From Television to Drone Vision: Telepresence and Touch in Contemporary Art
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Introduction: "Touching the Interface – Interfacing Touch"

Figure 1. Douglas Engelbart at the controls of the oNLine System during "The Mother of All Demos," San Francisco, December 9, 1968.

On December 9, 1968, Douglas Engelbart famously changed the future of computing. His presentation at the Fall Joint Computer Conference in San Francisco introduced the world to the oNLine System (NLS), which he developed with his team from the Augmented Research Center at the Stanford Research Institute. In the brisk 100-minute lecture, later known as "The Mother of All Demos," Engelbart demonstrated, among other things, live text editing on a cathode ray tube monitor, hyperlinked documents, the computer mouse, networked interaction, video conferencing, and the idea of a personal computer with a display screen.[1] The

importance of the demonstration was not just in what Engelbart showed the audience, but how he did so. Though he sat on a stage facing a packed 1000-seat auditorium, he addressed the crowd through a 22-by-18-foot screen displaying a live video image of him at the computer workstation. An Eidaphor video projector, borrowed from NASA and networked by the Advanced Research Projects Agency (ARPA), beamed the high-resolution image across the lecture hall while a team of assistants, including Stewart Brand, the producer of the psychedelic 1966 Trips Festival, were at the lab in Menlo Park remotely controlling and choreographing the images on the screen.[2] Despite being in the same room with his viewers, Engelbart indicated that he would address them "primarily through this medium" by pointing into the television camera, and thereby to the center of the video projection (fig. 1). In this casual gesture, he shifted attention from his physical presence on the stage to the mediating surface of the screen. But the giant screen was not there simply to show the engineer in close-up for the benefit of the large audience. During the presentation, the conference attendees saw the documents Engelbart was producing on his computer superimposed on top of live shots of the engineer looking into the screen or of his hands at the computer's new and unusual controls (fig. 2).[3] The dramatic mediation of the event cinematically sutured each viewer into a series of point-of-view shots that allowed her to imagine herself either face-to-face with Englebart across the mediating boundary of his terminal's screen, or at the keyboard of the workstation. When Englebart pointed at the screen he did not just point into the camera and at the audience; he pointed at the interface that had suddenly materialized before their eyes.

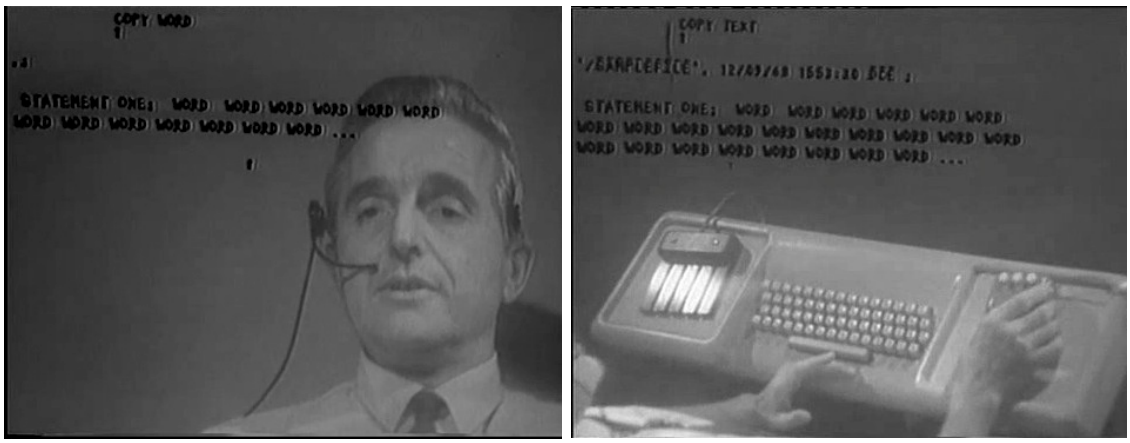

Figure 2: Two audience views of Engelbart's demonstration of the oNLine System (NLS), December 9, 1968. Right: Engelbart's face overlaid with the display image of the computer monitor. The mouse cursor can be seen as a black dot in the center of the image, just below the text. Left: Engelbart's hands operating the mouse and the NLS controls in combination with the computer's display screen image.

The Mother of It All

I begin this book on telepresence and touch in contemporary art with an extended discussion of Engelbart's legendary presentation because it marked a watershed moment in the history of technology, and because it unveiled the basic component parts of the video and interactive art of the following decades. "Telepresence" is the feeling of being present at a remote location by means of real-time telecommunications devices. One can be visually, aurally, and even tactically present to distant, mediated environments through networked devices, such as video cameras and telerobots. "The Mother of All Demos," I would like to argue, is an early example of a telepresent experience – despite the fact that Engelbart was seated in the auditorium, he tactically and interactively extended his body into and through a screen. The engineer used the live video screen as a mediating surface for executing actions and connecting with networked others, rather than as a transparent, uni-directional, spectacularized "window onto the world," as it was

understood by conventional broadcast television.[4] While Engelbart only hinted at its existence in the presentation, the Internet, too, was coming into being at the time of the demo. By 1969, Engelbart's NLS would be one of the first two nodes of ARPANET, which would later be transformed into the Internet and give birth the World Wide Web. The NLS also came at a significant moment for artistic production and practice. 1968 was the year that video emerged as a consumer technology, and artists took up its potential as an artistic medium. They began to explore the particular properties of video, testing its social and technological differences from broadcast and cable television, and imagining how the video screen might be a means of disrupting the normative relations established by TV, to become instead a site for interactive and even bi-directional contact with viewers.[5]

I called special attention to Stewart Brand's involvement with "The Mother of All Demos" to underscore the hallucinatory and synesthetic effects of what could have been an otherwise dry lecture.[6] The live multi-media presentation was nearly as complicated as the NLS system itself. It involved Englebart leasing microwave lines, transmitting video signals thirty miles up the San Francisco peninsula, and bouncing them off of eight borrowed television antennas, all with the technological and financial cooperation of NASA and ARPA.[7] The investment in the presentation indicates how important communicating the sensory experience of the NLS technology and its interactive elements to the audience was for Engelbart and his colleagues. In order to highlight the effects of live interaction with a computer for the audience, the Augmentation Research Center reframed the NLS experience as a "cinema of attractions." Tom Gunning coined this term to describe some of the

earliest films ever made, films that aimed not to communicate a narrative, but to revel in "the power to show something."[8] Theirs was a technique that "spoil[ed] the realistic illusion of cinema… by establishing contact with the audience," usually via figures who looked at or gestured toward the camera, thereby acknowledging both its presence and the construction of the scene for a viewer.[9] In his own "cinema of attractions," Engelbart pointed at the screen to acknowledge it as an interface. In doing so he "solicit[ed] the attention of the spectator" by rupturing the "self-enclosed" scene, world, aggressively subjecting the viewer to "sensual or psychological impact."[10] The "Mother of All Demos" figured the screen as a site for sensation – for vision, and hearing, but also, as facilitated by the mouse, touch. Engelbart held onto a small device that extended his hands and his actions into the ethereal space of the computer monitor.

