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Screening the Pre-Infant: Ultrasound Imaging and its Realisms

Abstract

Since its introduction in 1956 and subsequent adoption in the United States in the 1970s, obstetric ultrasound has become a nearly ubiquitous part of the ritual of pregnancy. Yet, its efficacy as both a social and medical technology has complicated its role in society and prompts us to consider the multiplicity of apparatus. While doctors use sonograms to delineate the boundaries between organs and healthy and pathological features in a fetus, for the untrained viewer, the ambiguous visual of the ultrasound image registers on an affective level.

Previous research on fetal sonograms has often focused on feminist perspectives and the ideological work of imaging bodies. However, critical work on this topic has been limited by a focus on optics. Using avisuality, antivisuality, and invisible media as my grounding concepts, I seek to destabilize the assumption that ultrasound is a visual technology in the first place, instead thinking of vision as constituted by multiple forms of knowledge—sensory information as well as graphs, annotation, and voiceover to create narrative continuity.

Building on the work of scholars such as Maurice Merleau-Ponty, Lisa Cartwright, and Akira Lippit, I elucidate how ultrasound's presentation through a blend of phenomenological, empirical, and documentary realism gives it meaning. As Karen Barad has contended, these assemblages are not innocent windows to the fetus, but rather help produce what they image. It is only through a variety of actors and frameworks operating in a heterogeneous perceptual space that the pre-infant emerges as a meaningful being.

For generations, ultrasound imaging has served as a formative step in the experience of pregnancy for women all over the world. The ability to see a fetus in the womb serves as a chiasmic moment between mother and child, providing a preliminary venue for the mother to begin to understand the growing being inside her as a separate, living infant. Today, ultrasound is used almost universally by doctors to delineate the boundaries between organs as well as between healthy and pathological features in a fetus. However, for the untrained viewer, the highly ambiguous visual of the ultrasound image contradicts this rationalist scopic regime; instead, perceiving the infant becomes an embodied and affective experience. How is it that a noisy, black and white image comes to be thought of as video evidence of a baby-to-be's existence? How can presence be revealed when it lies outside of our sensory capacities?

Previous work on fetal sonograms, particularly within feminist scholarship, has focused on the ideological work of fetal imaging. Carole Stabile, for instance, highlights the way in which visual imaging has created a division between mother and fetus and led to the "erasure of women's bodies."¹ Meanwhile, Valerie Hartouni has also written about

fetal imaging and the politics of abortion, gender, racialization, and women's bodies.² In the same vein, Rosalind Pollack Petchesky discusses the use of fetal images as spectacle in anti-abortion rhetoric and their implications for feminist theory.³ These works adeptly bring to light the cultural, historical, and political experiences within medical routines, particularly in regards to female bodies. Rather than focusing on the politics of fetal imaging, my intervention in this paper is to use fetal ultrasound to expand outwards and rethink the materiality of the image at the site where the body's intelligibility is produced. As Karen Barad has contended, these assemblages are not innocent windows to the fetus, but rather help produce what they image. For Barad, the sonogram "is sedimented out of particular practices that we have a role in shaping... *Apparatuses are themselves material-discursive phenomena, materializing in intra-action with other material discursive apparatuses.*"⁴ This second point is key to my analysis, which seeks to engage with the multiplicity of apparatus and to understand fetal ultrasound as an imaging system that entertains, diagnosis, and defines bodies all at once.

In other words, ultrasound is a not a stable

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and singular category of media. There is an element of function creep involved, wherein its status as medical image, documentary film, abstract art, or souvenir is determined by the manner in which the subject engages with the image. In fact, medical imaging is itself imbricated in a technical, cultural, and philosophical lineage that also includes sonar, spectral photography, and documentary film. As Lisa Cartwright puts it, “the long history of bodily analysis and surveillance in medicine and science is critically tied to the history of the development of the cinema as a popular cultural institution and a technological apparatus” and vice versa.⁵ As such, I seek to articulate ultrasound as more than a medical technology; rather, it lies at the intersection of multiple visual and cultural trajectories that understand knowledge and realism as a function not only of the eye, but also of the ear and of the skin. Far from merely reaffirming the spectator’s position as an interpreting subject, ultrasound’s effect as an imaging technology is negotiated through a combination of the image’s material indexicality, the fetus’ real-time movement and heartbeat, verbal explication, and a psychological desire to “see.” The on-screen rendition of the pre-infant is almost always partially seen, partially inferred, and partially imagined.

