

Reproductive Anxiety: Reconfiguring the Human in Virtual Culture

by

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Abstract

From Jean Baudrillard's bold critique of simulacra to the rapid expansion of intellectual property law and the subsequent proliferation of infringement lawsuits, virtual culture in the late 20th and early 21st centuries has been characterized by a profound sense of anxiety about the implications of digital, genetic and other bio-informational technologies. In this project, I conceptualize virtuality as a cultural disposition towards people and things as mixtures of materiality and information. Understood in this way, virtuality constitutes today what John Durham Peters (1999) calls "extremities of communication" which generate concerns, anxieties and controversies about what counts as human.

My approach to questions about the "content" of reproductive anxiety (i.e., what they are about) has been influenced by cultural and intellectual histories of reproductive technologies, which suggest that reproductive anxiety is a manifestation of a broader crisis of agency, authenticity, tradition and paternal order. There is thus much more at stake in controversies about plagiarism, copyright infringement, gene patenting and unauthorized reproduction than who owns what. Drawing from theories of virtuality, feminist technoscience, and actor-network theory, I argue that the virtualization of reproductivity puts legal, scientific and popular assumptions about subjectivity and collectivity in question.

Using a variety of methodological techniques, from "litmus tests" of humanness to online ethnography, I examine how cultural forms and practices mediate anxiety about reproduction, agency and the shrinking sphere of the uniquely human in controversies about unconscious plagiarism, transgenic organisms and digital music remixing. By

increasing the scale and pace of human-nonhuman entanglement, bio-informational reproductivity challenges the notion of society and subjectivity as purely human.

Anxieties about the shrinking zone of irreproducibility do not necessarily lead to the recuperation of purely human subjects and societies. Indeed, this study emphasizes the role of reproductive anxiety in the production of new figurations of the human subject whose autonomy, like that of nonhumans, emerges from entanglement.

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1. Reproductivity, anxiety and virtuality

In virtual culture, human subjectivity is shaped by the tension between two conflicting notions of reproduction: first, reproduction as a sign of stability, certainty, control and continuity, and, second, reproduction as sign of flux, uncertainty, danger and even death. Two well-known scenes in Ridley Scott's film *Blade Runner* (1982) highlight this tension. The first scene takes place in the apartment of the replicant-hunting protagonist, Deckard (Harrison Ford), who scans a photograph into his computer, uttering commands to move and rotate the virtual camera "inside" the digital image. This technique allows Deckard to view things that were previously invisible. "Zooming," "cropping" or "sharpening" do not quite capture what the computer enables Deckard to do with the image; the face in the mirror, which Deckard prints out, wasn't in the original photograph. The computer reconstructs the three-dimensional space in which the photograph was taken based on a two-dimensional image, and then pivots and moves a virtual camera in that space to reveal objects that were not visible from the angle of the camera that originally reproduced the scene. In this instance, digital reproduction is envisioned as a way of enhancing human control over space and time, and, more specifically, reconstructing reality so that it can be manipulated and new knowledge can be gleaned from old reproductions.

The second scene takes place at the headquarters of Tyrell Corporation, which designs and sells human-like replicants. In a darkened room, Deckard demonstrates that even the most sophisticated human-like replicants can be detected through an "empathy test." The film's audience hears only a few of the one hundred questions that Deckard asks the replicant, Rachael (Sean Young), but the test uses bodily responses (e.g., "blush

response” and pupil dilations), triggered by detailed questions about the subject’s memories, as indicators of either memories implanted in nonhuman form or humanly embodied memories based on human modes of perception and experience. In the end, Rachael fails the test. In the voiceover, however, Deckard discloses his inability to have any feelings about replicants, which is disconcerting for a replicant-killer or “bladerunner.” Rachael proves to be more empathetic toward humans than humans are towards her. This second set of scenes problematizes the reproduction of human qualities in nonhuman form. The audience witnesses the displacement of affect from humans to nonhumans, most visibly in the form of the machine-like coldness and precision of the human bladerunner. This early 1980s problematization exemplifies virtual culture’s uncertainty about what precisely “counts” as human, who/what is alive and who/what should be “terminated.” It raises a number of philosophical issues, such as the ethics of caring for and sympathizing with copies, but juxtaposed with the first scene, it highlights the central issue explored in my project: a common tension in different institutional contexts and cultural spaces between reproduction as a means of control and reproduction as an unruly process in need of control.¹

Changes in reproductive technologies, practices and regulations are often accompanied by the promise of more control over the world. Nevertheless, changes in technologies and regimes of reproduction provoke anxieties ranging from concerns about unauthorized copying in digital networks to transgenic contaminants in the food system. In this project, I use the term *reproductive anxiety* for this set of worries about the process of reproducing people and things as well as the consequences of those “ways of

¹ Kember (1998) puts it in psychoanalytic terms: “Technology can offer a fetishistic means of control but, not least because of the inherent instability of fetishism, it can also become overrun with the fears it is employed to conquer” (p. 7).

doing.” I argue that there is much more at stake in reproductive controversies than who owns what. Reproductive anxieties in law, science and popular culture anticipate the implications of reproductive practices, technologies and regulations for the uniqueness and autonomy of the human subject. Generally, the history of technical reproduction has shifted an increasing number of formerly human qualities to nonhuman materials, from the authority of written documents in the 12th century to the more recent attribution of intentionality and thinking to artificial agents and the legal rights accorded to plants to reproduce themselves. Thus, anxieties about what will become of the human in the emerging regime of reproduction are not unfounded. This emerging regime, I argue, is *virtual* in the sense that it is based on a perception of bodies and materialities more generally as enabled and constrained by code. What counts as human and what counts as life in the virtual regime has not been settled. Reproductive anxieties may thus be read not only as worries about the demise of human uniqueness in a world of intelligent and rights-bearing nonhumans, but also as a part of a struggle to enact conflicting definitions of virtuality.

Although reproductive anxiety is not new, its intensification has been noted by theorists in a wide range of fields who have suspected that contemporary technical reproduction exploits and displaces women’s reproductive agency and corporeal materiality (Barnard, 2000; Casper, 1994, 1998), demolishes the real/imaginary distinction (Baudrillard, 1983), bypasses the Symbolic towards a simulacrum of the Real (Beverley, 1990), and induces cultural stagnation (Chion, 1991). Communication and cultural studies have also produced a great deal of secondary literature which transposes Walter Benjamin’s (1969 [1936]) famous essay on art, perception and reproducibility to

electronic and digital media and culture (e.g., Brummett, 2006; Mitchell, 2003; Russell, 2004). In this project, I use anxieties to trace out competing ways of problematizing reproductivity in theory, law, design and culture. Although there is general agreement across these institutional and cultural settings that contemporary reproductivity operates at the juncture of information and materiality, anxieties point to different and conflicting models of subjectivity and collectivity according to which this form of reproductivity should be governed.

Much scholarly and journalistic attention has been devoted to the implications of biotechnical and digital reproduction for particular cultural practices and legal rights. These anxieties about particular reproductive technologies, events and laws as articulated by citizens, advocacy groups and commentators are premised on the notion that interventions in cultural and biological reproduction increase institutional control over people and things. But the institutional actors who are often assumed to define, represent, extend, constrain, etc. the reproductivity of people and things in law, science and engineering are not uniformly confident that new forms of control are legitimate or effective.

In controversies about food biotechnologies, these institutions attempt to construct realities from technical, utilitarian and legal languages, which downplay “the moral primacy of ecosystem preservation” (Scott, 2000, p. 294). Since technologies, states and firms are working together to commodify life on unprecedented scales, undermining the agency and rights of consumers and farmers and setting the stage for environmental and agricultural catastrophes in the process, groups like Greenpeace believe that destroying field trials of genetically modified plants is an ethical course of action. Given the

enormous financial success of Round-up Ready (herbicide resistant) canola, it is surprising that biotechnology firm Monsanto suddenly abandoned its plan to market Round-up Ready wheat due to increasing anxieties in key markets about the consumption of genetically-modified food.²

Like food, music is a mundane aspect of life that has recently become a focal point for anxieties about the institutional control over, and through, reproductivity. Since the successful infringement lawsuit in the US against the owners of the Napster file-sharing system, scholars have critiqued the corporate use of fear, litigation and design to lock consumers and musicians into a new regime of reproduction, in which, according to Tom McCourt and Patrick Burkard (2003), “private Internet communities must either police themselves or submit to corporate or state surveillance” (p. 335). Much like Monsanto in the context of biotechnology, Apple became one of the most visible institutional authorities in this new regime since the corporation deployed and managed the most widely-used system of digital locks and keys to prevent unauthorized copying of music and video. But again, people and things entered into unanticipated alliances which challenged the capacity and willingness of institutional authorities to maintain what turned out to be an extremely costly control system. Apple, the largest online music retailer, discursively aligned itself with the likes of the Electronic Freedom Frontier, calling for an end to technological copy restrictions since these systems would inevitably fail to control unauthorized copying.³

² Dana Flavelle (2004, May 11), Monsanto drops modified wheat: Shelving genetically altered crop called ‘business decision’; environmentalists, farmers, consumer groups claim victory. *Toronto Star*, p. D01.

³ Steve Jobs (2007, February 6), Thoughts on Music. Accessed May 29, 2009 from, <http://www.apple.com/hotnews/thoughtsonmusic/>.

Certainly, these moves away from certain reproductive control mechanisms need to be considered as elements of broader public relations strategies. But there is more than optics at work in these sudden changes in courses of action. Such moves indicate that the current regime of reproduction has not yet been stabilized and the reproductive behaviors of people and things often diverge from the actions prescribed to them in law and design. Events like these suggest that there is something amiss in the view of virtuality as an institutional form of reproductive control.

Generally, scholarly work on reproductive anxiety tends to construe it as a subcategory of “future shock” or as a primordial or ancient fear that recurs with every new media form. Important characteristics of reproductive anxiety tend to get lost in these accounts of reproductive macro-anxiety. Broad histories of reproductive anxiety cannot entirely predict which aspects of contemporary technologies, practices and regulations will be problematized in different institutional and cultural contexts. The notion that virtuality opens up entirely new and disorienting possibilities for subjectivity elides the political history of these possibilities in philosophy, law and science.

In this project, I identify a general tendency in legal, scientific, industrial and cultural activities to merge biological and cultural reproductivity into bio-informational systems as the primary source of contemporary reproductive anxiety. However, by leaving behind the fatalism, reductionism and essentialism of well-known theoretical and philosophical critiques of code-based reproductivity, this project highlights instances in which anxiety prompts the recognition of creative transformations of human subjectivity in relation to, and in partnership with, nonhuman others. Cultural and biological reproductivity have a long history of metaphoric links, but their reconfiguration and

integration as information is relatively new. As journalist and avid gardener Michael Pollan (2002) writes in regards to the potato, which in his view represents the human desire to order nature, genetically-engineered potatoes seem to have their “wildness” (disorderly nature) programmed out of them. At the same time, genetic engineering “allows a larger portion of human culture and intelligence to be incorporated into the plants themselves” (p. 198). Treating plants as software marks a new kind of relationship between people and plants, culture and nature. “While the other plants coevolved in a kind of conversational give-and-take with people, the NewLeaf potato has really only taken, only listened” (p. 197).