From Television to Drone Vision: Telepresence and Touch in Contemporary Art takes 1968 as a starting point for examining how video screens became spaces for communication and physical, tactile intervention. Over the next four decades, the video screen would become increasingly networked and interactive, following the lead set out by Engelbart and the Augmentation Research Center. Through the video camera, closed-circuit television, computer monitors, telecommunications satellites, fiber-optic cables, and the World Wide Web, video screens developed into sites for live connection with other users, distant places, and mediated - but not necessarily "virtual" – worlds.[11] Perhaps unsurprisingly, Engelbart's pointing finger would soon emerge as a meme within the history of video art and web artworks that engaged with the problems of mediated experience and networked contact.[12] Similarly, the

mouse developed from a tool that only allowed a user to intervene in the coordinates of screen space into a remote control enabling the operation of distant devices in real space via the computer interface. In the chapters that follow, I trace an arc of increasing interactivity and intervention in the twin developments of video and computer interfaces through tools that extend individual presence via "touch" – both figurative and literal – into the mediated space of the screen. By transforming monitors into sites for tactile as well as visual and aural interaction, the work I discuss in this book questions the aesthetic, social, and ethical stakes of media that allow one to manipulate and affect far-off environments and others. As such, this book is not simply an art historical account of the ways in which artists have refigured video screens by making them interactive and tactile; it is also a meditation on how our relationships to the world change when we can touch things that cannot touch us back.

The central claim of this book is that a critical and retrospective look at artworks ranging from the earliest artists' videos to the most technologically advanced interventions into today's military robotic technology offers up a way of understanding the rapid mediatization and remediation of contemporary sensory experience, and suggests how we might preserve a phenomenological and ethical connection to mediated places and persons in the face of such technological extension. *From Television to Drone Vision: Telepresence and Touch in Contemporary Art* establishes a history of telepresence in contemporary art that puts contemporary digital technologies and artworks enabling remote action in the context of earlier art works in analog electronic media that examined the same

conditions of liveness, mediation, and networked telepresence. There is a strong tendency in media theory and media art to stress the radical "newness" of contemporary technologies and effects. However, a clear lineage can be drawn between "new media" art and certain works from the late 1960s and early 1970s, enabling us to see how artists and engineers have long sought to explore the phenomenological, existential, and epistemological effects of mediated images, interactive interfaces, and remote action. Networked robots and unmanned drones may seem far removed from early experiments with graphical user interfaces, recorded analog video, closed-circuit television, and telecommunications satellites; however those things too were once at the cutting edge of networked technology and foreshadowed the ethical and phenomenological effects of today's networked actions. In *From Television to Drone Vision,* I demonstrate how they not only prefigured contemporary manifestations of remote presence and action, but also how they might help us begin to make sense of the expansion of our senses by technologies that privilege real time over real space, and to model strategies for engagement and interaction with mediated others. The artworks and artists discussed herein strive to add accountability, reciprocity, and relationality into media that tend to spectacularize the world and distance users from the effects of their actions.

As Kate Mondloch notes in her 2010 book, *Screens: Viewing Media Installation Art*, there has been a growing interest in theorizing the proliferation of screens and interfaces in contemporary media theory, but very little work has been done to consider these technologies and their effects in an art historical context.[13] In

From Television to Drone Vision I address this lacuna while also taking up two other topics that are suppressed in the history of art – television and tactility – as well as a recently maligned concept that had once held a firm place in film and media studies, Charles Sanders Pierce's notion of the index. These three themes – tactility, television, and indexicality – run through the whole of the book, and I argue that they are inherently intertwined in the concept of telepresence. The artists and artworks I analyze use televisual screens attached to antennas, VCRs, satellite feeds, telerobots, computer terminals, and unmanned drones to examine how we can touch and, in attenuated ways, be present in mediated environments, and what the ethical stakes of this reconfiguration of the body ultimately are.

Telepresent Touch

As defined in 1991 by techno-utopian artist and theorist Roy Ascott, "telepresence" is the condition of being "both here and there…whether mediated by computer networks, interactive video, slow-scan television, fax, digital image transfer, videotex, teleconference, videophone or online communications by means of telephone, cable or satellite link."[14] Ascott's list of existing telematic devices and technologies would be significantly extended over the next two decades. Today one might add webcams, chat rooms, message boards, online videogames, telerobots, and unmanned drones, as well as any number of other banded and generic, wired and "wireless" technologies for getting "in touch." While Ascott's examples are limited in relation to the present state of consumer and industrial technology, his general definition is, on the contrary, perhaps overly broad. According to his

formulation, almost any experience mediated by telecommunications technology can induce a state of telepresence.

For many other theorists, artists, and engineers, "telepresence" is a much more specific category of experience. Marvin Minsky, the co-founder of MIT's Artificial Intelligence Laboratory, who coined the term in 1980, used it to designate remote manipulation of robots by means of "high-quality sensory feedback."[15] In Minsky's account, then, telepresence is specifically related to haptic engagement; telepresence is different than mere telecommunication in that getting 'in touch' is a far less metaphorical description of one's actions. In the early days of the Internet, Minsky envisioned coupling new networked technologies with physical machines and feedback sensors so that computers could be used to "translate feel into feel," that is, to recreate the physical sensation of touch for far-off "teleoperators."[16] In his 1980 paper, he described yet-to-be invented technologies that would wire a user's hands to sophisticated tools through haptic sensors so that she could "'work' in another room, in another city, in another country, or on another planet."[17] New media artist Eduardo Kac, too, names touch as the primary sense that distinguishes telepresence from simple telecommunication. "Telepresence," by Kac's definition, is "telecommunications coupled with telerobotics," or, as he has put it slightly more capaciously, "combining telecommunications with remote action."[18] That is, to be telepresent to another person or place, one needs to be able to physically manipulate and affect the remote environment, not just see or hear it. Telepresence is grounded in touch, but that does not mean, however, that it is an embodied experience.