To account for ultrasound’s synthesis of visual and non-visual evidence, I ground this discussion within three theoretical frameworks that de-center the visible as a source of meaning: *avisuality*, *antivisuality*, and *invisible media* as posited by Akira Lippit, Lisa Cartwright, and Laura Marks, respectively. These concepts allow us to understand the ultrasound image itself as more than a purely virtual, immaterial representation of the infant. Drawing on scholars such as Maurice Merleau-Ponty, Bill Nichols, Vivian Sobchack, and Laura Marks, I will then describe how ultrasound’s presentation through a blend of empirical, documentary, and phenomenological realism gives it form and meaning. Ultrasound therefore serves as an important reminder that visual regimes and technologies are never passive, nor are they transparent. In order for the unseen to become the seen, the boundaries that we take for granted in our daily lives are muddled and destabilized: imagination slips into the real, texts become bodies, and fetuses make their transition into human babies.

Ghost in the Shell

Fetal ultrasound is embedded in a rich genealogy of technologies that seek to expose the interior to the public eye. Like other apparatuses of its kind that include x-ray, disease detection technologies, psychoanalysis, and arguably cinema itself, the novel views offered by these machines radically alter the limits of our knowledge and our personal sense of what it means to “be-in-the-world.” As José Van Dijck puts it, the invention of cinema and medical imaging technologies like x-ray that allowed people to “inspect the living interior body without having to cut it open” led to the emergence of “a new medical gaze.”⁶ This medical gaze fundamentally changed the way we understood our bodies, but in a Foucauldian sense, it also continued to pave the way for the medical field’s conflation of vision with knowledge and knowledge with control.

An essential aspect of how this gaze formed is the larger nineteenth century movement to study, guide, shape, and control knowledge about vision itself, thereby associating vision with the operation of power. As Jonathan Crary explains, a variety of technological assemblages used to study the human sensorium and subjective vision in the late eighteenth and nineteenth centuries served to quantify the porousness and complexity of human visual phenomena—everything from retinal afterimages (the persistence of an image in the absence of a stimulus) to the hallucinatory creation of stereoscopic images.⁷ Given this paradigm shift, I would like to start by first tracing a lineage through three related theoretical concepts—the antvisual, the avisual, and invisible media—to guide us in understanding what it means to screen the body, and more broadly speaking, what it means to visualize beyond the naked eye. Taken together, these three terms construct ultrasound as a space of uncertainty that, despite being partially virtual and imagined, has real and material consequences.

The idea of the antvisual was conceived by Lisa Cartwright in her book, *Screening the Body*, in which she proposes that the influence of medical imaging technologies as producers of anatomical knowledge comes not from their pictorial or cinematic qualities, but from the graphical traces associated with early scientific cinema. Cartwright explains, “the fascination with movement and the interior,

invisible processes in the early scientific cinema was bound up with the logic of the kymograph and its graphic, linear trace—a kind of ‘seeing’ that differs in important ways from other modes of cinematic and pictorial spectatorship.”⁸ In other words, medical imaging can be thought of as a technology that is premised on indexicality above iconic or symbolic forms of representation. Cartwright’s kymographic trace is a register of change in movement over time. Used for early radiological imaging, the kymograph receives and processes close-up images of animal movement as a flat silhouette.⁹ The analogy is of course, apt for ultrasound, which processes objects through sound as opposed to light (as most other moving image technologies do). Specifically, the ultrasound transducer emits sound waves that contact objects and return back to produce an array that ranges from white to black based on density. The product that is perceived is merely an indexical slice of the fetus that often times does not resemble a recognizable silhouette of the pre-infant, so much as its real-time movement. Like the kymograph, ultrasound destabilizes sensory perception as a source of knowledge, acting instead as an antvisual mode of sight.