Pollan’s anxiety is a common response in contemporary culture to new questions about where knowledge, agency and affectivity reside in bio-informational networks, what kinds of relationships are possible and desirable between humans and nonhumans in the bio-informational regime, and what forms of communication sustain those relationships. The convergence of reproductive biology and culture thus opens up new questions that are crucial for understanding communication today: Are programming and conversation mutually exclusive? Is conversation somehow superior to inscription? Do nonhumans simply “listen” or do they play an active role in signification in scientific, industrial and legal contexts?

The intertwined domains of reproductive culture and biology constitute today what John Durham Peters (1999) calls “extremities of communication” which compel rethinking of what constitutes humanness and what constitutes “good” communication. By analyzing affective responses to the technological reproductivity of memory, perception and organic entities, this project responds to Peters’ call for a history of the

extremities of communication, that is, communication with nonhumans and other “strange” partners.

The deep subtext of the adventures of ‘communication’ in modern thought, I argue, is confrontation with creatures whose ability to enter into community with us is obscure. A detailed look at thinking about communication would have to cover much of twentieth-century literature, philosophy, art, drama, cinema, politics, linguistics, social science, engineering, and natural science ... By exploring our strangest partners, I intend to illuminate the strangeness that occurs in the most familiar settings. (pp. 230-1)

Peters could only devote a chapter of his book on the intellectual history of communication to strange partners and thus his history was necessarily abbreviated and did not cover the wide disciplinary ground he believed was necessary to address a key ethical question of communication theory: “how wide and deep our empathy for otherness can reach” (p. 230). One of the key findings of Peters’ history of communication is that far too often the proper goal of communication has been to share thoughts and feelings. Since this intersubjective notion of communication is based on a “copy model of knowledge” (i.e., transference between world, mind and society without distortion) which aspires to perfect and authentic representation of worlds and selves, it generates anxieties about obstacles to communicative transference, in particular, the irreducible differences between languages, media, people, socio-cultural settings, historical conditions, modes of interpretation, and so on. Moreover, intersubjective notions of communication underwrite historical patterns of exploitation and domination since anyone or anything that appears to be incapable of imparting its interior states (or appears to lack interiority) is treated as a passive object which can be studied, ruled, used, etc. but must be excluded from society since it frustrates dialogic communication.

The history of attempts to establish forms of understanding, contact and partnership with machines, animals and ghosts points toward an alternative model of communication based on empathy and engagement with otherness. As ludicrous as attempts to communicate with dolphins, the dead, and digital automata may seem, at certain points, they depart from the transmissive notion of difference as something to be overcome and move towards a translational approach that strives toward what Amit Pinchevski (2005) calls “contact without assimilation.” This project engages with challenges to the boundaries of human subjectivity and collectivity articulated through cultural anxieties about electronic, digital and biotechnical reproductivity. It does so by exploring sites in which the ordinary boundaries between people and things, humans and nonhumans, are temporarily suspended and new possibilities for attachment, association and autonomy can emerge.

Reproductive anxiety often appears to be a defensive response to changes in the socio-technical and political conditions of contemporary life. Given that, at least since Mary Douglas’s work in the in 1960s, anxiety has been associated with exploitative forms of governance and that postmodern theorists frequently claim that there is no longer a centred subject to feel anxiety, one might wonder if anxiety can be positively valued as creative and transformative, as I propose here. In Douglas’s (1966) work, anxiety was associated with fixed, bounded and constrained subjectivity, or subjectivity as “subject to” some form of external control or coercion. Certainly, Douglas’s critique of governance-by-anxiety can be appreciated in light of contemporary uses of anxiety in, for example, the mass litigation of file-sharers by corporate copyright owners or the promotion of biotechnologies as solutions to ageing, drought and poverty. Governance in

these instances depends on the production of worriers so as to make action more amenable to institutional “guidance.” It is possible to overstate the difference between anxiety and autonomy in terms of an opposition between the irrational submission to power and the rational engagement of informed citizens. In this view, anxiety plays a role in social ordering and transformation, but not a positive one; anxiety is caused by repression (in Douglas’s study, the repression of dirt and disorder) and repression is negatively related to self-expression and openness. Anxiety doesn’t fair much better in postmodern theory, which suggests that anxiety can only be experienced by a stable subject and that, since the subject is destabilized (dispersed, schizoid, etc.), this affective state apparently no longer exists. Summarizing Frederic Jameson, Jean Baudrillard and others, Douglas Kellner (1992) writes,

It is thus claimed that in postmodern culture, the subject has disintegrated into a flux of euphoric intensities, fragmented and disconnected, and that the decentred postmodern self no longer experiences anxiety (with hysteria becoming the typical postmodern psychic malady) and no longer possesses the depth, substantiality, and coherence that was the ideal and occasional achievement of the modern self. (p. 144)

Postmodern characterizations of the subject present a challenge for the theorization and analysis of reproductive or any other type of anxiety. If decentred subjects cannot feel anxious, then my empirical studies of anxious subjects would suggest that postmodern perspectives of the subject, and of anxiety and affectivity more generally, need to be revised. What if the actors in a given setting act and speak anxiously and, perhaps even more shockingly from the perspective of postmodern theory, seem to believe they have a stable self? As N. Katherine Hayles (2004) argues in regards to the contemporary publishing industry, “For writers who hope to make a living from their work, the problem with such high-tech and high-theory exercises is that the majority of

mainstream, non-academic readers continue to believe they possess coherent subjectivities” (p. 779).

Similar problems emerge for musicians, farmers and jurists, as discussed in subsequent chapters. Subjectivities become as complex as the objects through which they are mediated, but they do not implode once and for all. As illustrated in this project, a diverse array of industrial, legal, scientific and artistic practices are currently reconfiguring the subject in informational terms. Anxious responses to various incursions of technical reproductivity into vestiges of the uniquely human suggest either the recuperation of centred subjectivity or the capacity of decentred subjects to experience anxiety. Rather than construing anxiety as an affective state belonging to the individual subject, I consider it to be a type of group affect which colors different institutional and cultural contexts with a mood of apprehension in the face of new human entanglements with the nonhuman, which leads to changes in the patterning of action. Construed in this way, anxiety slows things down. A sense of uncontrollable multiplication can, by way of anxiety, lead to deliberation and rethinking. Law figures centrally in many instances of reproductive anxiety not only because of its authority, but because its speed (or, rather, its slowness); careful procedural pacing is perceived to be an effective way to counter the hazardously rapid pace of technoscientific innovation. By considering anxiety in terms of its modulations of the temporality of socio-cultural processes, research can critically explore the role of anxieties in making reproductive processes, actions and events more meaningful and regulable.

Since scholarly use of “anxiety” generally derives from psychoanalytic theory, it is helpful to clarify the meaning of the term in psychoanalytic theories of anxiety. In his

revised theory of anxiety, Freud (1959 [1926]) suggests that the generation of anxiety-symptoms and anxiety symbols, along with the mechanism of repression, are vital psychic functions that mediate danger. Freud's work provides a helpful reminder that the relationship between anxiety and repression is much more complex than scholars often assume.⁴ Anxiety in Freud's view was the affective basis of fear, which triggers repression and other defence mechanisms. Since these fears may be real and rational, anxiety is not necessarily morbid, excessive or dysfunctional. It is the defence mechanisms set in motion by anxiety which can lead to distortions, projections and denials of fear, not anxiety. In Freud's account, the emphasis is on the positive and active role of anxiety, which conflicts with the certain strands of contemporary psychoanalysis which represent the anxious subject as a victim of debilitating and potentially fatal disorders, new discoveries of which are regularly published in *The Journal of Anxiety Disorders*. However, in order to transpose Freud's theory of anxiety to the level of socio-cultural analysis, researchers have had to make some significant alterations.

Post-structuralist reinterpretations of Freud, which inform many feminist studies of reproductive technology, tend to emphasize the subject's formation in relation to others, including "things," in order to extend fundamental concepts like anxiety, repression and the split subject to cultural analysis. This has proven to be a productive starting point for the study of reproductive anxiety, as the most sustained analyses, such as Judith Roof's (1996) *Reproductions of Reproduction*, begin with a conceptualization

⁴ After a detailed discussion of childhood animal phobias, Freud (1959 [1926]) makes the following generalization which forms the core of his revised theory of anxiety: "the *affect* of anxiety, which was the essence of the phobia, came, not from the process of repression, not from the repressing agency itself. The anxiety belonging to the animal phobias was an untransformed fear of castration. It was therefore a realistic fear, a fear of a danger which was actually impending or was judged to be a real one. It was anxiety which produced repression and not, as I formerly believed, repression which produced anxiety" (pp. 31-2).

of the subject as a conflicting set of desires and fears. Such analyses, however, tend to impose this conceptualization of the subject on the actors, displacing the complex and variable subjectivities enacted through reproductive anxiety. Rather than conceptualizing anxiety as desire, which tends to be object-oriented, it can be understood in terms of affect or mood, which is constituted through and in turn colors particular settings and situations. By reconfiguring the relations between humans and nonhuman and thus putting human uniqueness in question, technical reproductivity generates anxieties. These anxieties in turn mark the contours of new associations of humans and nonhuman. They thus point towards the key epistemological question at stake in this dissertation: how does reproduction affect the manner in which the human subject is conceptualized, modeled and enacted in virtual culture?

Reproductive anxiety is a common theme in communication and cultural studies but the processes through which these anxieties are provoked, merged and used as resources in mobilizing definitions of the subject and society remain largely unexplored. In communication and cultural studies, the capacity to reproduce through technical innovations seems to be an anti-anxiety mechanism. Scholars often express a remarkable degree of confidence in reproductive media for generating stable societies and subjects. Harold Innis's (1986 [1950]) "A Plea for Time," – an anxious meditation on modernity's anti-temporal bias and the increasing obsession with spatial expansion since the advent of writing – is in fact a plea for more reproduction, albeit of a specific type (durable, relatively immobile, decentralized, etc.) to reorient social values and develop what Vincent di Norcia (1990) calls "continuity without rigidity" (p. 357). Other media theorists have argued that self-reflexivity and self-consciousness require a mode of

reproducing life in durable forms so that the self can be externalized and a degree of distance can be established between the self as the object and as the subject of knowledge (e.g., Debray, 2000)

Psychoanalytic theories of technology and feminist theories of technoscience engage directly with anxieties about the converging domains of reproductive biology and reproductive culture. Listing the various devices and techniques that were integrated into fertility clinics during the 1980s, Dorothy Nelkin (1995) writes, “These technologies have, in effect, redefined reproduction as an artificial act, open to a startling degree of manipulation. Small wonder that they have generated futuristic fantasies, feminist fears, and frequent speculations about their potential abuse” (p. 619).⁵ For Nelkin, reproductive technologies lead to artifice, and artifice leads to anxiety which in turn gives rise to “a veritable industry of historical, philosophical, and sociological inquiries into the meaning of reproductive interventions” (*Ibid.*). While I trouble the notion that all reproductive anxieties are about manipulation since this implies a rather rigid notion of technology as instrument, one of the key conceptual innovations that I borrow from this “industry” of feminist inquiries is the emphasis on reproductivity rather than reproduction. Whereas *reproduction* refers to a process, *reproductivity* refers to a set of embodied capacities. Reproductivity, as it is used in feminist literature, links different ways of activating, distributing and managing these capacities with broader questions of agency, subjectivity and power.