In Ascott's, Minsky's, and Kac's discussions of telepresence there is a problem with the physical, phenomenological status of the user's body, and where, exactly, it is.[19] Kac describes telepresent interactions as responsive and "reciprocal" because the teleoperator receives information about the mediated location through video, audio, and (perhaps even) tactile force feedback, and then adjusts her behavior based on that information. She may move the robot one way, see the effect, and then execute her next action based on the results observed. Information moves in two directions.[20] There is feedback. Yet this does not, in fact, mean that the system is reciprocal. In most telematic artworks and industrial applications of telepresence technologies, information may flow in two directions, but agency moves only in one: in Kac's telepresence works, for example, a teleoperator can intervene in a remote environment, but her body is not made vulnerable or available to those on the other side of the screen.[21] The mediation of touch through telepresence seems to undo Maurice Merleau-Ponty's basic phenomenological principle that, with haptic sensations, one is always both toucher and touched.[22] In fact, the driving force behind Minsky's own conceptualization of telepresence is to insulate the teleoperator's body from contact with the mediated environment. Telepresence allows people to "enter" hazardous, hostile, or dangerous environments with no risk to their physical safety.[23] Minsky names outer space, the ocean floor, and nuclear reactors as the potential contexts for telepresence, but one may easily extrapolate from this field of action to include conflict zones, protests, and other sites in which some bodies are protected by remote technology, and others are exposed and vulnerable without the power to strike back.

In Ascott's broad formulation, the locational presence of the body is even further abstracted. Networked interaction via telematic devices, according to him, leads to an "out of body" experience; "it is to be at once everywhere and nowhere."[24] Through networked telecommunication the user's body is "fragmented" and "dispersed."[25] Ascott imagines users leaving their bodies and their specific places in space and time (as well as their specific races, ethnicities, cultures, and genders) to connect with a shared, planetary consciousness.[26] Networked telematic technologies, according to Ascott, can create a digital version of Teilhard de Chardin's "noosphere," "a thinking layer, enveloping the biosphere of the earth," that would connect all people to each other, and "contribute to the harmonization of the planet."[27] In Ascott's formulation, then, to lose one's corporeal body and its specific coordinates in space and time is to grow closer together. Ascott's disembodied user illustrates well Marshall McLuhan's notion of technology an extension of the body across time or space that shifts the "scale of our affairs."[28] But each extension is simultaneously also an "amputation." In the electrical age, McLuhan writes, the central nervous system extends outside of the body and becomes disconnected from it by means of information technology and communication devices.[29] Our minds are set free into the ether, as our bodies are left behind. Despite the utopian (as well as deterministic) rhetoric of McLuhan's and Ascott's claims, N. Katherine Hayles rightly describes this logic as a "nightmarish" continuation of the Western humanist tradition that conceives of consciousness as "the seat of human identity."[30] Liberal humanism, she writes, imagined the subject as possessing a body but not as being integrally, essentially tied to that body. In the guise of "posthumanism," the body is

refigured as the "original prosthesis we all learn to manipulate, so that extending or replacing the body with other prostheses becomes a continuation of a process that began before we were born."[31] Hayles's narrative makes it easy to imagine not only how our concepts of presence might become separated from our bodies, but also how our tendency to imagine touch as a uni-directional and non-reciprocal phenomenon has been exacerbated through networked interfaces and other technological devices. Telepresence can easily be seen, then, as the next step in the Western liberal humanist tradition that, in its posthumanist phase, has detached the mind from the body, while giving the former unprecedented powers through extended, mechanized, physical prostheses. Hayles's project in *How We Became Posthuman* is to contest the logic of disembodiment and point to the ways in which information technology makes visible its materiality. My own project in *From Television to Drone Vision* continues along this line, by looking to the ways in which artists have sought to reconnect bodies on both sides of the screen by resisting the dematerialization and disembodiment telematic technologies seem to foretell or promise.

VR /TR

The insecure material status of the networked body leads to a set of epistemological and ethical problems. Individuals can carry out physical actions in distant environments, but the conditions of virtuality can often make it unclear to the user of the interface if her actions are simulations or merely mediated. Ken Goldberg, the engineer and artist responsible for putting the first robot on the Internet,

distinguishes "VR" (virtual reality) from "TR" (tele-reality).[32] The distinction between the two, he writes, "is vital: VR is simulacral, TR is distal."[33] Virtual reality presents what Oliver Grau calls "spaces of illusion" in which a "panoramic view is joined by sensorimotor exploration of an image space that gives the impression of a 'living' environment."[34] In virtual reality, then, the user engages with a simulated world through a variety of controls that communicate visual, auditory, and even haptic sensations of that fictional world.[35] As Jaron Lanier, an early pioneer in virtual reality puts it, VR allows the user "to see, hear, and feel things that aren't really there."[36]

"Tele-reality" is something quite different. It shows things that are real but that may not be "there" with the viewer or user. It presents mediated access to a real place, usually in real time. This is not a novel concept; television and video in their live forms fit this description. Thomas J. Campanella suggests that a "genealogy of visual synchronicity" could stretch quite far into the technological past to link telepresence to early optical devices for augmenting vision, such as the telescope, binoculars, and the microscope, as well as technologies that mediate direct vision, such as the camera obscura and camera lucida.[37] Given this list of devices, the distinction between the distal and the virtual seems clear – a real place mediated versus a simulated place screened – but in practice, as well as in language, the difference, I would like to suggest, is often much harder to parse. First, the term "virtual" does not simply mean "simulated," "invented," or "inauthentic." It has a much more complex usage and etymology. The contemporary uses of the term alter and even invert its original meaning. Derived from the Latin "*virtualis*," "virtual" was

initially used to describe the particular, even physical, qualities – or *virtues* – of a person or thing: "Inherently powerful or effective owing to particular natural qualities."[38] Over time, however, the "particular" slid into the "essential," the actual into the ideal. "Virtual" came to mean "in essence, potentiality, or effect, although not in form or actuality; supposed, imagined," and, at the same time, for "practical purposes, although not according to strict definition; very near, almost absolute."[39] That is, the word now functions as a contranym.[40] This quality of meaning both something and its opposite is particularly confusing in regard to the virtual, for it specifically clouds the distinction between VR and TR, between total simulation and mere mediation. When we perceive or describe something as "virtual," do we mean that it is simulated rather than real, or that is near enough to the actual to be used as a practical and effective substitute? Certainly, the live video image of an event is not the thing itself – it has been converted into an electronic image – but we are likely to accept it as an operational substitute for the event that it transmits. The twinned media of television and video both have etymological roots that point to how the mediation is easily accepted as one's own vision – they are, from Greek and Latin, respectively, "vision at a distance" and "I see."[41] They are technologies that extend and stand in for our natural senses.

