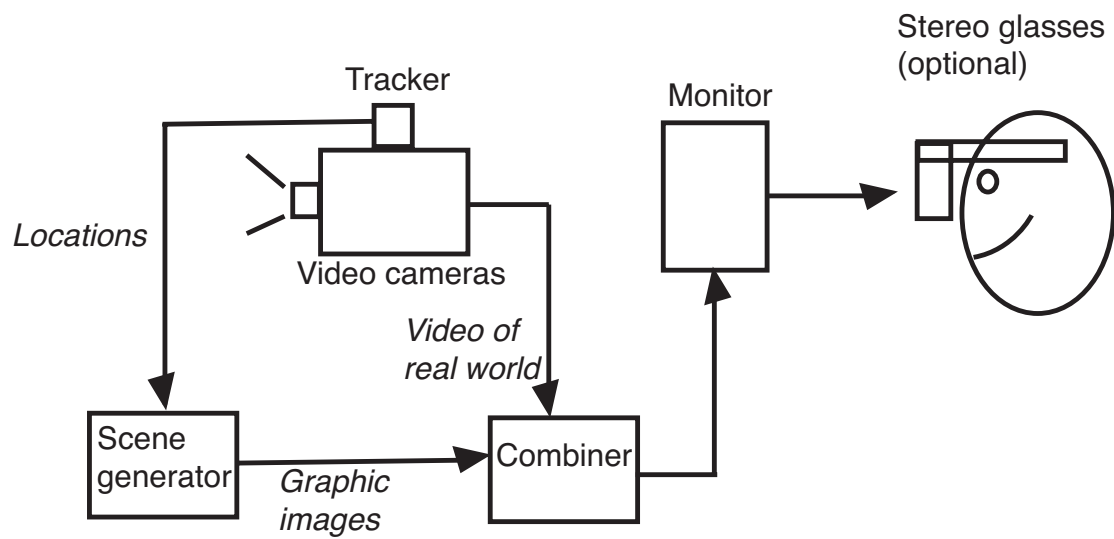


Fig. 3: Monitor-based AR conceptual diagram (Azuma 1997)