Cartwright’s antvisuality intersects with Akira Lippit’s term, *avisuality*, which is likewise a rejection of ocularcentrism to describe the imaging of the interior. For Lippit, *avisuality* emphasizes not only the indexicality of such images, but also the process of mental extrapolation and imagination that must occur to produce certain forms of *visuality*. Lippit goes on to characterize this mode of *avisuality* as a kind of excess, a force that “exceeds the capacity of the spectator to see it, to withstand its very specularity.”¹⁰ Lippit names x-ray, psychoanalysis, and atomic radiation as phenomena that all prescribe to this logic of *visual media* that cannot be validated by human visual perception. Ultrasound is indebted to elements of this excess or *visual “force”* by refusing a direct, present tense or single space relationship between eye and image. As Lippit explains, these technologies are excessive because they can be both temporally and spatially dislocated—ultrasound, x-ray, and other *avisual media* create an “impossible topography” and “phantasmatic hybrid or emulsion,” dissolving subject together with object.¹¹ In regards to temporal hybridity, *avisual images* may inscribe future anniversaries yet to come—

for the skeletal x-ray image that phantasmatic anniversary is death; for the ultrasound it is life.¹² This notion of the anniversary is key, as it helps us understand the infant as existing within multiple timeframes. Ontologically, I conceive of the ultrasound as indistinguishable from the thing in its *future* form—the moment we see the ultrasound pre-infant presented as a baby, it is already, psychologically speaking, a baby. Ultrasound is therefore a form of *visuality* and presence that is premised on its antvisuality, *avisuality*, and unavailability as a purely present-tense object. Put another way, it is a kind of reverse haunting: the sonogram makes the future present the same way that spectral photography makes the past present.

The third base term in my theoretical tripod is *invisible media*, which hones in on exactly where we leave off with *avisuality*: the latency of *media objects* that are not immediately visually available to the subject. Laura Marks makes the proposal that any image is “merely the selectively unfolded surface of enfolded information.”¹³ In her sense, image, information, and capital selectively reveal the reality of experience. Some of the original source material, however, remain latent, implicate, or enfolded. In the case of ultrasound, the baby-to-be undergoes a process of unfolding through sonar technology to become a two-dimensional rendering, but this transmission from information to image is only partially encoded. To communicate this notion of delayed visibility, I use the term “pre-infant,” which was proposed by Francine Wynn to describe the baby-to-be-in-the-womb. Her logic for electing “pre-infant” is to echo Merleau-Ponty’s use of the prefix to “signify the originary, the primordial, the latent and the virtual” in a way that “anticipates but does not necessitate the baby’s existence.”¹⁴ The enfolded pre-infant is therefore distinct from the medicalized fetus that is categorized by the doctor’s eye as well as the unfolded infant that is visible on the screen. In the next section, I delve deeper into this empirically constructed fetus through a discussion of the antvisual medical gaze.

Empirical realism and the medical gaze

The way that the real-time fetal ultrasound works as a technical process involves several degrees of mediation. First, a handheld transducer is moved

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across the abdomen, emitting pulses of inaudible ultrasound waves (2MHz to 20 MHz) that contact bodily tissue and bounce back to produce a density-based gradient in real-time. As the echoes return, the analog signals are focused by the beamformer, which gives it specific sizes and shapes at various depths within the body. The information is then amplified and processed as a digital signal.¹⁵ Finally, a scan converter converts the beam into a digital image matrix, making the raw information readable on a 2D screen.¹⁶ Echoes appear as bright spots when they are produced by surfaces and boundaries between tissues, while fluids appear dark. This indexical trace is antvisual and avisual—the trained ultrasound technician must be versed in recognizing specific signs within the image and automatically extrapolating these signs into a mental picture of the three-dimensional fetus itself. That is not to say, however, that the image is purely a text to be read; real-time motion also establishes a sense of corporality. The baby's physical kicking and heartbeat, read alongside the movements of gray lines, creates a living body. Duration and motion, as Christian Metz asserts, gives the pre-infant an autonomy and defines it against the background of the womb.¹⁷