⁵ Anne Balsamo (2000) makes a similar point in regards to cyborgs: “Thus cyborgs fascinate us by technologically refashioning human difference” (p. 150). As discussed in Chapter 2, however, the figure of the cyborg in feminist literature generates fears of difference and anxieties about identity, which are associated with masculine subjectivity.

My approach to questions about the “content” of reproductive anxieties (i.e., what they are “about”) has been influenced by cultural and intellectual histories of reproductive technologies, which suggest that reproductive anxiety is a manifestation of a broader crisis of agency, authenticity, tradition and paternal order (Lury 1993; Peters, 1999; Seltzer, 1992; Roof, 1996, 2004). I agree with Roof (1996) and Peters (1999) that many worries about technological reproduction since Plato are manifestations of an ongoing tension between orderly and promiscuous reproductivity and that, following Mark Seltzer (1992) and Celia Lury (1993), reproductive technologies do not simply enhance control but generate uncertainty about the locus of agency in socio-technical networks. However, I put these accounts of the content of reproductive anxiety to the test in the analysis of worries, concerns and controversies about reproductivity in particular institutional settings. Even if the sources of reproductive anxiety are ancient or primordial, they are enacted in historically and culturally-specific forms. An overly-simplistic but nevertheless common understanding of the dynamics of reproductive anxiety is that technological change causes reproductive anxiety, as implied in Nelkin’s notion of artificial reproduction. Variations in the intensity, distribution and articulation of reproductive anxiety may be attributed in part to the different kinds of subjectivities formed by electronic, biotechnical and digital reproductivity, keeping in mind that reproductivity is a configuration that includes technology but is not reducible to it.

What seems to be particularly worrying for a number of diverse actors including composers, music fans, jurists and farmers is “higher-level” programmability, that is, programmability beyond automation. When an arrangement or assemblage goes into this kind of “crisis mode,” descriptions of the object act as retroactive histories. What was

once a taken-for-granted object belonging to a taken-for-granted subject and a set of indisputable differences between humans and nonhumans suddenly erupts into a struggle between competing problematizations which enact different histories. As memory, perception, language and other hallmarks of the humanist subject are informationalized, coded and programmed, different and sometimes conflicting institutions and cultural spaces articulate similar anxieties about the aim and limit of this seemingly uncontrollable reproductivity. By piecing together a theory of subjectivity in relation to technology from Mark Hansen's (2006) work on virtuality, Hayles' (1999) critical reinterpretation of cybernetic philosophy and Bruno Latour's (1999) theorization of the nonhuman, I argue that the virtualization of reproductivity increases possibilities of contact between the human and nonhuman which generates anxiety by destabilizing the boundaries of the subject and of the broader the collectivity of people and things.

I begin this project with an intellectual history of reproductive anxiety in the academy for several reasons. First, as Lauren Rabinovitz and Abraham Geil (2004) argue, too many studies of contemporary forms and practices of reproduction under the banner of digital culture are "historically amnesic," which is to say that they overlook or obscure the political history of subjectivity and technology which shapes the anxieties of the "present moment."⁶ Subjectivities are constituted within a shifting network of technologies of (re)production, signification, consumption, embodiment and

⁶ This is a generalization and it refers to the kind anxious discourses about Internet governance, digital democracy, erosions of privacy, the digital divide, overly-protective intellectual property laws, and so forth, which against their own critical and often materialist impulses, tend to neglect the ways in which these matters of utmost importance *come to matter* through historical forces that form subjectivities and technologies according to certain regimes of knowledge and power. Like all generalizations, it leaves out some important historical work by the authors in Rabinovitz and Geil's edited collection (e.g., Hayles, Peters, Gitelman) as well as Manovich (2001), Sterne (2003), Lury (1993), and others who have devoted considerable attention to the history of subjectivities and technologies which informs and shapes contemporary anxieties about technologies of reproduction.

representation (Hayles, 1999, p. 28). Virtual culture's anxiety is about the reconstitution of the human subject through the "feedforward" and feedback between these categories of social practice and experience. The digitization of reproduction has the potential to construct new kinds of subjects, but only in relation to these other physical and semiotic components of sociotechnical environments, some of which are not digital in any sense of the word.

Anxieties about reproduction and contact between humans and "strange partners" have received some attention in communication studies, but my analysis of the literature confirms Peters's claim that other fields have a much longer tradition of engaging with human connections to "monstrous others". Thus, reproductive anxieties in aesthetics, legal studies, feminist theory and psychology provide a larger "affective space" in which to explore the extremities of communication in human-nonhuman collectivities and the reconceptualization of human uniqueness and supremacy.

Using a variety of methodological techniques, from "litmus tests" of humanness to online ethnography, I explore how cultural forms and practices mediate anxiety about reproduction, agency and the shrinking sphere of the uniquely human in three contexts: the reconceptualization of memory as "hyperactive" in cases of unconscious musical plagiarism; the redefinition of the self-replication of patented organisms as the authorized or unauthorized use of an invention; and the defense of online creative subjectivities against the total automation in music scenes based on the "mashing-up" of the audio data of other musicians. What is at stake in each case varies, but they all have one thing in common: reproductivity as a mode of control and continuity increasingly exists in tension with reproductive disruptions of boundaries between humans, between humans and

nonhumans and within the human. By probing these disparate sites of cultural practice where the relationship between the human subject and technologies of reproduction is figured in contradictory ways, the project emphasizes the variability of concepts of humanness and the role and identity of the human in the emerging reproductive regime. While digital and biotechnical reproductivity give virtual culture its current anxieties, I suggest that these anxieties often point to the loss of a particular figuration of the human as fundamentally different and closed off from the nonhuman. Rather than tying virtual culture's historical emergence to that of particular technologies, I point to a historical sequence of problematizations of the subjectivity and sociality which culminated in, and contributed to, anxieties about the individuated subject in the cybernetic notion of virtuality.

While communication studies continues to devote considerable attention to the implications of an expanded and arguably overly-protective regime of cultural access and reproduction, technologies that replicate humanness as well as the institutions which govern these replications have not yet been explored in terms of their implications for notions of what precisely is political about reproduction. Drawing from scholars who have focused on the traffic between systems of biological and cultural reproduction, my dissertation situates this anxiety about reproductive media within the broader political history of the relationship between technology and subjectivity.

2. Literature review: A survey of reproductive anxiety in scholarly discourse

Scholarly discourse about reproduction articulates broader cultural anxieties. Roof (1996) points out that, along with the art world, intellectual culture is particularly marked by reproductive anxiety. “One register in which anxieties about this disturbance appear in a Euro-American cultural imaginary is in representations of reproduction cast as reasoned attempts to grapple with the import of mechanical reproduction (Benjamin), symptomatic expressions of a paternal hypercreativity (Apollinaire), or attempts to recuperate mechanical reproduction for the human (Pop art)” (p. 35). Far from being an affectively cool zone, the academy has historically been one of the most important institutions for the articulation of anxieties about reproduction. Many prominent scholars have argued that discourses and technologies of reproduction inhibit the vital mechanisms of apprehension, social transformation, historical consciousness, cultural transmission, and resistance. They become instead mechanisms of confusion, social control, historical amnesia, cultural stagnation and social conformity (e.g., Boggs, 2001; Rabinovitz & Geil, 2004; Chion, 1991 [1987]; Deleuze, 1995; Adorno, 1991; Terdiman, 1993). In this chapter, I argue that scholarly anxieties about reproductivity are shaped by investments in conceptual categories that are considered foundational and indispensable to the epistemological commitments of particular groups of scholars.

Conceptualizing the academy as an affective space highlights an important dimension of intellectual culture: what matters to the people who belong to particular intellectual communities? In order to approach the academy as an affective space, this survey is informed by a theory of affect drawn from Matt Hills’s (2001) essay on

affective attachment in music fandom on the Internet. Affect is often used interchangeably with emotion, but as Hills points out (following Larry Grossberg) it is important to distinguish affect from desire. Affect indicates an attachment and is legible to the analyst because it is often mapped onto texts (in the broad sense) and acts as a disposition or “mood” rather than as a desire. “Focusing on affect rather than theories of pleasure allows us to consider the specific emotional colourations and relationships of fandom ...” (p. 148). I am not suggesting that an analysis of scholarly discourse can proceed in the same way as a study of fandom. However, academic attachments (or investments) can be used to map out how and why reproduction matters to certain intellectual communities at specific historical moments and becomes a source of concern, worry and anxiety.

Contemporary academic discourses about reproduction are shaped by one or more of the following five intellectual traditions: (1) communication studies, especially media theory (e.g., Innis (1986 [1950]); McLuhan, 2001 [1964]);⁷ (2) aesthetic theory, especially the Frankfurt School’s well-known theories of the effects of technological reproduction on cultural value and political consciousness (e.g., Adorno, 1991; Benjamin, 1965 [1936]);⁸ (3) legal studies, especially critical histories of legal subjectivity in

⁷ Many scholars in communication studies contest the media-centric histories of subjectivity as articulated by McLuhan in his notion of media as “extensions of man” (Williams, 1981; Sterne, 2003). However, McLuhan still operates as a negative model in such studies which often explicitly counter the perceived technological determinism in McLuhan’s work. Some of the more recent articulations of reproductive anxiety in media studies derive from scholarly attempts to distance themselves from McLuhan but arguably recast his arguments in more pessimistic and even apocalyptic terms (e.g., Baudrillard, Kittler, Virilio). Hayles’ (1999) and Haraway’s (2000 [1985]) historical revisions and conceptual retooling of cybernetics have led to a new set of questions about overlaps rather than essential differences between humans and machines, biological and informational processes. By “media histories” I am also referring to cultural histories of communication which point to changing conceptions of death, spirits and vitality, which influenced the development and use of modern media (Sconce, 2000; O’Gorman, 2004).

⁸ Contemporary attempts to theorize biological and cultural reproductivity through the same conceptual frame often draw from Benjamin’s (1969 [1936]) “artwork” essay (e.g., Buck-Morss, 1992; Mitchell, 2003), as indicated by the abundance of articles with titles that play on that of the artwork essay. Recent

property regimes (e.g., MacPherson, 1962; Edelman, 1972);⁹ (4) feminist theory, especially radical feminism and the ongoing debate about biological reproduction and reproductive technologies as sources of oppression or emancipation (e.g., Millet, 1970; Firestone, 1970),¹⁰ and; (5) psychology, especially psychoanalysis and the relays it established between memory, desire, the unconscious and the uncanny (Freud (1973 [1919]; Jung, 1964, 1970)).¹¹ While discussions of reproductive anxiety are relatively rare, a survey of how reproduction has been problematized across the disciplinary

work in aesthetics has re-examined the basis of Adorno's notoriously pessimistic view of technical reproduction (Kaufman, 2002; Levin, 1990). Since aesthetic theory is concerned with questions of the senses, perceptual and experiential frameworks and affectivity, it has become a rich resource for understanding the relationship between technology and embodiment in philosophies of new media (Hansen, 2006) and in neuroscientific reconceptualizations of meaning-making (e.g., Lakoff & Johnson, 1999).