In the hope of containing the contradictory senses of the "virtual," media theorist Ann Friedberg has offered a more generic definition of it. For her, the virtual is "any representation or appearance (whether optically, technologically, or artisanally produced) that appears 'functionally or effectively but not formally' of the same materiality as what it represents."[42] Virtual images may depict simulations

or fictional environments; or they may be mediations of views of real, real-time environments. Of course, Friedberg's expansive redefinition only exacerbates the problem of undecidability in relation to telepresence and teleaction—or what Goldberg describes as "telepistemology."According to phenomenological philosopher Hubert Dreyfus, telematic technologies have not only given new life to the Western humanist tradition of imagined disembodiment; they have also threatened to compel a renewed Cartesian skepticism:

> We can keep up on the latest events in the universe, shop, do research, communicate with our families, friends, and colleagues, meet new people, play games, and control remote robots all without leaving the room. When we are engaged with such activities, our bodies seem irrelevant, and, thanks to telepresence, our minds seem to expand to all corners of the universe. But at the same time a skeptical doubt can creep into our sense of almost god-like control and omniscience. All this knowledge is indirect, inferred from what we see on our screens and hear from our loudspeakers. What if all this telepresence were rigged and there was nothing outside our room but a duplicitous computer feeding carefully organized audio-visual data to our computer to create the illusion of a world with which we believe we are interacting?[43]

If all mediated vision can inspire instrumentalist as well as Cartesian doubt, then comprehending the type of image and one's relationship to it becomes more pressing as our ability to act upon the image or scene through an interface becomes more powerful and more commonplace. Our bodies seem "irrelevant" because, by

the power of our minds coupled with networked machinery, we can functionally be in two places at once, something bodies – by their very nature – are not able (at least not yet) to do. But the question remains, does the *other's* body become irrelevant, too? We may feel protected (if not omnipotent) by virtue of our physical separation from the scene of action (if not by our literal "disembodiment") and without risk of reciprocity, but if all of our information about our teleactions is inherently mediated – distanced from our bodies and its direct sensory apparatus – will we accept without question the reality of our teleactions and their effects on those bodies that lack the privilege of disembodiment?

In *From Television to Drone Vision* I am concerned specifically with screen-based media that engage with these questions through the effects of televisual telecommunication, be they examples of early video art or contemporary new media works using networked telerobots or unmanned aerial drones. Telepresence and its tactile interventions in and through screen space complicate the boundaries of our bodies, extend our corporeal agency and influence, and blur the distinctions between physicality and virtuality. All of the works I discuss take advantage of the video screen's simultaneous undecidable authenticity and the pressing urgency of its images. Moreover, they all aim to make both sides of the screen matter. I have chosen to narrow my focus to video works in order to engage in a particular set of aesthetic, social and political effects that arise from video's grammatical quality of signaling the "I see" and what Samuel Weber calls television's "uncanny confusion," that is, the inherent inability of viewers to distinguish recorded video images from live video images and the ways by which television – as a medium and as an

institution – has aimed to exacerbate this confusion.[44] The chapters that follow examine how video images – live or recoded – place the viewer in specific social and ethical, as well as somatic relationships to what they show. I discuss television in its most basic form as video that delivers (or appears to deliver) live *vision-at-a-distance*. While there is still much to be said about the role of broadcast and cable television in the experimental arts of this same period, *From Television to Drone Vision* primarily addresses uses of video that happened outside corporate delivery systems, instead focusing on closed-circuit environments and online channels.[45]

Chapter one, "The Index and the Interface," offers a rigorous rereading of Peirce's semiotic concept of the index, and introduces the theoretical and conceptual framework of the chapters that follow. My aim is to counter typical (mis)understandings of the index, which view it as a material trace of a past moment of physical contact that provides evidence of an existential truth. This formulation has led to claims of the index's "death" in the digital age. The argument is that, since the index is a sign grounded in materiality, and this materiality is what assures its evidentiary and impartial truthfulness, then the "immateriality" of digital media and their electronic processes of recording result in the loss of the indexical trace in the image. Were it true, this would in fact be a significant loss, since it would stand to reason that if the index were gone, so too would be the element of the image that communicates existential and epistemic information, and that compels belief in those who apprehend it. In opposition to these claims, I establish the index as a type of "immaterial" touch, and as a sign of real-time engagement, but one that is always mired in uncertainty despite its evidentiary qualities and uses.

Returning to Peirce's discussions of the index, I aim to counter claims about the digital "death of the index." Drawing upon the work of Laura Mulvey, Roland Barthes, WJT Mitchell, Susan Sontag, Lev Manovich, and Laura U. Marks, I argue that contrary to the dominant narratives of media theory, the index is an inherently ephemeral, doubtful, and distant sign that has the very curious property of hinging on a split temporality; that is, regardless of when the index was produced, it establishes a forceful present-tense connection with its receiver. Rather than being "dead" in the digital age, I assert that the index is the operative sign for understanding images and experiences mediated by virtual interfaces, particularly those using live video, television and networked media. I ground the discussion of the index and the philosophical, ethical, epistemological, and phenomenological stakes of its "death" in an account of one of the earliest telerobotic artworks, Ken Goldberg's *Legal Tender* (1996). Goldberg's project used the newly established World Wide Web to allow remote users to manipulate a telerobot to "touch" – and ultimately deface – two $100 bills. The artwork introduces the problematic notion of the index and its relationship to the video interface. By establishing the index as a doubtful and dubious sign that nonetheless (potentially) points to a real, ongoing and unfolding event, I argue both for the necessity of believing in the index and examine how it is in its nature to deceive its receiver, as well as the consequences of such deceptions.

The second chapter, "Uncanny Valley: Early Video and The Fantasy of Presence," takes up the redefined index, its indeterminate nature, and its potential for deception to examine the ways in which early video artists used the new

medium of videotape to expose the ontological indeterminacy of television and the powerful yet fantastical experiences of presence and contact it could create through transmission. These effects, I argue, hinge on the self-conscious production and circulation of indexical signs. Apparently simple early videos, such as Vito Acconci's *Centers* (1972) and *Theme Song* (1973), and Joan Jonas's *Left Side, Right Side (1972)* (1972) and *Duet* (1972), accurately and effectively diagram the complex temporal, spatial, and semiotic structures of broadcast television that intentionally confuse viewers as to their space/time relationships to the event depicted.

The videos in question cause the viewer to mistake the past for the present, the far for the near, the there for the here, and the recorded for the live. Each of the works dramatize video's and television's indexical nature – that is, their status as signs that create a strong existential connection between themselves and their receivers (which, in turn, results in feelings of surety and belief,) even as they are at the same time of fundamentally dubious and indeterminate origin. Building on the work of television theorists such as Jane Feuer, James Freidman, and Mary Ann Doane, I argue, moreover, that it is through the circulation of other indexical signs within video images – deictic shifters and pointing fingers, for example – that television broadcasts create their confusing spatial and temporal effects.

In my analysis, Acconci's and Jonas's videos reveal the ontological ambivalence of both the index and video/television by means of another ambivalent effect – the uncanny. As Samuel Weber has explained, under the technological logic of film and cinema, screens typically re-present something that has already taken place. There is a clear temporal relationship between past and present: the screen

image is a mimetic copy of a previously existent original. But this is not the case with television, which completely unsettles the hierarchy of original and copy.[46] The inability to distinguish the live from the recorded, the now from the then, transforms the screen into a site of "uncanny confusion."