However, as one of the primary objectives of empirical realism, *definition* must be interrogated as a mode of interaction with an image. Any defined image is an image that can be read at a distance, and this distancing has consequences for how we characterize the relationships between knowledge, sight, and control. The biggest benefit to using ultrasound as opposed to x-ray or some other form of imaging is its promise of observational, noninvasive surveillance. While the idea of distance is already predetermined in this context, this promise of noninvasive observation is also illusory. Technology informs medical knowledge, and medical knowledge also informs how we see, culturally and psychologically. The mere imposition of the medical gaze on the process of pregnancy is a kind of intervention in the way that it fundamentally changes the private, privileged relationship between mother and pre-infant to a public relationship between doctor, patient, and medicalized fetus.

Part of this process of definition involves timing. Ultrasound is typically conducted between 18–21 weeks, barring other complications. This is because the second trimester is the earliest time that

doctors are able to visualize and evaluate discrete organs like the heart, as well as discern the sex of the baby. Van Dijck explains, “more advanced ultrasound machines show more fetal defects at an earlier stage of pregnancy; the technical ability to detect rare fetal abnormalities becomes the technical imperative to offer such scans to all pregnant women.”¹⁸ Thus, it is only at a certain level of maturity that a fetus is worthy of being surveilled, and this is the point at which deformity might reveal itself. In other words, the baby is made visible when it can be recognized by pre-existing knowledge structures and treated as an object of suspicion. To echo Foucault's *The Birth of the Clinic*,¹⁹ medical imaging as a kind of discourse control, in which the possession of ever more knowledge is required to fold in unruly bodies and invisible disease into that which can be recognized and categorized. In effect, becoming a body is synonymous with becoming a body to be sorted. Recent efforts to re-medicalize ultrasound or discourage “fun-sonography” or nonmedical uses of the technology enforces the medical exclusivity of ultrasound and maintains the technology as a mechanism of control and definition.²⁰ In turn, the logics of this definition (such as the trimester system) reinforce medical influence in society.

Of course, the assumption that the office of a trained sonographer in obstetrics and gynecology is always medical is itself false—medical ultrasound visits have always incorporated sociality by providing narrative tailored to the family as well as giving away videotapes or photographs of the ultrasound image as keepsakes at the end of the visit. Janelle Taylor goes one step further to say that this routinization of the ultrasound exam, with all its “acts of showing and telling, repeated millions of times each year,” contributes to the unique position of the fetus as socially and politically charged in contemporary American society.²¹

Ultrasound as Documentary

In “The Work of Art in the Age of Mechanical Reproduction,” Walter Benjamin creates an analogy between medicine and filmmaking. He writes, “Magician and surgeon compare to painter and cameraman. The painter maintains in his work a natural distance from reality, the cameraman penetrates deeply into its web... That of the painter

is a total one, that of the cameraman consists of multiple fragments which are assembled under a new law.”²² If the cameraman is like a surgeon in the way that he assembles fragments, then surely we can also think of the doctor as a kind of documentarian, who, through a show and tell process, sutures together a narrative about the ultrasound image for an audience of family members. To extend this analogy, ultrasound imaging is a filming and directing process. The technician moves the transducers to the right locations and angles to compose the best possible iconic image of a fetus, and then supplements this display with a story about what is being recorded by the apparatus. Ultrasound creates flattened, two-dimensional views that must be partially imagined in order to be understood as representative of a three-dimensional, material infant. This interpretation process depends on a voiceover to impart structure to an avial imaginary. As Elizabeth Cowie puts it, the documentary image is presented as knowable in terms “organized by the film, not by reality.”²³