⁹ Regimes of copying, as theorized by Lury (1993), mix together legal, aesthetic, philosophical and psychological concepts of the subject in order to contain the disruptive potential of reproductive technologies. In order to analyze how regimes change as well as figurations of subjectivity within them, scholars often deploy concept of the author-function (a way of containing a text's polysemy) and biopolitics (the body as a key site of power in contemporary regimes of rule) from Foucault. Michael Hardt and Antonio Negri (2001) have argued that contemporary forms of sovereignty and regimes of rule depend on interventions in what they call the "biomass." James Boyle's (1996) book is perhaps closest to my own in the sense he analyzes a variety of seemingly disparate controversies about intellectual property, from propertized genetic information to trade secrets, and argues that these conflicting and controversial forms of intellectual property reflect the contradictory roles that information is expected to play in contemporary society.

¹⁰ Moira Gatens (2000) summarizes the "well-worn" paths that feminist scholars have taken against Western philosophy: "Past philosophical ideas have been both targets of feminist criticism and a resource for re-thinking human being in its ontological, ethical, and political diversity. The combined influence of Cartesian dualism and classical liberalism on contemporary philosophy has received especially intense scrutiny from feminists. The body/mind dualism, associated with Cartesianism, has fed into the sex/gender dualism where the bodily capacities of each sex are considered to be relatively fixed (within a given range). Culture, it is allowed, may influence the final form which gendered subjectivity takes, but only within the parameters set by nature. These common ontological and metaphysical assumptions about human being have had profound effects on theorizations of the proper place of each sex within social and political life. Women's perceived greater involvement with the body, their capacity for reproduction and their supposed closeness to nature, destines them for the private sphere and for submission to the authority of their citizen-husbands" (p. 59). For feminist critiques of Cartesian dualism, Gatens points to Susan Bordo; for liberalism, Susan Moller Okin. Then, in footnote 2, she writes, "Carole Pateman may be seen as one of the most important critics of this view. See, especially, *The Sexual Contract* (1988)."

¹¹ Sherry Turkle (2004) is probably the best example of a "critical follower" of Freud and Lacan (although not Jung) who has made a series of attempts to theorize computer culture in psychoanalytic terms. In his survey of postmodern theory, legal scholar Douglas Litowitz (2000) concisely states the appeal of Lacanian theories of subjectivity for communication theorists: "For Lacan, subjectivity (selfhood) is created as a function of language and discourse, by the introduction of the individual into a realm of symbols. The self does not come into the world fully formed and transparent, but is formed by semiotic systems and codes (Oedipal prohibition, kinship, fashion, dress, customs). Law, then, can be understood as a system of signs and discourses that create legal subjectivity" (p. 60).

spectrum enables the analyst to become more sensitive to the various meanings ascribed to reproduction in the nexus of relationships between technology and subjectivity.

Reproductive anxiety is usually considered to be symptomatic of a more fundamental crisis. Many scholars conceptualize reproductive anxiety as a crisis of agency. However, each body of literature offers a different account of how reproductivity poses a threat to agency and what kind of subject feels anxious about it. The five bodies of literature respond in similar ways to historical transformations in reproductivity, in particular, the sense that biological and cultural reproductivity have become increasingly “technologized” as well as the sense that both are increasingly governed by the same institutional logic (technoscientific and biojuridical). However, it is not the case that scholarly discourses merely respond to ruptures and transitions occurring outside the academy. Scholarly accounts of what is worrying about reproduction and who should be legitimately worried have also been shaped by intellectual movements of the late 20th century. As discussed by John Law (1991), these intellectual movements may be summarized as follows: (1) the problem of epistemology, or the relativization of absolute categories, which led to various attempts to “re-anchor” knowledge production and refigure the subject of knowledge; (2) the problem of heterogeneity, or the growing recognition of the constitutive role of “things” in human action and the ensuing problem of rethinking social relations; and, (3) the problem of distribution, or the reconceptualization of the distribution of differences, semiotic and material, as a crucial part of the exercise of power (p. 3). In what follows, I examine how these movements affected disciplinary approaches to questions of reproduction.

The degree to which each of the bodies of literature engages with the problems of epistemology, heterogeneity and distribution is indicative of what matters and what is problematic about reproduction across the disciplinary spectrum. Using these problems to develop an affective topology of reproductive anxiety in the academy allows me not only to point out overlaps, gaps and over-trodden areas in studies of reproduction but also to develop an historical account of how and why problematizations of reproduction change over time.

The order of my discussion of the literature does not correspond to the degree of influence on my own work. In fact, the opposite turned out to be the case as I moved through the literature and constructed my own theoretical framework. I present them in order of their familiarity to me and, I suspect, to many other communication scholars.

Communication studies

From harmful images to violent behaviour, the classic worries of communication studies have emerged under conditions of extreme change in reproductivity. Debates about (mis)representation, effects on minds and behaviours and social organization take for granted the new reproductivity and mobility of traces. Daniel Boorstin's (1961) *Image* is perhaps the most well-known book-length articulation of reproductive anxiety in which the reproductivity and manipulability of images are the central villains in a fall of civilization tale. Although Boorstin's critique of illusion, fantasy, fame without achievement, and so forth were critiques from a politically conservative perspective (as suggested by the book's subtitle, *What Happened to the American Dream*), Boorstin expressed worries about the expanding world of copies which subsequently became commonplace in academic and popular literature across the political spectrum, including

Baudrillard's (1983) *Simulations*. Boorstin's main concern about "the image" – the blurring of the line between entertainment and politics – is symptomatic of a broader reproductive anxiety about the loss of standards for evaluating the reality which images were beginning to supplant. Boorstin's book represents a peak in academic and popular reproductive anxieties about the false reality generated by images and, more fundamentally, about the loss of evaluative criteria by which to judge an image or a person's truth-claims. This reproductive anxiety in communications thought beginning in the 1940s and 1950s was compounded by new ways of theorizing science-as-culture in the 1960s and 1970s. The affective fallout of this intellectual movement registered itself very clearly in academic discourses about reproduction. Today, similar anxieties in communication theory have emerged through discourses of virtuality.

Virtuality refers to a cultural condition enabled by processes of informationalization. Unlike the "lossless" reproductivity associated with the digital, distortion and noise are often considered to be unavoidable in discourses of virtuality in part because the virtual introduces a complex ecology of analog and digital media and sets in motion a "hermeneutic circle" between the imaginary and the real, information and materiality, etc., rather than providing a uniform template for the production of meaning (e.g., database, loop, etc.).¹² Hayles's (1999) critique of cybernetics is representative of the transformative notion of the virtual which refuses positions outside technological and semiotic channels (e.g., humans as discrete entities operating as senders or receivers). For Hayles (2002), "the appropriate model of subjectivity is a communication circuit rather than discrete individualism" (p. 803). Hayles (1999) drew

¹² Brian Larkin (2004) demonstrates how this techno-cultural condition of distortion plays itself out not only in the official media of the developed world but in the piracy networks of developing countries.

attention to the long history of mediations that constitute the virtual in cybernetics and argued that, far from being a synonym for disembodiment, virtualization is a transformative extension of embodied subjectivity.

Based on Peters's (1999) history of the idea of communication, virtual culture's anxieties about reproduction have their roots in 19th century worries about "disembodiment," which initiated "a long struggle to reorient to a world in which the human is externalized into media forms" (p. 228). According to Peters, popular and scholarly concerns about communication stem from the rearrangement of corporeal subjectivity and the locus of the human within the "great network of being" (p. 229). Peters's (2004) history of phonography, like that of Jonathan Sterne (2003a), suggests that new modes of reproduction provoke retroactive redefinitions of the capacities of the human subject, such as the fallibility of human hearing. In Peters's view, "the human" remainder of replication and simulation is a "fleshy residuum," which conforms to a general tendency in contemporary theories of the virtual which understand it in terms of a productive tension with, rather than a simple opposition to, materiality and embodiment.

In Hansen's (2006) philosophy of new media, for example, "virtuality" seems to be akin to Benjamin's (1969 [1936]) notion of aura, since artworks and human bodies interact in the "virtual dimension" or the medium of embodied affectivity. Hansen distinguishes his notion of the virtual from that of Deleuze (for whom the virtual is a transcendent realm that is occasionally actualized), defining it in terms of "openness" to the new and to otherness. While the digital may "promise" certain interactions between virtualities, Hansen is careful not to equate the two: "Far from being a synonym of the digital, the virtual must be understood as that capacity, so fundamental to human

existence, to be in excess of one's actual state" (pp. 50-1). Ron Burnett (2005) offers a similar view of virtualization as the process through which people extend their bodies into a space which in turn transforms embodiment and the nature of communication (p. 66). Digital media enable an experience of the affective, virtual embodiment. Chuck Tryon (2003/4) underlines the role of anxiety in this process of "remediation" and "black-boxing" of the digital in virtual culture. Since digitalization is perceived to be more malleable than photography, it tends to undermine stable definitions of the human forged by photography. Whether the digital is inevitably opposed to stable subjectivity is besides the point in Tryon's view. Virtual culture is marked by a "double nostalgia" for stable human subjectivity and for the photographic mode of reproduction that subtends that form of subjectivity. "These anxieties regarding digitalization," writes Tryon, "are often based on some concept of authenticity, the desire to return to some 'authentic' real that can only be captured photographically through the earlier, more reliable processes of mechanical reproduction" (p. 43). The same argument could be made about certain theoretical critiques of virtualization-as-disembodiment, which assumes that people are seduced into a fantasy world of total technical mastery (Horner, 2001).

Hansen (2006) presents an alternative embodied notion of the virtual in his conception of virtualization. The virtual in this framework is not something that can or should be escaped, smashed or reduced to representation. Rather, he emphasizes the folding back of the actual into the virtual, and the unique virtuality of human being, which consists of constraints (as Deleuze, Baudrillard and Cubitt are eager to point out) but also enabling and animating projects of "every concrete bio-cultural body" (p. 144). Michael Hardt and Antonio Negri (2000) concur:

[W]hen the dialectic between inside and outside comes to an end ... the new forms of labor power are charged with the task of producing anew the human (or really the posthuman). This task will be accomplished primarily through the new and increasingly immaterial forms of affective and intellectual labor power, in the community that they constitute, in the artificiality that they present as a project. (p. 217)

In this view, there is no uniform virtuality or code underlying everything; rather it is precisely the difference and tension between the virtualities of subjects and objects that for Hardt and Negri redefine nature as an “artificial terrain open to ever new mutations, mixtures, and hybrids” and for Hansen “open a circuit between the body and an informational *process*” (p. 144). The virtual is not a transcendent dimension for thought but a “quasi-empirical” dimension for embodied affectivity and for the spacing necessary for embodied experience.

This theory of the virtual reconfigures the relationship between reproduction and subjectivity. As Felix Guattari puts it: “We are not in the presence of a passively representative image, but of a vector of subjectification” (as cited in Hansen, p. 145). W.J. Thomas Mitchell (2003) suggests that contemporary mediations of reproductivity transform embodiment by shifting the goal of reproduction to enhancement rather than copying of the original and increasing the intimacy of the organic and the machinic while dispersing subjectivity across those materials. These changes in the nature of reproductivity, like previous historical shifts in mediation, can increase the durability of traces and offer new possibilities of social control, but they also act as objects of anxiety since they raise questions about origin, identity and continuity. Although “bio-cybernetic” reproductivity in Mitchell’s view is characterized by its invisibility and its inaccessibility to representation, it is registered in the thematization of embodiment in

cultural works. These themes include “the spectre of the ‘living machine,’ the re-animation of dead matter and extinct organisms, the destabilizing of species identity and difference, the proliferation of prosthetic organs and perceptual apparatuses, and the infinite malleability of the human mind and body” (p. 486).