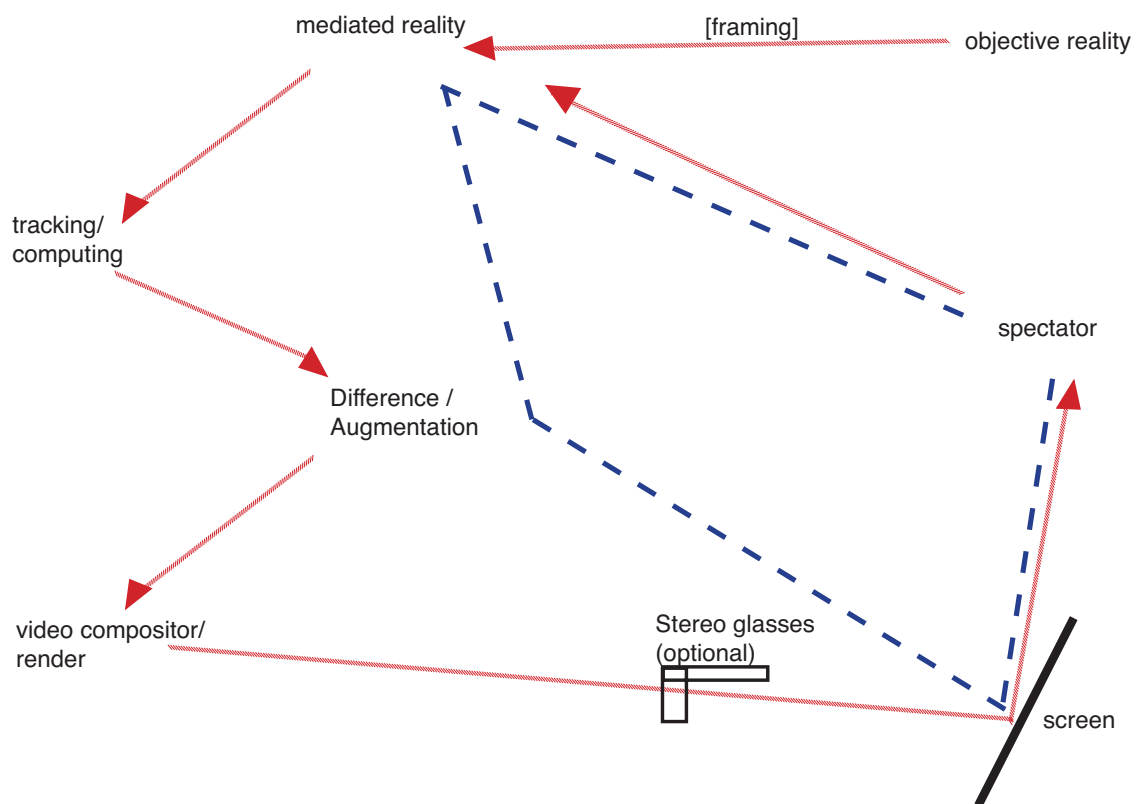


Fig. 4: Augmented Reality Apparatus (Azuma's diagram redrawn after Baudry)





Fig. 5: 'We AR in MoMA' (Manifest.AR 2010)



Fig. 6: '52card Psycho' (G.A.Rhodes 2009)



Fig. 7: 'Nue Morte' (Claudia Hart 2013)

graphical art works in the New York MoMA without permission to be discovered through a smartphone app (similar to a myriad of other projects from the productive AR(t) collective). The juxtaposition of virtual and real was the site for the conceptual expression; this juxtaposition of compositing played with subverting real-world boundaries with virtual boundaries, in this case the real controls of private property and museum curation. Early AR(t) works used AR fiducials— barcode-like patterns used for image tracking and robot-vision. In my own project from 2009, '52CardPsycho', the spectator is allowed to interact with a deck of custom cards; in an AR 'magic mirror' screen the cards become the 52 separate shots that make up the shower scene of Hitchcock's *Psycho* (Fig. 6). The viewer is able to assemble and dissect the ancestral cinematic medium creating sculptural objects and 4D spreads of time. For spectators there was a certain fascination in the fiducial cards. The fiducial pattern itself serves to reveal the apparatus— an acknowledgment of the code which only the tracker and scene-generator can read. Fiducials are an image of the AR medium in which I can watch a computer see and interact with it while understanding that I can not read what it does. They are, perhaps, an image of our contemporary relationship with computing at large; the fiducial code reveals the obscurity of the computational process instead of hiding it. In a 2013 work which I designed for the artist Claudia Hart, a custom app allows the viewer to see through a custom-made dinner plate—as if beneath the material as in *Trompe-l'œil*, the digital grotesque lying beneath the surface erotic and rotting (Fig. 7). In the work, titled *Nue Morte*, through the smartphone screen the viewer can see beneath their plate and food a languid virtual-nude covered in crawling ants. The experience toys with the representation of 3D in the two dimensional screen; the virtual is given the third dimension while the real object, a plate, is just a two dimensional screen emphasizing the particular mediated virtuality of the compositing process.



These works, like proto-cinema, are initial experiments in the medium showing that of which it is capable. But a more mature AR(t), seeking out its essential material and unique expressive potential, will grapple with making self-reflexive AR to subvert AR ideology as it forms. For me, the greatest potential seems to be in the repression of mediation in favor of a 'mediated-as-real'. In an early AR work by Canadian artist David Rokeby, 'Seen' which was installed in the Venice Biennale of Architecture 2002, four screens are connected to what seems like live cameras in the Piazza san Marco (across town) altered with temporal effects filters he designed. 'Seen', and works like it that create a sort of AR window experience, are not just effected videos; the circuit and apparatus are essential. So much so that, when unable to install a live HD connection from the piazza, Rokeby faked the connection with a pre-recorded half hour capture that was then fed through his filter; yet the description on his website remains, "The installation is made up of 4 video projections whose video material are calculated live from a single video source;" it is then parenthetically noted that the live video was not, in fact, live. This insistence on the live nature of the circuit belies the definition of the medium: augmentation with electrical circuits and apparatus. Live mediation is the 'reality' in augmented reality. And increasingly it is our own reality. This suppression of the real in AR seems fertile ground in which to explore our contemporary relationship with networked media— our virtual presence and lives made in relationship with machines that see before we see, read our digital codes and cookies and histories that we cannot know, then compile and render out their own selections of pixels and images... all without us seeing the process. Future AR(t) will question how to make mediation not seem real— to break, momentarily, the illusion of reality in mediation.

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