Writing on documentary, Philip Rosen makes the important claim that, “when that representation is explicitly said to be valuable because of the presence of the apparatus, the indexicality of the image—the image emerges as insufficient in itself. It must immediately be explained, sense must be made, the very shape of the image requires verbal explication and pinpointing.”²⁴ As an antivisual media form, ultrasound is a distillation of this documentary realism; in order to present itself as knowable, it relies on indexicality as well as human explication to bolster that very indexicality. After all, what is a graph without a key or titles? A major part of what is notable about this empirical-documentary realism is its epistephilic qualities. Cowie highlights this knowledge-seeking modality of documentary: “What is seen is taken to be knowledge, for documentary—rather than simply actuality—film is associated with the serious, and its spectator is posited as a subject of knowledge. Aligned with the controlling discourse of the titles or voice-over within the documentary film, or with the documentary investigator who may figure directly in the film, we identify with the “other” of knowledge, a position of mastery.”²⁵ However, the difference between ultrasound and a purely didactic documentary is a measure of affect, where identification occurs as

both a process of learning as well as a process of evocation. Due to its inherent social and ritualistic qualities, ultrasound is not merely an epistephilic documentary, but rather, it is what Bill Nichols terms “gnostophilic,” or indebted to a form of knowledge that is “not dependent on distance, objectivity and reasoned analysis alone but also on empathy, identification, feeling, tone, and sensibility.”²⁶ Taylor explains that the result of this documentary gnostophilia is a kind of gendered unease in the doctor-documentarian’s process of explication:

“There is a delicate balancing act involved in emphasizing the traditionally feminine skills of caring as properly central to the professional identity of sonographers, when at the same time it is their specialized technological skill that underwrites their claims to professionalism more generally.”²⁷

As a documentary process, ultrasound is therefore socially fluid. As the relationship between the image, viewer, and doctor fluctuates between medical and social realms, the sonogram, too, fluctuates in its status as both medical object and *film-souvenir* or home video—marking out a nostalgic experience for the future even as it is used to diagnose the present.²⁸

A Phenomenology of Ultrasound

While documentary realism and empirical realism hint at a complex relationship spectator, doctor, and machine, it is phenomenological realism that really gets to the heart of the identification process between the mother and the pre-infant. The very notion of a medical gaze is a rationalist idealization that binds together matter and space: “Matter occupies space and, inversely, whatever occupies space is matter.”²⁹ Diana Coole explains, however, that this perspective has a tendency to exclude the interior, casting matter as flat and lacking in any negatives. The ultrasound apparatus that includes doctor, patient, and machine breaks from a Cartesian perspective, as it is premised on those very negatives, imaginary topographies, and interiorities that Descartes excluded. In order to move beyond the binary divisions between subject and object, mind and body, space and time, I turn

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to the *lebenswelt*, a sense of being-in-the-world as elaborated by phenomenologists Edmund Husserl and Maurice Merleau-Ponty. One of the major innovations of phenomenology as a critical approach is its ability to understand screen images not only as a product, but also as a process. For Merleau-Ponty, meaning emerges as the image unfolds for the viewer—perception is never static. As in natural vision, objects create “an impression of an emerging order, of an object in the act of appearing, organizing itself before our eyes.”³⁰ This assessment of cinema applies directly to ultrasound, as both are an “objective technology of perception and expression that comes—and becomes—before us in a structure that implicates both a sensible body and a sensual and sense-making subject.”³¹ A pre-infant becomes a fetus or an infant through ultrasound in this very way: matter and space acquire meaning and structure through a formative and evolving relationship between the viewer’s eye and the image.

Additionally, Merleau-Ponty provides a productive spatial understanding of what it means to “unfold” invisible media through movement, visual address, and the judgment of the mind. He explains, “Even the objects right in front of me are not truly seen but merely thought...If I am able to speak of cubes, it is because my mind sets these appearances to rights and restores the hidden surface.”³² This notion of seeing the unseen through the imagination echoes Lippit’s avisuality, which emphasizes mental projection as a key player in the process of vision. A spectator’s ability to understand the ultrasound image as a baby is then also predicated on a type of embodied imagination. For the sonographer, professional training helps to lubricate the mental translation process between signs in the image and a physical correlation to an infant. Outside of the technical field, the ability to understand the image as a baby is highly predicated on the mother’s understanding of her own body—there is an implicit expectation that an infant ought to include a head, hands, feet, a heart, and other body parts.