In Sarah Kember’s (1998) work, virtual culture includes the practices, techniques and discourses of the legal system, engineering, and medical institutions along with the cultural industries. Whether or not these institutions use digital media is of less concern to Kember than the imagining or visualization techniques they use to draw power from reproductive entities, events, and processes. Kember is concerned with “fears and hopes” surrounding reproductive technologies, which she traces, through a mixture of socialist feminism, Foucault and Freud, to the subject and its affective investments in the positivism and realism of technoscience. The activation of the image as a virtual/transformational object and the diminishment of the authority of the image as an objective trace of an object are particularly disconcerting in cultural spaces built on positivist modes of thought, such as law and medicine. While Kember initially critiques the notion that the distinction between mechanical and digital reproduction has significant socio-cultural implications (it is the affective and ideological investments in those distinctions that matter), ultimately she, like Hayles (1999), Peters (1999) and others, argues that “identical” objects produced by different means have important implications for institutional authority, interpretation, meaning, value, and so forth.

While the authors discussed here differ on the relative importance of the characteristics of technologies of reproduction, they agree that virtual culture involves a transformation of embodied subjectivity, not the disembodiment of the subject. Most

importantly, as Kember emphasizes in her book, virtual culture is characterized by a high degree of anxiety about the implications of new technologies for authority, knowledge and identification. Virtual anxiety elucidates the extent to which many institutions depend upon scientific mediation or “information-transfer,” the efficacy of which is not simply increased by bio-informational reproduction and virtual remediation.

The attack on absolutes provokes anxiety about the capacity to discern between knowledge and power and about the loss of standards for producing good knowledge, for acting ethically, and for evaluating the actions of others. More recently, studies of virtual culture by scholars such as Lisa Nakamura (2000; 2002) and David Horner (2001) critiqued “cyber-idealism” in popular and academic discourses about digital media, targeting in particular the rhetoric of disembodiment. While Nakamura was concerned with the manner in which anxieties about digital networks were being assuaged through reassertions of Western selfhood through an othering process based on stereotypes of race and gender, Horner’s concern was that “virtual selves” lack the material continuity that enables re-identification, which is crucial for accountability. But Horner asserts that “virtual selves” are impossible. If virtuality-as-disembodiment is impossible, then why should we be concerned about it? The problem is that people’s belief in disembodiment has real consequences. “The dangers of such beliefs are in their amoral character. There is an apparent suspension of the real, physical self” (p. 82). But virtuality-as-disembodiment also generates uneasiness. As Nakamura (2002) writes, “Bodies get tricky in cyberspace; that sense of disembodiment that is both freeing and disorienting creates a profound malaise in the user that stable images of race work to fix in place” (p. 6). For Horner, virtual culture is a popularized and dangerous version of epistemological

relativism, where everything is a fleeting performance and there are no stable foundations for subjectivity. For Nakamura, what is worrying is not so much the destabilization of the subject in virtual environments but the reassertion of racial and ethnic differences in a way that supposedly reassures the Western subject.

If the decentred subject (the central figuration of humanness in structuralist and post-structuralist cultural theory) epitomized epistemological relativism, then the problem of the constitution of subjectivities within a heterogeneous social world can be understood as a result of the new prominence of materiality in social research in the 1980s. The problem of how to conceptualize this new sociality (e.g., the socio-technical, assemblage, cyborg, heterogeneous network, etc.) also underlined the problem of subject-formation and self-constitution in the discursive and material dispersal of agency. The “thingishness of things,” as Will Straw (1999) puts it, challenged theories of subject-formation based on social structure, ideology and discourse. This problem was compounded by the emergence of virtual entities and environments.¹³ The virtual was perceived by some scholars to undermine key elements in the process of subject-formation such as re-identification, accountability, and moral agency. It seemed that at precisely the moment that some scholars began to recognize the importance of materiality in the constitution of agency (rather than just as a constraint or supplement to it), others began heralding an age of subjectivities cut loose from bodies and material environments (Horner, 2001).

Law locates the problem of heterogeneity in the 1980s with the rise of new theories of materiality and the turn to “things” as agential while Lev Manovich (2001)

¹³ Some scholars believe that things and subjects in virtual and material environments can be adequately theorized through theories of discourse (e.g., Poster, 1993). The materiality of media for other scholars cannot be adequately analyzed through notions of discourse (e.g., Kittler, 1999)

and other media theorists highlight the manner in which new media objects challenge conventional relationships of things as material artefacts. But isn't the problem of materiality in communication as old as the *Phaedrus*? Aren't anxieties about reproducing humanness in nonhuman form as old as media, that is, the incorporation of extra-somatic, nonhuman materials (paper, radio waves, magnetic tape, etc.) in the act of communication? These problems and anxieties, Peters (1999) argues, are indeed ancient.

Socrates provides a checklist of enduring anxieties that arise in response to transformations in the means of communication. Writing parodies live presence; it is inhuman, lacks interiority, destroys authentic dialogue, is impersonal, and cannot acknowledge the individuality of its interlocutors; and it is promiscuous in distribution. Such things have been said about printing, photography, phonography, cinema, radio, television, and computers. (p. 47)

Changes in habitual ways of thinking about and enacting the self are usually supported by new modes of communication. There is a complex interplay between inscription (the "disembodiment" of subjectivity beginning with writing) and incorporation (the embodiment of subjectivity through habitual action, boundaries between self and other, etc.). Changes in embodiment and inscription generate similar anxieties. But this is not the same thing as saying that handwriting and MP3 generate the same anxieties. Different modes and regimes of reproduction support different figurations of subjectivity and sociality. The shift to writing and the shift to MP3 thus generate anxieties about the disruption of different forms of subjectivity and sociality.

In the next chapter, I highlight variations in the anxieties stemming from the disruption of different figurations of subjectivity in the cybernetic leveling of selves, societies, cultures, organisms and machines as systems, which anticipated and stimulated contemporary hopes and anxieties about virtuality. Here, I want to highlight a tension in communication studies between historicizing anxieties and theorizing the "newness" of

new reproductive media. For the cultural historicist, anxieties about new media may seem to merely play out an old debate about what constitutes proper and pathological communication, which traditionally ends with denunciations of the nonhuman while hybrids proliferate in everyday practice (Latour, 1993). However, these anxieties typically emerge when there is a disturbance in the appearance of purely human communication; they signal problems of impurity and promiscuity at specific historical moments. While metaphoric links between sexual and communicative intercourse are nothing new, I suggest that what provoked anxiety in the 1980s was the dislocation of agency from the human subject and existence from perception in the convergence of reproductive culture and biology in the bio-informational regime.¹⁴ Metaphoric circuits and discursive constructions play an important role in the figuration of subjectivity in relation to this convergence. But the anxieties about the biological reproduction of culture (e.g., gene patents) the cultural reproduction of biology through the simulation of presence and the programming of perception (e.g., plagiarism, digital compression) point to disturbances in the materiality of signification.

There is a tension between cultural histories of media technologies, exemplified by Sterne (2003a), Lisa Gitelman (2004) and Adrian Johns (2002), which highlight the recurrence of anxieties as a manifestation of tensions between reproductivity and the logic of capitalism and the attempt by Hansen (2006), Hayles (1999), Manovich (2001), Nakamura (2000; 2002), Poster (1990) and Roof (1996) to analyze the specific subjective effects of new media. In his discussion of the “principles” (defining characteristics) of

¹⁴ Peters’s (1999) analysis of the *Phaedrus* gives us some idea of how old these anxieties and associations are: “Socrates is worried, in short, about paternity and promiscuity ... Socrates gives a patriarchal vision of the process of reproduction, inasmuch as the key question is the seed rather than the gestation; he figures philosophical instruction as a kind of reproduction without women” (p. 48-9).

new media (i.e., computerized media), Manovich argues that the most fundamental difference between “old” and “new” media is the latter’s numerical representational scheme. New media objects are composed of code, can be described mathematically, and are more programmable than the objects of “old” media. All other qualities associated with new media derive from its numerical “form.” Manovich is generally upbeat about the creative possibilities of new media but he periodically underlines the manner in which numeric representation dislocates agency from the human subject.¹⁵

In terms of reproductive anxiety, Manovich’s principles of new media may be understood as an enumeration of the qualities of contemporary reproductive technologies which generate anxiety about “thingness” (which he calls variability, since objects are not singular and fixed but rather exist as continuously modified multiples) and humanness. The properties of new media do not necessarily lead to discrete, modular, recombinable, automated and variable subjects. Such a claim would fall into the trap of historical amnesia, forgetting the political history of relationships between subjectivity and technology which Sterne (2003a) and others strive to reconstruct. At the same time, cultural histories of media that attempt to challenge any claim about novelty of contemporary media and their implications for subjectivity can lead to a sense that contemporary anxieties and controversies about reproductivity are articulations of structural tensions (which change very slowly) or repetitions of ancient anxieties (which never seem change).

¹⁵ For example, Manovich coolly describes how numeric representation operates through the quantification of people, things as well as behaviors, which in turn enables an enormous array of tasks previously reserved for human beings to be delegated to machines and algorithms. In combination with numeric representation, the modular form of new media, which preserves the independence of discrete units even when they are combined and recombined, enables “higher level” automation. More activities in media production, access and use can be automated, including intentionality in the creative process.

In order to analyze reproductive anxieties as mediations and catalysts of changes in reproductivity while avoiding a descent into reductive understandings of the technology-subjectivity relationship, a framework needs to be developed that takes account of continuity and change, stability and multiplicity. Hayles' (1999) critical interpretation of cybernetic theory provides such a framework.

A book produced by typesetting may look very similar to one generated by a computerized program, but the technological processes involved in this transformation are not neutral. Different technologies of text production suggest different models of signification; changes in signification are linked with shifts in consumption; shifting patterns of consumption initiate new experiences of embodiment; and embodied experience interacts with codes of representation to generate new kinds of textual worlds. In fact, each category – production, signification, consumption, bodily experience, and representation – is in constant feedback and feedforward loops with the others. (p. 28)

Just as the “same” text generated by different techniques of (re)production requires attention to change, emergence and mutation, so too the “same” anxiety generated by different technologies and regimes of reproductivity should direct the analyst's attention to the feedforward and feedback loops that generate new figurations and experiences of embodied subjectivity. Patterns need not be reduced to repetitions. At the same time, mutations in subjectivity unfold in different directions because at any given moment there are different technologies, principles and rules that operate to reproduce people and things.¹⁶

¹⁶ Anne Friedberg (1998) argues that technologies that remain on the margin of many histories of technology today (such as the diorama as well as by everyday practices of walking and looking) enabled alternative forms of fluid and mobile subjectivity and that, more importantly, subjectivities were formed by multiple technologies of reproduction. Each mode of visualization depends on different devices and optical principles which, in Friedberg's terms, “produce diverse subjective effects” (p. 259). Sterne (2006) identifies the same problem in cultural histories of sound reproduction. Although he believes that technologies of sound reproduction (from the stethoscope to digital recording) were generally constituted by bourgeois dispositions toward sound and listening, his notion of technology – a crystallized part of the “second nature” that Bourdieu calls habitus – leaves open the possibility for other narratives and alternative histories of the relationship between sound reproduction and subjectivity.