Working between the theories of the uncanny developed by Weber, Ernst Jentsch, Sigmund Freud, and, importantly, roboticist Masahiro Mori, in chapter 2 I use the uncanny as a means of discussing not the reanimation of the "dead", but, rather, the indeterminacy of the live. The index, like television itself, always acts as "live," regardless of whether or not it is. It is not a sign of a dead past; it marks, and, moreover, *creates* the effect of an unrelenting present. At every moment Acconci's and Jonas's videos uncannily conjure an effect and its opposite: presence and distance, now and then, the heimlich and the unheimlich, and in doing so produce alternating effects of comfort and alienation, connection and dislocation. The uncanny effects of indexical interfaces, I argue, evoke what Alexander R. Galloway calls "the unworkable interface." Acconci and Jonas, I contend, echo and disrupt Engelbart's original gesture by pointing – literally and figuratively – to the edges of the interface. By transmitting overdetermined indexical signs through an indexical medium to create the fantasy of television-as-telepresence, they establish the illusion of real-time, bi-directional contact through a telematic interface only to frustrate the user when what appears to be a transparent window becomes an "unworkable" opaque surface. By failing to deliver the experience their language and the technology seems to promise, Acconci and Jonas instill in their viewers the

pressing desire to touch the screen and the body that appears to be waiting on the other side, and that seems to make their own bodies available for physical contact.

In 1964 Marshal McLuhan put forward an interesting and confounding idea: despite its reputation as a machine that conditioned passivity, he proposed that television was an inherently participatory medium, and its participation was primarily rooted in tactile engagement. This tactility had nothing to do with flipping switches or turning dials. Rather, because of the low-fidelity of the television image, with its broken scan lines and constantly shifting electronic surface, the viewer's eyes had to act as a hand, smoothing the disjointed image into a complete picture. The image on the screen was created by the "scanning finger" of the electron gun, and in response, the viewer's eyes repeated this gesture, transforming her sight into a touch that made contact with the surface of the glass.[47] Chapter 3, "Touching Television: Interactive Video and The Ethics of Observation," looks to experimental video works from the late 1970s that aimed to transform the viewer into an active agent and producer of what appeared on the screen. Focusing on the work of Chris Burden, I argue that he reworked the television screen as a site for active, physical intervention as a challenge to the medium's apparently spectacularizing, distancing, and immobilizing effects. In a world in which all of our engagements always already appear as mediated, I claim that Burden, surprisingly, used television to create situations that demanded immediate, direct intervention.

A sculptor by training, Burden is best known for his 1972 performance, *Shoot*, in which a live audience sat by and watched a marksman take aim and fire at his impassive body. Speaking at the time, Burden connected his desire to be shot to

a need for an empathetic engagement with the images – fictional and real – that he saw on television: "How do you know what it feels like to be shot if you don't experience it? It seems interesting enough to be worth doing … everybody watches it on TV every day. America is the big shoot-out country."[48] By taking an average, televisual sight off of the screen to feel it in the flesh, Burden gained intimate, experiential contact with experiences he had only ever witnessed in a mediated manner. The audience, however, had a different role to play. The performance required both the audience's live, unmediated presence and its inaction. The viewers watched the event unfold as if it were on television, despite Burden's close physical presence and the opportunity, if not the responsibility, to intervene. If *Shoot* commuted a televisual experience into real space for Burden, it also mediated direct experience by imposing a televisual structure onto the performance that made it apparently impervious to audience intervention and touch. The audience appeared to be "screened" from the live, proximal event.

In the years following *Shoot*, Burden began using screens and video monitors as a means of mediating his live performance to telepresent audiences. Chapter 3 addresses a series of Burden's live closed-circuit television performances executed in the wake of *Shoot*. Perhaps counter-intuitively, I argue that Burden used the video screen to combat the immobilizing, televisual passivity that structured his unmediated performances. The screen in Burden's video performances of the mid-1970s became a site for interaction, urgent intervention, and physical touch. Comparing live "unmediated" performances such as *Shoot* (1971), *Bed Piece* (1972), and *Doomed* (1975) to CCTV performances *Velvet Water* (1974), *Back to You* (1974),

and *Do You Believe in Television* (1976), I contend that Burden's use of television forced viewers to become actively and tactilely involved with the represented event by crossing to the other side of the screen, literalizing McLuhan's notion of televisual touch.

Chapter 4, "Inhabiting the Interface," looks to the work of video artists Kit Galloway and Sherrie Rabinowitz to examine how the televisual image might go beyond mediating distant places and become a "place" itself. In 1977, Galloway and Rabinowitz began collaborating with the National Aeronautics and Space Agency (NASA) on a series of live satellite video performances that variously refigured the television screen as an interface for embodied interaction. Although their 1980 installation, *Hole in Space,* which connected public sidewalks in Los Angeles and New York City with a cinema-scale satellite video portal, was their most spectacular and well-documented work, I focus instead on their very first satellite artwork, *Satellite Arts 1977* (1977). *Satellite Arts 1977*, too, was a bi-directional, bi-coastal, real-time television link between two locations. But the artists did not simply put the remote participants in audio-visual contact by using the monitor as a "window" onto another place, as they did in *Hole in Space*, or adopt the split-screen format of conventional television broadcasts, which manifests physical distance and separate spaces as a graphic divide in the image. Instead, they transformed the television screen into a surface upon which embodied interaction occurred. The artists exploited the inherent latency of the "real time" satellite image to have the participants route all of their bodily actions through the delayed feedback of the television monitor. To be present to one another in the specific space-time of the

composite satellite image, the performers had to embody a quarter-second delay in all of their actions. I propose that through a series of "crossed wires" that combined two video feeds into one and synesthetically collapsed vision and touch, *Satellite Arts 1977* diagramed what it would be like to hold in suspension the binaries that structure embodied existence – here/there, now/then, self/other, real/virtual – and actualized Maurice Merleau-Ponty's notion of the "chiasm," a condition of simultaneity that is only ever eminent in the physical body. Galloway and Rabinowitz used satellite technology and "real time" video images to hypothesize an ethics of engagement with others in mediated environments and to model a phenomenology of telepresence.