However, in order to then see the baby as a delineated other, the mother is in the strange position of having to construct her own body (the womb) as an exterior space, or space to be observed. Elsaesser explains this “haptic vision” or “out-of-body experience” as a narrative strategy that seeks consciousness and subjectivity “by trying

to disembody it, externalize it, void it even, and then relocate it in the world of things, of spaces, and the space of the ‘other’.”³³ On the screen, the mother’s body is duplicated and divested by the mind—it exists in two spaces as body and text. The movement of the baby further defines the womb as an otherworld, creating a psychological division between the mother as subject and the mother’s womb as object. Of course, as Sobchack explains, this self-possession of the subject is never complete: “the very mobility of its vision structures the cinematic subject (both film and spectator) as always in the act of displacing itself in time, space, and the world; thus, despite its existence as materially embodied and synoptically centered (on the screen or as the spectator’s lived body), it is always eluding its own (as well as our) containment.”³⁴ The two cinematic subjects—mother and pre-infant—are therefore simultaneously grounded in material reality and virtuality. In fact, these two realms are in constant dialogue as they produce each other. Rather than thinking of life rendered or reduced on screen, this dialogic relationship points us towards the “lifeness of media” itself, or the fecundity of media in generating new hybrid modes of being.³⁵

From pre-infant to infant, fetus to healthy fetus, ultrasound imaging is a key social and psychological transition period during pregnancy. However, this paper has attempted to demonstrate that ultrasound imaging is not a singular or static media form. Rather, we define it based on how we experience it and categorize it as a realist technology. Furthermore, the way in which we end up fusing empirical, documentary, and phenomenal modes has very real and material consequences for how we think about life and knowledge in relation to visibility. Using avisuality, antivisuality, and invisible media as my grounding concepts, I destabilized the assumption that ultrasound is a visual technology in the first place, instead thinking of vision as constituted by multiple forms of knowledge—sensory organs like the ear and skin—as well as non-sensory knowledge like graphs, annotation, and logical inference to create narrative continuity. The larger takeaway is that this nonvisual mode of seeing is not “negative,” passive, or void of significance; the sonogram, doctor, and patient work together to create a fluid ensemble or Gestalt that tells its own story. Put another way, all medical imaging is a layering of meaning—a

coagulation of cultural prejudices, expectations, medical knowledge, and traditions onto a screen. Imaging of the interior offers us clarity in some senses and noise in others; it depends on what

we desire from that viscosity. In the ultrasound, vision is therefore many things at once: an act of penetration, an assertion of power, a searching gaze, a form of cathexis, and a feat of imagination.