As horror films ceaselessly remind us, another kind of reproductive anxiety derives from spiritual nonhumans. Kittler suggests that it is not only “earthly” nonhumans that provoke anxiety in the realm of reproduction: “The spirit-world is as large as the storage and transmission possibilities of a civilization” (as cited in Peters, 1999, p. 139). For Sterne (2003a) and Peters (1999) point out, there is a generalized inability to mourn (especially in contrast to the perpetual mourning of Victorian culture) in contemporary culture, and anxiety about death causes repression of ghostly and spiritual entities that seem to proliferate in reproductive systems. Thus, for some media theorists, reproductive anxiety is a type of death anxiety which propels innovation in bio-informational reproductivity since it provides a foundation for fantasies of ageless vitality (Baudrillard, 2000; Cubitt, 1998; Curtis, 2004).¹⁷

Fantasies of bio-informational immortality aside, the 1980s marks a point where techniques of communication not only frustrated the ideal of purely human subjectivity, but also encouraged scholars from a variety of fields and disciplines to use communication as the ultimate means of boundary crossing. The development of digital and genetic reproductivity in particular pushed human-nonhuman intimacies to unprecedented extremes in the 1980s. In response, new definitions of humanness emerged in the philosophy of communication, with capacities arising from the body, such as affectivity and unconscious perception, as the focal point (Hansen, 2006).

¹⁷ The long history of communication with animals and spirits in different modes of reproduction from letter-writing to broadcasting to tele-technologies is fascinating, but it has its own cultural and institutional history which does not always intersect with the kinds of the anxiety that I am tracing out here. Communication with the dead, whether intentional or not, raises a kind of death anxiety, and I do not wish to suggest that all reproductive anxieties are about death. Indeed, many of the reproductive anxieties that I analyse here have more to do with emerging forms of life (genetic, artificial) rather than with death specifically. I remain open to the idea of reproductive anxiety as a kind of death anxiety (albeit, the symbolic death of a certain figuration of the human subject), but a different set of case studies would be required to engage with questions of ghostly others.

Such reconfigurations of the human conform to Peters's (1999) notion that humanness is what is different. Technical reproductions provide litmus tests of what is uniquely human at a given historical moment. Whatever cannot be reproduced, replicated or simulated is human. The human is a socio-technical construction since it is contingent upon the frameworks people use to externalize personality and objectify the body.¹⁸ This is a particularly salient example of the manner in which communication theorists provide tools for understanding how anxiety about human uniqueness does not lead to existential dread or to a paralyzing sense of assimilation into impersonal systems. Rather, it can be extremely productive and motivating, not only for philosophers of communication like Hansen but also, as I demonstrate in subsequent chapters, in law, music and activism.

Recent revisions of the history of bio-informational media highlight the need for contemporary studies of digital media and other technologies of reproduction to resist the contemporary idea that technologies mark a break with the past and lead to entirely new issues, debates and tensions.¹⁹ I retain this insight of media history in order to offset the notion (which guides Roof's work) that the digital and the genetic lead to radical upheavals of the symbolic order and mark a break from the regimes and technologies of mechanical, analog and other modes of reproduction. However, as Hayles (1999) demonstrates so well, being cognizant of continuities and patterns does not preclude the study of emerging and transforming experiences of embodiment.

¹⁸ Peters's (2004) history of phonography, like that of Sterne (2003), suggests that new modes of reproduction provoke retroactive redefinitions of the capacities of the human subject, such as the fallibility of human hearing.

¹⁹ The collection of essays on digital culture edited by Lauren Rabinovitz and Abraham Geil is exemplary in this regard. Literary studies, with its enormous wealth of historical knowledge about the trust and order engendered after initial anxieties about "new" reproductive technologies such as handwriting in the 12th century has much to contribute to the studies of control in digital communication (Lessig, 1999; Galloway, 2004).

While reproductive anxiety is not new, it does not remain static; it has a culturally, historically and institutionally specific form that needs to be studied in terms of the affective investments and figurations of subjectivity which appear to be threatened by particular actors. Rather than projecting the characteristics of reproductive media as theorized by Manovich, for example, onto subjectivity, I have developed a theoretical framework and methodology influenced by Peters' litmus tests and actor-network theory that enables actors to define the novelty and indeed the reality of reproductive media. Thus, analysis can focus on the differentiation and categorization of reproductive media in the actors' claims and performances of socio-technical change and continuity, rather than committing to an overly-simplistic notion of contemporary technologies, knowledges and practices as a sharp break from the past.²⁰ A history of culturally and institutionally specific reproductive anxieties, rather than of the "same" anxiety provoked by different reproductive technologies, can, to borrow Law's (1991) phrase, be more "sensitive to the ways in which differences may be turned into distributions" (p. 15). The current distribution of reproductive anxiety has a history, and that history needs to be retold here in a way that is attentive to the heterogeneity of the entities that constitute the regime of reproduction.

²⁰ One of the most important works on the heterogeneity of the social in reproductive regimes is Williams' *Culture* (1981) wherein the key distinction between cultures based on (embodied) repetition and those based on (exact, mechanical) replication was originally developed and later used by scholars such as Lury (1993; 1998) to theorize subjectivity in virtual culture. Lury (1993) uses Williams' typology in her historical analysis of modern technologies and regimes of copying. These regulatory configurations allow capitalist media systems to adapt potentially disruptive reproduction technologies to their own objectives. In her later work, Lury (1998) draws from other theorists, such as Baudrillard, to examine the role of memory prosthetics (especially photography) in the construction of personhood in contemporary culture. The implications of the shift from repetition to replication is also discussed in Lisa Gitelman's (2004) study of the "material meanings" of an extremely controversial technology of musical memory (piano rolls) in the late 19th and early 20th centuries. Gitelman traces out the relationship between conceptions of authorship and the anxiety surrounding the shift in musical skill and memory to perforated paper.

The ongoing debate about whether or not new media depart from the paradigm of representation and reproduction and operate through modes of simulation or reconstruction has provided some useful insights into the boundary blurring which I contend makes people worried for various reasons in different institutional and cultural contexts. However, I have found that jurists, engineers and musicians and fans have their own answers to such questions and I seek to understand how and why they conceptualize reproduction as “copying” or “automation” within their own signifying systems.

The notion that digital media foster fantasies of immortality does not hold up in my analyses of law, science and popular culture. Another explanation for cultural anxieties about reproduction needs to be given to account for the anxieties legible in cases of plagiarism, transgenic patent infringement and virtual remixing. In Chapter 3, I develop the framework for providing such an account using the notion of virtuality and the subject as a communication circuit rather than as a discrete individual.

Aesthetics

One of the key concerns in communication and cultural studies of reproduction is the relationship between technological reproduction and the authenticity of cultural and individual expression. However, a more sustained engagement with the problem of reproduction in terms of authenticity can be found in aesthetics. The valuation of artefacts and practices based on their authenticity is a response to the collapse of levels or hierarchies of knowledge. As discussed in the previous section, the historicist impulse to interpret “new” definitions of authenticity as part of centuries-old process of remediation has the potential to gloss over the specifics of the content and form of contemporary

anxieties. As discussed below, authenticity has been used in aesthetics at least since Benjamin's "artwork" essay to designate the artwork's uniqueness and its capacity to testify to its own history. But in the age of bio-informational reproduction, processes, materials and behaviours (including self-replication), not resemblances, are multiplied. In this context, authenticity acquires new meanings. The crisis of aura can account for some of the anxieties in the domain of art and culture, but other anxieties have less to do with the uniqueness of objects and more to do with the uniqueness of living subjects.

Scholarly anxieties about the division and hierarchization of cultural and biological reproduction (stemming from Plato's division of mind and body) have generated a substantial body of critical analytic work on philosophical aesthetics. As Eva Geulen (1996) argues, sexual reproduction was the model for 18th century organicist notions of art as the "offspring" of the aesthetic creativity and artistic genius. This metaphorical transfer from sexual reproduction to artist production is a particularly pronounced version of the Platonic ideal/real dichotomy.

Privileging the poet's 'children' over real children, the platonic hierarchization of mind and body is grounded in a metaphorical gesture that simultaneously elevates birth to a privileged image of (male) aesthetic production and demotes actual (female) reproduction. The immortal life of poetry rests on the mortality or even the death of women and children. Feminism has not ceased to chastize this ideology of aesthetic production. (p. 163)

This argument is convincing up to a certain point but, as Geulen argues, it is a mistake to assume that the gendering and sexualisation of relationships between aesthetic, technological and biological reproduction are invariably sexist. In her reading of Benjamin's work, Geulen highlights the manner in which his eroticized writing on reproduction disrupts rather than reinforces the Platonic ideology of male creative genius: "Benjamin insists on the subversive effects that modern technologies have on gender-

overdetermined distinctions such as production and reception or creative and manual labor” (p. 163). The incorporation of mechanical reproduction into artistic production troubles the privileging of artistic genius over manual labor; the artist becomes more of a technician than an autonomous producer. Geulen suggests that this is one way of disrupting, suspending or at least establishing a detour around the ideology of aesthetic production. Roof (1996) provides a book-length version of this argument, although digital and genetic rather than mechanical reproduction are the subversive agents.

Benjamin scholars derive a “media theory” between the two essays of 1936, “The Storyteller” and the “artwork” essay, which suggest an historical transition from embodied variations/repetitions to replication of the same (Chow, 1989). Interpreted in this light, Benjamin’s reproductive anxieties and those of the writers he studied signal a shift in the nature of communication; reproductive anxiety can be used an index of attachment to certain modes of communication that appear to be threatened. More generally, Benjamin scholars highlight the ways in which historically-specific anxieties are communicated through discourses of reproduction.

For Benjamin, certain cultural works articulate the degree to which artists felt that their activities were threatened by technical reproduction. In his reading of Baudelaire, Benjamin highlighted the poet’s anxiety about the manner in which technological extensions of memory were compensating for the decline of humanly embodied practice.

The techniques based on the use of the camera and of subsequent analogous mechanical devices extend the range of the *memoire involontaire*; by means of these devices they make it possible for an event at any time to be permanently recorded in terms of sound and sight. Thus they represent important achievements of a society in which practice is in decline. To Baudelaire there was something profoundly unnerving and terrifying about daguerreotype. (as cited in Chow, p. 71)

The more Benjamin investigates Baudelaire's reproductive anxiety, the more he shares Baudelaire's anxiety. Benjamin scholarship that "diagnoses" Benjamin with various anxieties of his time does not always engage with the specific subjectivity-technology relations that provoked his anxiety (it is instead deemed to be misplaced anxiety or historical misunderstanding).

The complex communicative functions of reproductive anxiety are highlighted in Mark Seltzer's (1992) work on naturalist fiction. Anxiety communicates what he calls the *body-machine complex*, which is a set of oppositions and links between bodies and machines that was a key enabling agent in the shift from market to disciplinary society. In other words, the body-machine complex could not be an agent of historical change without anxiety as its communicative intermediary. Psychoanalysis along with literary fiction provoked and managed anxiety and its communicative capacity. For Seltzer, anxiety communicates a psychosocial and theoretical structure that manages (orders and reconfigures) distinctions between "natural" and "unnatural" bodies and modes of reproduction.