Satellite Arts 1977 forced its participants to transform their haptic and kinesthetic senses into visual ones in order to meet others in the ethereal no-place of the television screen. They used their physical bodies to steer their images toward each other to "immaterially touch." Touch, as a metaphor, has deep roots in telecommunications. All manner of telecommunication, whether audio, visual, or textual are forms of "getting in touch," "keeping in touch," or even, to borrow from AT&T's 1979 ad campaign, "reach[ing] out and touch[ing] someone." Perhaps the most poetic of tactile telecommunications metaphors is the one that names the high-pitched electronic audio squeal that marks the process of modems, networks, or busses connecting devices as a "handshake." The noise makes the moment of contact perceptible to the user, but the name transfers the audio feedback into an imaginary image of courteous, tactile interaction. The synesthetic transfer of audio to vision to touch calls the user's attention not only to the very physical infrastructures of cables

that "hug the globe"[49] and enable all of our wired and "wireless" connections, but also to the presence of others – other users facing terminal screens, holding mice, waiting to get "in touch." In chapter 5, "The Presence of Others: Telerobotics and the Digitization of Touch," I move forward in time and technology to discuss telepresent experiences enabled by new cable infrastructures and the World Wide Web that allowed users not only to be in touch, but to physicalize the metaphor of the modem's handshake. Some twenty years after Engelbart demonstrated the computer interface and the mouse as technologies that gave the user sensory access into data space, artists and engineers began using the Internet and the newly established WWW to extend the user's vision and touch into distant-yet-real environments. In this chapter I look to some of the earliest art works that enabled viewers to become "users" by operating remote technologies to control what they could see and hear, as well as touch.

Beginning with Jaime Davidovich's 1980 responsive video project for Warner Brother's experimental, interactive QUBE cable system, and moving on to early telerobotic projects by Ken Feingold, Ken Goldberg, Eduardo Kac, Marie Sester, and Eric Paulos, I examine how remote presence is indexed on the interface and in real space on both sides of the screen. The artworks trace an arc of increasing physical presence and haptic intervention in distant environments via remote control. The artists I discuss in this chapter use telerobotic technologies to explore the humanistic elements of mediated interaction. While these technologies appear to undo the baseline phenomenological properties of sensory reciprocity and reversibility in which the seer is always (potentially) seen, and the toucher is always

both a subject and object of touch, the artworks in this chapter work to elaborate the philosophical and ethical stakes of what it means to touch something that cannot touch you back, and how one's presence is made present when one's agency but not one's body is manifest at a location. Force feedback and remote control create uncanny sensations for subjects on either side of the screen – the telepresent user finds herself at a keyhole looking in on a world that may be unaware of her presence, and therefore seems simulated or staged; and inhabitants of the screened space witness the sudden animation of previously dormant, inanimate technologies that come to life imbued with an unseen, omnipotent power.

When we can act upon distant objects and things without embodied feedback to confirm our actions, the consequences of those actions can become hard to trust, especially if we have bought into the rhetoric of the "death of the index" and the epistemological and existential doubt it inspires. It is very easy to treat a distal world as a simulated one, and to understand the lack of reciprocity as lack of responsibility. That so many telerobotic artworks take the shape of what one might commonly understand as a game or toy further complicates the user's relationship to her mediated actions. Chapter 6, "The Trouble with Telepresence: Remote Action and the First Person Shooter," centers on an analysis of Iraqi artist Wafaa Bilal's 2007 interactive installation and performance, *Domestic Tension (Shoot an Iraqi).* For the month of May, Bilal took up residence in Chicago's Flat File Gallery. Visitors could come to the gallery to see Bilal installed in the exhibition space, but they were not the only ones "there." Bilal was being watched live by thousands of remote viewers who had control of a telerobotic paintball rifle. Visitors to the website could

take turns firing the gun via a simple game interface with limited controls and streaming live video. They could pan the camera left and right, watch real-time video of Bilal reacting to their shots.

During the course of the exhibition 60,000 rounds of ammunition were fired at Bilal.[50] The viewers' actions were physical, but their presence was not. And here is the trouble with telepresence: the virtual and the real intersect on the surface of the screen. Bilal combined a live, streaming image with virtual "objects" – buttons, arrows, text, links – that had effects in a physical place. In *Domestic Tension*, Bilal established both a clear homology between telepresence and remote weapons systems, and blurred the presumably clear distinction between VR and TR, which is, of course, necessary for the responsible use of telerobotic technologies in both their artistic and normative, military functions. Bilal's installation asked users to rehearse their habitual actions, gestures and viewpoints learned in "first-person shooter" video games in an arena that was ethically and existentially far more murky. *Domestic Tension* set up a game – both real and virtual – through which users could test their belief in the image and their disembodied actions, as well as their moral and ethical relationships to these actions. Although the installation was dystopically premised as a cathartic outlet for racialized frustrations in the wake of 9-11, Bilal's installation conditioned empathy (at least among some viewers/participants) for bodies under remote surveillance and the physical and psychological duress of telepresence. The dedicated users of the site, of which I was one, not only experienced the thrill and ambivalence of disembodied action, but also learned how to augment and disable the system – both by hacking its software to increase its

destructive powers and using their virtual bodies to shield and protect Bilal's real one.

Chapter 7, "The View from Here: Drone Vision and the Trauma of (Not) Being Touched," shifts from of Bilal's configuration of the teleoperator as (war)gamer to a series of artists who examine what is now the most familiar – and contentious – manifestation of telepresence: aerial drones. When Engelbart, McLuhan, Minsky, and Ascott outlined their ideas of a technologically-enabled future, their predictions seemed equal parts science and science fiction. Their fantasies of remote action and disembodied presence, however, have quickly become commonplace in military and consumer contexts. To argue that drone operators, seated at their virtual interfaces, thousands of miles from the "theater of war," engage in a kind of play akin to tinkering with motorized toys or video games is commonplace. While their controls may be structured like game interfaces, drone operators typically understand their experiences as very real; moreover, the hypermediation of their encounter makes the event seem both immediate and unmediated. After a strike, drone operators must linger over the scene invisibly witnessing the devastating aftermath of their actions. It is precisely this strange blurring of the here and the there, the embodied and the disembodied that has led drone operators to experience an exceptionally high rate of post-traumatic stress disorder (PTSD), compared with other military personnel.[51] If as McLuhan and others have argued, information technology "is not an extension of our bodies, but of our central nervous system," one could understand drone pilots not just as extending disembodied-yet-physical powers into

remote places, but also as exposing their psyches to shocking, hostile, traumatizing scenes to which they are both passive witnesses and active antagonists.

The final chapter looks to artists working with drone technology to investigate the existential condition of the teleoperator and the impact of his disembodied powers on his perception of the world around him and on the world on the screen. I look to video works by a wide range of artists, including Omer Fast, Trevor Paglen, Harun Farocki, and Jeff Cain, to understand how drone vision functions in relation to conventional discussions of trauma and traumatic witnessing. The term "drone" calls up etymological associations with monotonous, mechanical boredom and slavish, unthinking labor. And, indeed, this is the conventional and convenient view of the "valorless" operators of artillery and surveillance drones.[52] The artworks addressed in this chapter use footage of military drones in action, appropriated (and leaked) flight recordings, interviews with drone pilots, and virtual reality simulations to examine how telepresent touch reaches back and touches the operator in his air-conditioned suburban bunker. My intention is neither to justify nor condone the use of military UAVs—like the artists discussed in this chapter, I believe them to be both unconstitutional and morally and ethically reprehensible—but (again, like the artists) I want to look closely at the experience of telepresence for the operators, and the disorienting and damaging effects of drone vision for parties on *both* sides of the screen.