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Notes

- 1 Carole Stabile, “Shooting the Mother: Fetal Photography and the Politics of Disappearance,” *Camera Obscura* 28, (1992): 180.
- 2 Valerie Hartouni, *Cultural Conceptions: On Reproductive Technologies + The Remaking of Life* (Minneapolis: University of Minnesota Press, 1997).
- 3 Rosalind Pollack Petchesky, “Fetal Images: The Power of Visual Culture in the Politics of Reproduction,” *Feminist Studies* 13, no. 2 (1987): 265.
- 4 Karen Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*, (Durham and London: Duke University Press, 2007): 202–203.
- 5 Lisa Cartwright, *Screening the Body: Tracing Medicine’s Visual Culture* (Minneapolis: University of Minnesota Press, 1995): 3.
- 6 José Van Dijck, *The Transparent Body: A Cultural Analysis of Medical Imaging*, (Seattle: University of Washington Press, 2005): 4.
- 7 Crary cites Johann Friedrich Herbart as one of the major figures who first advocated for the quantification of cognitive experience. This impulse to quantify human psychology in turn directly led to pedagogical ideas about controlling young minds. Jonathan Crary, “Techniques of the Observer,” *October* 45 (1988): 13–20.
- 8 Cartwright, *Screening the Body*, 20.
- 9 *Ibid.*, 23.
- 10 *Ibid.*, 41.
- 11 Akira Mizuta Lippit, “Phenomenologies of the Surface: Radiation-Body-Image,” in *Collecting Visible Evidence*, eds. Jane Gaines and Michael Renov, (Minneapolis: University of Minnesota Press, 1999): 80.
- 12 *Ibid.*, 69.
- 13 Laura Marks, “Invisible Media,” in *New Media: Theories of digitextuality*, eds. Anna Everett and John T. Caldwell (New York: Routledge, 2003): 33.
- 14 Francine Wynn, “The early relationship of mother and pre-infant: Merleau-Ponty and pregnancy,” *Nursing Philosophy* 3 (2002): 8.
- 15 Joseph Woo, “A Short History of the Developments of Ultrasound in Obstetrics and Gynecology,” Joseph SK Woo MBBS, FRCOG, <http://www.ob-ultrasound.net/history.html>
- 16 Perry Sprawls, “Ultrasound Production and Interactions,” *Sprawls Educational Foundation*, <http://www.sprawls.org/ppmi2/US-PRO/>.
- 17 Christian Metz, *Film Language: A Semiotics of the Cinema*, trans. Michael Taylor, (Chicago: The University of Chicago Press, 1990): 7.
- 18 *Ibid.*, 8.
- 19 Michel Foucault, *The Birth of the Clinic: An Archaeology of Medical Perception*, (London: Tavistock, 1973): 9, http://monoskop.org/images/9/92/Foucault_Michel_The_Birth_of_the_Clinic_1976.pdf
- 20 Nonmedical ultrasound clinics do not offer full diagnostic information about the fetus, but rather, are meant to produce keepsakes of the pre-infant for families. The medical community has largely sought to discourage this type of ultrasound by exploiting parental fear of open-ended risk. See the American Pregnancy website for an example: “Keepsake Ultrasounds Or Sonograms,” *American Pregnancy Association: Promoting Pregnancy Wellness*, January 2014, accessed June 10, 2015, <http://americanpregnancy.org/pregnancy-health/keepsake-ultrasound/>
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- 22 Walter Benjamin “The Work of Art in the Age of Mechanical Reproduction,” in *Illuminations*, ed. Hannah Arendt, trans. Harry Zohn, (New York: Schocken/Random House: 1969). Reprint, *Marxists Internet Archive*, <https://www.marxists.org/reference/subject/philosophy/works/ge/benjamin.htm>
- 23 Elizabeth Cowie, “The Spectacle of Actuality,” in *Collecting Visible Evidence*, eds. Jane Gaines and Michael Renov, (Minneapolis: University of Minnesota Press, 1999): 27
- 24 Philip Rosen “Document and Documentary: On the Persistence of Historical Concepts,” in *Change Mummified: Cinema, His-*

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toricity, Theory, (Minneapolis: University of Minnesota Press, 2001): 230.

25 Ibid., 29

26 Bill Nichols, *Representing Reality: Issues and Concepts in Documentary*, (Bloomington and Indianapolis: Indiana University Press, 1992): 194.

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28 Vivian Sobchack, "Toward a Phenomenology of Nonfictional Film Experience" in *Collecting Visible Evidence*, eds. Jane Gaines and Michael Renov, (Minneapolis: University of Minnesota Press, 1999): 248.

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30 Maurice Merleau-Ponty, "Cezanne's Doubt," in *Sense and Non-Sense*, trans. Hubert L. Dreyfus and Patricia Allen Drefus, (Evanston: Northwestern University Press, 1964): 14.

31 Vivian Sobchack, *Carnal Thoughts: Embodiment and Moving Image Culture*, (Oakland: University of California Press, 2004): 160.

32 Merleau-Ponty, *The New Psychology*, 50.

33 Elsaesser, "World Cinema," 12.

34 Sobchack, *Carnal Thoughts*, 150.

35 Kember and Zylinska, *Life after New Media*, xvii