Seltzer's work is based on the notion that reproductive anxiety is indexical; the display of anxieties in literature enables Seltzer to elucidate an historical "psychotopography", or the affective texture and distribution of affective intensities in literary fiction. Seltzer's argument is not so much that anxiety is buried deep in the text and papered-over by other themes and motifs, but rather that a specifically male anxiety about reproduction and the relationship between bodies and machines in capitalist society motivates the production of particular genres of fiction by male writers. As with much policy discourse about reproductive technologies, fiction writers in this period channelled

anxiety into “wilderness” or “frontier” tales which in turn worked as the backdrop for dramatic reassertions of masculinised individual agency. The notion that reproductive anxiety is a male reaction to female reproductivity appears in much of the literature on biomedical reproductivity as well as psychoanalytic feminist interpretations of films and other cultural texts.

As discussed in the previous section, many contemporary anxieties about reproduction are manifestations of the problem of discerning truth and the loss of standards. The original/copy dualism, once considered an absolute and universal opposition through which to all artistic and cultural practices, styles and works should be judged, functions today as a convenient target for deconstruction. Thus, according to contemporary cultural theory, artifacts, styles and personalities are no longer evaluated in terms of originality but rather in terms of a struggle over meaning and identity (i.e., cultural politics). “Poaching” and appropriation are considered to be creative acts mastered by fans, critics, artists and corporations alike.²¹ Postmodernism’s sensibility of pastiche is exemplified by art that foregrounds its reproducibility, its irreverent embrace forms of recording and transmission, and its self-affirmation as a copy.²²

²¹ For a seminal piece on the cultural significance of appropriation, see Hebdige (1994 [1979]). The basic elements of subcultural theory have been expanded to virtually every kind of cultural practice, such that the opposition between subculture and mainstream is no longer absolute but is a function of context (Thornton, 1995). Perhaps the most well-known articulation of the notion of appropriation as a creative act is Jenkins (1992) *Textual Poachers*. Inspired by de Certeau, Frith, McRobbie and other theorists of cultural politics, Jenkins not only contested the production/reproduction distinction as well as the more familiar high/low culture hierarchy, but attempted to write “both as an academic (who has access to certain theories of popular culture, certain bodies of critical and ethnographic literature) and as a fan (who has access to the particular knowledge and traditions of that community” (p. 5). Ziff and Rao’s (1997) edited collection provides a series of articulations of cultural appropriation as both a mode of colonial power and as a strategy of postcolonial resistance.

²² For Jameson (1991), the process of de-differentiation or the ongoing merger between dualisms is characteristic of “postmodernism theory” and its aesthetic exemplars. Jameson notes that postmodern appropriation is not the same as quotation: “In the visual arts the renewal of photography as a significant medium in its own right and also as the ‘plane of substance’ in pop art or photorealism is a crucial symptom of the same process [of de-differentiation between high and low]. At any rate, it becomes

In the place of the original/copy opposition, Baudrillard (1983) famously offered the precession of simulacra. Although Baudrillard does not provide dates, this precession seems to coincide with the shift from industrial production to bio-informational reproducibility in which, Baudrillard argues, signs no longer reflect or distort reality but cover up the absence of reality. For their part, some art historians have rejected the idea of the original/copy opposition, asserting instead that the relationship between them is a function of socio-cultural context. Art historians who are not entirely convinced by postmodern celebrations of reproduction and copying have re-examined the value and function of fakes and forgeries as determined by historical contexts. Indeed, debates about authenticity can divert attention away from the complex relations between originals and reproductions. In the current historical context, for instance, news coverage can help a good fake attain or exceed the value of an original (Radnoti, 1999).

An epistemological crisis such as the confusion and inversion of relations between originals and reproductions coincides with the deconstruction of a regime of reproduction centred on the dualism of author/text. Deconstructions of authorship in turn provided the theoretical basis for the proliferation of critiques of intellectual property law. The figure of the author in aesthetic theory, copyright, promotional culture and artistic discourses has been a rich field in which scholars have explored the intersection of technical reproduction and reconfigurations of subjectivity. In Roland Barthes' (1977 [1968]) famous critique, the author is opposed to the "scriptor" who is produced through

minimally obvious that the newer artists no longer 'quote' the materials, the garments and motifs, of a mass or popular culture, as Flaubert began to do; they somehow incorporate them to the point where many of our older critical and evaluative categories (founded precisely on the radical differentiation of modernist and mass culture) no longer seem functional" (p. 64). Jameson's reproductive anxiety is about the manner in which this gesture of populism in theory and in culture is a "reflex" of a bureaucratically depoliticized society in which all art is considered political except political art, which is considered to be relapse into culture.

the act of writing, and does not exist prior to that act. The post-structuralist approach to the author was articulated most clearly by Foucault (1977), wherein the author does not so much disappear in history or in the act of writing but rather is a mechanism of power that governs and regulates the production of meaning. More recently, scholars such as Rosemary Coombe (1998) and Jane Gaines (1991) have explored challenges to the author-as-creator in struggles over the meaning and ownership of intellectual property in popular culture. Indeed, scholars in a wide range of disciplines critique and historicize authorship as a way of challenging forms of possessive individualism more generally. While scholars differ on the question of what social conditions (political, economic, technological, etc.) enabled the emergence of authorship in Western culture, many agree that critical studies of culture, law and science need to account for the construction of the author and its use in struggles over power (Woodmansee & Jaszi, 1994).

While recombinant artistic practices may seem to conflict and even oppose Romantic authorship, digital video cameras, samplers and laptop computers (which can perform all of the functions of previously discrete devices with the right software) no longer require a team of experts to operate. Such consumer devices can be easily operated by an individual amateur, and can thus generate the sense that the user is a lone producer. This remains, however, an incomplete development. Romantic authorship is used to bolster claims to cultural ownership, and versions of auteur theory are used by some critics and fans to interpret the meaning of sampling and other forms of recombinant culture. But copyright is interpreted by firms in such a way that the “author” is identified as a “creative team” in which publicists, supervisors, editors and other previously intermediary positions are considered to be indispensable to the work’s reception and

thus to its meaning and value. A single point of origin is replaced by a constellation of technical, marketing and managerial experts. Contribution to marketability displaces creativity. While this seem to be a turning point narratives of the rise and fall of Romantic authorship, it should be noted that firms can alternate between different and conflicting notions of authorship to mobilize their various interests in policy, remuneration of labor and marketing (Boyle, 1996). Recombinant art meets creative lawyering at every corner.

Moreover, as Ted Striphas and Kembrew McLeod (2006) argue, these legal and economic maneuvers can pull creative labor away from creative (and critical) subjectivity.

In the realm of traditional copyright law, authors are required to secure permission from (and sometimes hand over money to) a journal publisher in order to incorporate the contents of their own articles into a book they have authored. This results in many ironic examples of alienation, where, for instance, scholars engaged in Marxist critique literally are legally alienated from their own work. (p. 126)

Firms may be willing to acknowledge the dependence of a work's originality on its successive copies in commentary, criticism, the activities of fans, recombinant art, and so on when the marketability of a work depends on its perception as a rich resource for these various activities (or when the firm is simultaneously promoting a work as well as authorized access to the devices and services required to engage in these activities). The author function has been "diversified" into an experience of control over culture that is promised to consumers of works and technical devices and as a proprietary claim to the symbolic and material relations that constitute these works, devices, meanings and experiences.

The various arguments about the significance of cultural reproduction in the shift towards postmodernism were provocative and exciting, but they also induced anxiety about the erosion of referents in reality, the capacity to use style as a means of differentiating oneself, and the possibility of aesthetic judgment if, as David Muggleton (2000), writes, “there are no rules, there is no authenticity, no ideological commitment, merely a stylistic game to be played” (p. 47). Intellectual and popular discourses of reproduction are marked by a tension between the recognition of relativism and need for ethical and aesthetic standards. Contemporary cultural theory’s attack on authenticity is exemplary in this regard. Summarizing this view, Muggleton writes, “The all-encompassing power of the contemporary mass media has ensured that there can no longer be a sanctuary for the original, ‘pure’, creative moment of subcultural innovation that preceded the onset of the contaminating processes of commercialization, commodification and diffusion” (p. 45).

The celebration of inauthenticity by certain cultural theorists sounds hollow in light of cultural analyses of contemporary practices of authentication (i.e., legitimation, evaluation, affective investments, etc.).²³ Reproductive anxiety in these studies appears to stem from uncertainty about the value of artifacts. While notions of authenticity deployed in, for example, record collecting, help to reduce this uncertainty, the proliferation of modes of authentication between socio-cultural, institutional and historical contexts can generate anxiety about the relationship between authenticity and other ethico-aesthetic values (e.g., genuineness, originality, uniqueness, canonicity, obscurity, etc.).

²³ Straw (1991) notes that different music scenes are marked not only by different styles but by the manner in which they circulate and authenticate material culture (e.g., CDs, records, the places in which they accumulated, advertised, played, etc.). For an Innis-inspired account of the relationship between authenticity, meaning and materiality in music scenes, see Straw (2002). Thornton (1995) provides an empirical study of authentication practices in British dance music culture.

Reproductive anxiety is in this sense not just about the dissolution of absolutes; it is more specifically about the proliferation of authenticities developed by commercial and juridical institutions as well as critics, collectors, scholars, fans, artists, etc. Reproductive anxiety in contemporary academic discourse is tied to the displacement of absolute authenticity by relativized authenticities.

Historically, authenticity supported the object's testimony to its historical experience, and displaced cult value during the emergence of the secular system of artistic evaluation. For Benjamin (1969 [1936]) "the concept of authenticity always transcends mere genuineness ... the function of the concept of authenticity remains determinate in the evaluation of art" (p. 65, note 8). Authenticity is a quality of people and things that is developed and modified through successive changes in reproduction: "Precisely because authenticity is not reproducible, the intensive penetration of certain (mechanical) processes of reproduction was instrumental in differentiating and grading authenticity. To develop such differentiations was an important function of the trade in works of art" (p. 65, note 3).

Authenticity is not so much destroyed by technical reproduction but rather multiples and migrates. Alan Goldman (2006) acknowledges the arguments of the historicists, but argues that human subjectivity is the field in which knowledge, imagination and emotions transform an artwork into aesthetic experience. Copies and originals differ to the extent that the subject knows the difference between them and the degree to which this affects aesthetic experience.

Peters makes the same point in a thought-experiment designed to test the distinction between artworks and reproductions:

Imagine that some novel technical process could replicate the *Mona Lisa* molecule for molecule – the canvas, the paint, and the frame, including the effects of aging and exposure to chemicals, heat, and humidity – such that it would be impossible to tell a copy and original apart if they got switched. Still the two works would not at all mean the same thing. One would invite inquiries about the fetching smile, the other about the amazing technique. One would ask us to travel a chain of contagious magic across the distance of time back to Leonardo’s time, the other would be a spectacle of ingenuity, not a moving or perplexing work of art. It would be a simulation, not an expression. (p. 238-0)

This thought-experiment seems particularly relevant given the assumption in virtual culture that the technical limits of reproduction are quickly fading; industries and institutions capitalize on the reproductivity things, people, actions, skills, etc. Peters argues that even without technical limits, there remains a technical disposition and a hermeneutic or interpretive disposition towards artifacts which is determined by the knowledge that one is in the presence of either a “simulation” or an “expression.” But both dispositions depend on an ethic of reproductive authenticity articulated through the disclosure of the means through which the semblance of presence is given. As Latour and Adam Lowe (forthcoming, 2010) suggest in a similar thought-experiment, the difference is not so much between technical and non-technical reproduction, but between different material configurations of skills, knowledge, practices, settings, etc. One demands continuous restoration (dusting, reframing, bulletproof glass, etc.); the other requires technicians drilled in the fictional art of molecular forgery. Mixing them up intentionally or simply losing track of which is which would be unethical. In both cases, the mix up disregards and offends the ethical imperative to respect differences in the reproductive histories of objects.