Here/There

"Here" and "there" appear to be opposites—mutually exclusive terms—but telepresence brings them into contact. The slash between "here" and "there" in the subheading above acts as an interface: a boundary, a dividing line, "a surface lying between two portions of matter or space," "a means or a place of interaction between two systems."[53] It separates the *here* from the *there* and creates a site for their encounter. Moreover it stands in for a series of possible coordinating conjunctions: here and there, here or there, here but there, here yet there, neither here nor there. Interfaces cause problems for distinguishing the here from the there. If bodies, as Samuel Weber has argued, are things that occupy one place at a time, then media, like television, that interface separate places in real time "can be neither fully there nor entirely here."[54] While for Weber, the slash would stand in for "neither…nor," the effects of telepresent action suggests that it could represent "both…and" at the very same time. That is, telepresence creates a situation – a site – in which the incompossible coincidence of "here and there" and "neither here nor there" become paradoxically – and effectively – possible. Interfaces do not mark, but rather blur the boundary between the here and the there. "Here" and "there" are deictic shifters – indexical words that rely on context for their clear use and meaning. On the interface indices play their parts well – shifting, pointing, implicating. The here becomes the there, the now becomes the then, the I becomes the you, the self becomes the other. Be it a television screen or a networked computer, the interface upsets Weber's basic principle that if one is embodied here, now, one cannot be somewhere else at the same time. *From Television to Drone Vision* is an attempt not just to think through the possibility (or, indeed,

inevitability) of this "impossible" situation, but to propose how we might act, feel, and *be* on and through the surface of a screen—given that, like it or not, this is where we all now increasingly do live, act, fight, love, and touch.

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[1] John Markoff, *What the Dormouse Said: How the Sixties Counterculture Shaped the Personal Computer Industry* (New York: Penguin, 2005), 148.
[2] Markoff, 151. For more on Brand's involvement with staging "The Mother of All Demos" see Markoff, 152-157.
[3] At other moments in the presentation the projection screen showed just the documents Engelbart was producing or mixed these images with live feeds of other engineers at the SRI lab.
[4] This idea of the television screen as a "window onto the world" began as early as 1946 in Thomas H. Hutchinson's 1946 book, *Here is Television: Your Window to the World* (New York: Hastings, 1946).
[5] For a discussion of how early video artists sought to decentralize television distribution, see Kris Paulsen, "Half-Inch Revolution: The Guerrilla Video Tape Network," *Amodern* 2 (Fall 2013), np. http://amodern.net/article/half-inch-revolution/. For the involvement of the Stanford Research Institute in decentralized video projects, see Tung Hu-Hui, "Truckstops on the Information Superhighway: Ant Farm, SRI, and the Cloud" in *Media-N*, Meredith Hoy and Kris Paulsen, eds. (Spring 2014), np.
[6] Brand was brought in to make the presentation more of an "event" by Engelbart's collaborator, Bill English. "The unstated connection, of course," John Markoff writes, "was Brand's background in helping orchestrate Ken Kesey's Acid Tests." Markoff, 152.
[7] Douglas Engelbart, "The Augmented Workshop," in *The Personal Workstation*, Adele Goldberg, ed. (Reading: AMC Press, 1988), 234.
[8] Tom Gunning, "The Cinema of Attraction: Early Film, Its Spectator, and the Avant-Garde," *Wide Angle,* vol. 8, no. 3-4 (1986): 64.
[9] Gunning, 64.
[10] Gunning, 64, 66.
[11] Please see Chapter 1, "The Index and the Interface," for a discussion of the complex ontological category of the "virtual" as it related to computer screens and interfaces.
[12] See Chapter 2 of this volume, "Uncanny Valley: Early Video and the Fantasy of Presence," for a lengthy discussion of the pointing finger and its relationship to the interface.

[13] Kate Mondloch, *Screens: Viewing Media Installation Art* (Minneapolis: University of Minnesota Press, 2010), xi.
[14] Roy Ascott, "Connectivity: Art and Interactive Telecommunications," *Leonardo* 24, no. 2 (1991), 116.
[15] Marvin Minsky, "Telepresence," 1. Originally published in *Omni Magazine*, 1980. http://web.media.mit.edu/~minsky/papers/Telepresence.html (Accessed November 11, 2011).
[16] Minsky, np.
[17] Minsky, np.
[18] Eduardo Kac, *Telepresence and Bio Art: Networking Humans, Rabbits, and Robots* (Ann Arbor: University of Michigan Press, 2005), 78, 97. The difference between these two definitions is whether or not the "remote action" must be carried out by a robot, rather than a person taking orders. Both Eduardo Kac and Ken Goldberg have telepresence projects in which remote operators control a human proxy through directions and commands. See Eduardo Kac's *Telepresence Garment* (1995-1996), and Ken Goldberg's *Tele-Actor* (2001) and *Tele-Twister* (2003-2004).
[19] I borrow the term "user" from Roy Ascott. For Ascott, the "viewer" of contemporary art becomes a "user" around 1950 with the development of "vertical field viewing" introduced in the work of Robert Rauschenberg, and as discussed by Leo Steinberg in the "Flatbed Picture Plane" section of his landmark essay, "Other Criteria" (1972). While Steinberg sees Jackson Pollock's work still residing on the side of illusionism and the vertical picture plane, Ascott sees Pollock's work as part of the flatbed logic and the movement from nature and the viewer to the culture and the user. Pollock, Ascott writes, creates an "'all-at-onceness' that is the very epitome of telematic networking. His space is inclusive and inviting, in a sense providing for a kind of anonymity of authorship that embraces the viewer in the creation of meanings. The metaphysical promise of Pollock's work is made technologically explicit in telematic systems, where the dichotomy of artist/viewer or sender/receiver of the earlier era is resolved into a unitary 'user' of the creative system." Roy Ascott, "Art and Telematics," in *Telematic Embrace*: *Visionary Theories of Art, Technology, and Consciousness*, ed. Edward Shanken (Berkeley: University of California Press, 2003), 195.
[20] Eduardo Kac, "Telepresence Art," in *Telepresence and Bio Art: Networking Humans, Rabbits, and Robots* (Ann Arbor: University of Michigan Press, 2005), 140.
[21] See, for example, *The Ornitorrinco Project* (1989-1996), *Rara Avis* (1996), *The Telepresence Garment*, 1995-1996, and *Urapuru* (1996-1999).
[22] Maurice Merleau-Ponty, "The Intertwining – The Chiasm," in *The Visible and Invisible*, trans. Hazel E. Barnes (Chicago: Northwestern University Press, 1968), 142.
[23] In Chapter 7, "The View from Here: Drone Vision and The Trauma of (Not) Being Touched," I address the psychological effects of telepresence on the teleoperator.
[24] Roy Ascott, "Art and Telematics," in *Telematic Embrace*: *Visionary Theories of Art, Technology, and Consciousness*, ed. Edward Shanken (Berkeley: University of California Press, 2003), 187, 199.

[25] Roy Ascott, "Telenoia," in *Telematic Embrace*, 265. In "Telenoia," Ascott shifts his earlier description of networking as disembodiment to emphasize a new kind of human and humanity emerging, materializing through network culture. Networking, he writes, ignores not only "the boundaries of geography and region, and of culture and gender, but contributes, along with new scientific and philosophical insights, to the erasure of the established boundaries of the material body…. This erasure leads, however, not to a disembodiment of the person, nor to an immateriality, but to the rematerialization, the redescription, reconstruction – in short, the reinvention of the human being." 263.

[26]Ascott, "Telenoia," 263. N. Katherine Hayles points out in *How We Became Posthuman*, that Minsky, too, found his way to disembodiment. She sites a 1996 lecture in which "he suggested it would soon be possible to extract human memories from the brain and import them, intact and unchanged, to computer disks." N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999), 13.

[27] Ascott, "Art & Telematics," 197; Ascott, "Is There Love in the Telematic Embrace?," in *Telematic Embrace,* 241.

[28] Marshall McLuhan, *Understanding Media: The Extensions of Man* (Cambridge: The MIT Press, 1994), 7.

[29] McLuhan, 43.

[30] Hayles, 3.

[31] Hayles, 5.

[32] In 1994, Goldberg and his collaborators Michael Mascha, Steven Gentner, Jürgen Rossman, Nick Rothenberg, Carl Sutter, and Jeff Wiegley launched *The Mercury Project*, a telerobotic artwork that enabled online users to excavate artifacts in a sandbox in their lab at the University of Southern California. Ken Goldberg, et al, "Beyond the Web: Manipulating the Real World," *Computer Networks and ISDN Systems* 28 (1995), 209-219.

[33] Ken Goldberg, "Introduction: The Unique Phenomenon of a Distance," in *The Robot in the Garden: Telerobotics and Telepistemology in the Age of the Internet*, ed. Ken Goldberg (Cambridge: The MIT Press, 2000), 5.

[34] Oliver Grau, *Virtual Art* (Cambridge: The MIT Press, 2003), 7.

[35] As Samuel Weber has pointed out, just because virtual worlds are fictional, this does not mean that actions in these spaces do not have effects outside of the game. He takes up the example of the use of "real currency" in virtual games in his article, "A Virtual Indication." There is a growing market, he writes, for "virtual goods and services, what this phenomenon demonstrates is how misleading it is today… to try to simply 'oppose' something like 'virtuality' to something ostensibly more material, more real, such as 'indexicality.'" Samuel Weber, "A Virtual Indication," in *Digital and Other Virtualities*, ed. Antony Bryant and Griselda Pollock (London and New York: I.B. Tauris, 2010), 65.

[36] Adam Heilbrun, "Virtual Reality: An Interview with Jaron Lanier," http://www.jaronlanier.com/vrint.html (Accessed February 23, 2014). Originally published in *The Whole Earth Review* (Fall 1989).

[37] Thomas J. Campanella, "Eden by Wire," in Robot in the Garden, 27.
[38] "Virtual, adj. and n.". *OED Online*. March 2014. Oxford University Press. http://www.oed.com/view/Entry/223829 (accessed March 11, 2014).
[39] "Virtual, adj. and n.". *OED Online*. March 2014. Oxford University Press. http://www.oed.com/view/Entry/223829 (accessed March 11, 2014).
[40] For a discussion of the contranymic qualities of "virtual," see the discussion Antony Bryant and Griselda Pollock's *Digital and Other Virtualities* in Chapter 1 of this book.
[41] "Television, n.", *OED Online*. March 2014. Oxford University Press. http://www.oed.com/view/Entry/198769?redirectedFrom=television (accessed March 12, 2014); "Video, n.", OED Online. March 2014. Oxford University Press. http://www.oed.com/view/Entry/223260?rskey=7UyU0U&result=1&isAdvanced=false (accessed March 12, 2014).
[42] Anne Friedberg, *The Virtual Window* (Cambridge: The MIT Press, 2006), 11.
[43] Hubert Dreyfus, "Descartes's Last Stand," in *The Robot in the Garden: Telerobotics and Telepistemology in the Age of the Internet*, ed. Ken Goldberg (Cambridge: The MIT Press, 2000), 49.
[44] Samuel Weber, *Mass Mediauras* (Stanford: Stanford University Press, 1996), 121.
[45] See my 2012 article, "In the Beginning, There Was the Electron," for a discussion of experimental uses of broadcast television in the late 1960s. Kris Paulsen, "In the Beginning, There Was the Electron*," X-TRA Contemporary Art Quarterly*, vol. 15 no. 2 (Winter 2012): 56-73.
[46] Samuel Weber, *Mass Mediauras*, 121.
[47] Marshall McLuhan, *Understanding Media: The Extensions of Man* (Cambridge: MIT Press, 1994), 313.
[48] Willoughby Sharp & Liza Bear, "Chris Burden: The Church of Human Energy," *Avalanche* (Summer/Fall 1973): 54.
[49] Sam Biddle, "How To Destroy the Internet," *Gizmodo*, May 23, 2012, http://gizmodo.com/5912383/how-to-destroy-the-internet (Accessed February 26, 2014).
[50] Wafaa Bilal, *Shoot an Iraqi* (San Francisco: City Lights Books, 2009), xvi. Bilal lived in the gallery from May 4 – June 4, 2007. The installation remained up until June 16th. The artist wanted to title the work "Shoot an Iraqi," but the gallery found the title too controversial. The camera continued to broadcast live during this period as well. However, the gun was not operable.
[51] See: Dan Gettinger, "Burdens of War: PTSD and Drone Crews," *Center for the Study of the Drone,* April 21, 2014, np. Online. http://dronecenter.bard.edu/burdens-war-crews-drone-aircraft/ (Accessed May 10, 2014).
[52] See chapter 7 for a discussion of how both civilian and military discourses understand the actions of drone operators as cowardly or even dishonorable. See also: "Medals for Drone Pilots?," *The Economist*, March 27, 2014, np. Online. http://www.economist.com/news/united-states/21599785-fraught-debate-over-how-honour-cyber-warriors-medals-drone-pilots (Accessed May 10, 2014).

[53] "Interface, n." *OED Online*. March 2014. Oxford University Press. http://www.oed.com/view/Entry/97747?rskey=Le382F&result=1 (accessed May 02, 2014).
[54] Samuel Weber, *Mass Mediauras*, 115-120.