The different dispositions in the *Mona Lisa* experiment assume that the histories of each object will be disclosed to those who confront them. But the boundary between

expression and simulation is becoming difficult to draw in aesthetic theory. This problem has been addressed by scholars working at the intersection of media and aesthetic theory, some of whom argue that digital media, like all modes of reproduction, depend on conventions of representation while others suggest that representation and reproduction do not capture the manner in which digital media operate, that is, by simulating the behaviour of representational media. In biotechnical engineering, expression (having a unique existence) is no longer the privileged category; it is inseparable from the proteins which encode expression and from the life form that results from expression. This is a key problem for aesthetic theory as well as for artistic practice, as suggested by W.J. Thomas Mitchell (2003) in his analysis of transgenic art where there is, for a variety of technical and institutional reasons, literally nothing to see. The glowing rabbits that are missing from transgenic performance art highlight an important problem of knowledge in the “age of biocybernetic reproduction,” Mitchell argues: the invisibility and institutional inaccessibility of reproductive entities and processes.

Perhaps the most troubling aspect of bio-informational reproductivity is the manner in which the scientific knowledge about reproduction transgresses cultural prohibitions on the production of certain types of knowledge. As Kurt Back (1995) argues, Western culture sets limits on intimate knowledge or knowledge that violates the body or privacy of the person as well as on esoteric knowledge or knowledge that is considered to be dangerous. Scientific knowledge production about reproduction transgresses both of these limits.

Knowledge of the construction of human beings touches both kinds of these boundaries. Physically at least, the ultimate building blocks of the human body, genes in current language, are the most central and most intimate parts of a person; on the other hand, their exploration deals with questions of the nature of

life and of human existence that touch forbidden or at least esoteric knowledge, which should be available only to a few. (p. 327)

Reproductive anxieties, according to Back, typically derive from well-publicized incursions of science into reproductive processes and materials (such as bodies). The publicity compounds the anxiety of the transgression of the limits of knowledge. On the surface, contemporary society seems to support unconstrained scientific exploration. Quite often, anxieties stemming from the “old” limitations on knowledge appear only indirectly in scientific, journalistic and legal discourse; the affective display of anxiety is more obvious at the level of what Back calls “popular myth.”

If one’s knowledge about technical reproductivity was limited to postmodern cultural theory, one would have to conclude that there is no anxiety about reproduction anymore. However, the renewed interest in Benjamin’s work during the 1980s and 1990s underlined the manner in which the very definition of art shifts in response to changes in technologies of reproduction. The concept of the optical unconscious has been deployed to make sense of the aesthetics of photography and film, but Benjamin’s anxiety, which he appeared to share with Baudelaire, about technological extensions of involuntarily memory has implications for the dislocation of agency from the human subject which have not been explored very thoroughly in music. As I discuss in Chapter 4, the aural unconscious is potentially disruptive of discrete individualism or bounded subjectivity since it implies that humanly embodied memory collaborates with recordings and transmissions to generate copies independently of the subject’s conscious mind.

The countless essays inspired by the “artwork” essay provide a framework for understanding the political history of the relationship between reproductive technologies

and aesthetic subjectivity. Among these essays, I have found Mitchell's the most useful since it highlights the unique anxieties provoked by biotechnical reproductivity. In contrast to postmodern theories of unauthorized copying as subversive, Mitchell locates a more profound disruption of the boundaries between agency and programming, aesthetic play and physical harm and the emergence of a regime of reproductivity which puts the original/copy dualism back in play with the copy serving as an enhancement of the original. As discussed in Chapter 5, anxieties about DNA stem from the transformation of living organisms into works, or in patent law terms, "inventions." From Back, I borrow the concept of popular myth, since anxieties about DNA stem from generalized knowledge about the possible capabilities of informationalized life, not strictly from the specialized discourses of cellular biology or patent law.

Legal studies

Disruptions of the subject and the social articulated in the academy in terms of the problems of epistemology, heterogeneity and distribution have also been articulated through law and in discourses about law. Worries about the implications of reproductive media for knowledge production, social ordering and distributions and delegations of agency in law compound broader concerns about the source, scope and efficacy of law's authority. The knowledge society thesis (that there is a major socio-economic shift in developed, capitalist societies from industrial to informational production) has led to reassertions of the importance of law, especially intellectual property, for securing "intangible assets," while on the other hand, law is frequently characterized as "too slow" to effectively regulate technoscientific innovation. Drawing from legal studies and

cultural studies of law, new questions emerge about changing role of law in contemporary distributions of reproductive capacities, labour and decision-making. In particular, legal studies shifts attention to the manner in which law recognizes and authorizes certain forms of subjectivity and sociality which in turn generates a series of others as morally-suspect subject-object relations. In addition to the question of why reproductive anxieties tend to be translated into the form of legal disputes, legal studies also suggests that research should explore how law generates reproductive anxieties through its selective authorization of technical objects, subjectivities and models of ethical sociality, and mediates anxieties originating elsewhere by placing itself in between technoscientific actors and the models of reality they seek to mobilize and circulate.

As a result of boundary confusions introduced by the problem of epistemology (e.g., relativization of knowledge including science), new rationalities have been developed to reinstate standards. This has been a key area of study in sociocultural studies of law, which often highlight opportunistic and ideological definitions of reality in legal discourse. Poststructuralist approaches to copyright offer insights into the ideological function of the figure of the author. Generally, the immense body of literature that deconstructs (primarily Romantic) authorship does so in order to debunk legal, industrial and popular notions of cultural ownership as something that naturally arises from the creative process. With few exceptions, these approaches do not give much attention to anxieties about the reproductivity of texts and their role in the construction of the figure of the author and in the emergence of copyright law. Similarly, studies of copyright and digital media underline the origin of reproductive anxiety in public

relations campaigns about “piracy” by corporate copyright owners (Leysdon, Webb, French, Thrift & Crewe, 2005; McCourt & Burkart, 2003; Yar, 2005). Anxiety, it seems, is a resource used to mobilize jurists and legislators.

Rosemary Coombe (1998) argues that intellectual property law reinforces the power of a singular owner as author despite academic and popular scepticism about autonomous authors and inventors creating things from nothingness. In contrast, Lury (1993) argues that the legal system is not impervious to shifts in epistemology and in technologies of reproduction. Legal systems persist by altering regimes of conduct, which can be seen in the patterns of remuneration of creative labour and in reconceptualizations of the audience.²⁴ From printing through to broadcasting and computer-based simulation, Lury argues the technologies of reproduction increase the distance between sites of production and consumption and thus, from the perspective of media industries, they are agents of uncertainty and disruption. The primary function of intellectual property law is to contain this uncertainty and the disruptive potential of infinite replication. The implicit argument in Lury’s history is that reproductive technologies generate uncertainty which leads to anxiety (for cultural producers) which in turn motivates the expansion and transformation of what she calls regimes of copying (rules and prohibitions but also modes of compensation, distributions of authority, rights, and so forth).

Nomi Stolzenberg (2007) provides a clearer articulation of this relationship between anxiety and law: “uncertainty breeds anxiety. And anxiety breeds longing for relief” (p. 343). In many instances, including those involving technological reproduction,

²⁴ Similarly, the authority of scientific knowledge has been critiqued by “social realists” in studies of science and technology (e.g., Collins and Yearley). These scholars suggest that other frameworks that allow scientists to freely associate elements of the natural and social worlds, such as ANT, are incapable of exposing opportunistic definitions of reality in science.

“anti-anxiety law” reassures the subject that certainty can be temporarily imposed by the deployment of more reproductive technologies. Stolzenberg examines legal fictions as an instance of “good-enough judging,” which follows the principle of adequacy (imperfect knowledge) and runs through science, philosophy and other fields, but which is particularly pronounced in law because the decisions law makes have significant consequences because they are backed by the state:

At least one important psychological function that good-enough judging seems to serve is the alleviation, or management, of anxiety. That uncertainty generates anxiety in many circumstances is undeniable ... the law manages and copes with that uncertainty, often acknowledging and denying it in the same breath ... one of the key functions of the legal mechanisms that do this is the suppression of the anxiety that attends uncertainty ... Long before modern medicine delivered anxiety-anxiety drugs and psychiatry in its various forms, the law patented its own form of therapy for treating anxiety (...) In law, words, verbal formulas and incantations, are the tools used to alleviate anxiety. And, as in psychoanalysis, these legal words have a genuinely transformative, almost thaumaturgic effect. (p. 343)

Law’s anti-anxiety function is frustrated by the uncertainty of the value and meaning of materials produced by digital and genetic reproductivity. For Kember, Roof and Stolzenberg, reproductive anxiety is a culturally specific manifestation of a much more fundamental fear of difference, unfamiliarity and uncertainty, which is assuaged through obsessive rendition (or rendering) of the unknowable. In this view, the epistemological authority of scientific techniques of reproduction in law is threatened, but all the more compulsively deployed against this threat. Using very different case studies, Kember and Roof argue that the reproduction as a means of knowing and controlling the world in law generates anxiety when evidentiary requirements hinge so much on the capacity to supply reproductions of reality (surveillance tapes, DNA) that identity and identification become synonymous.

Legal scholars have engaged with the problem of heterogeneity by highlighting the role of reproductive technologies in new modes of regulation. Lawrence Lessig (1999) and Alexander Galloway (2004) suggest that the regulation and policing of action is increasingly shifted out of law into code. The problem is not only the delegation of regulatory tasks to digital (and, I would add, genetic) reproductions but also that these codes are increasingly scripted, owned and controlled by private actors. While the extent to which this anxiety is shared by those outside of the academy is debatable, James Boyle (1996) provides a useful framework for linking anxieties between different branches of law, between regulators and publics, and between public and private actors.

There is no consensus on the role that information is expected to play in contemporary capitalism. In some instances, information is expected to operate as a commodity or asset and thus property law is considered to be an appropriate way to regulate its reproduction. This conflicts, however, with the role of information in market culture wherein “transparency” is considered to be crucial to the efficient allocation of resources. In such instances, restricting information through property law or secrecy is a perceived as a threat to capitalist economies. In Boyle’s framework, reproductive anxiety could be viewed as a consequence of the contradictory roles assigned to information in contemporary capitalism. Rather than tracing anxieties to structural tensions, in the substantive chapters I explore the manner in which reproductive anxiety articulates the renegotiation of what counts as human in different fields of practice.

The “turn to things” in sociology, which is a part of the broader problem of heterogeneity, has opened up new ways of understanding the role of objects, artifacts and material environments in the construction of legal subjects and in the regulation of

conduct over time and space. Reproductive anxiety became more pronounced in a wider array of academic discourses in the 1980s due to the problem of material heterogeneity. Once scholars recognized that “the social” is partly technical and that “the technical” is partly social, they needed concepts that would allow them to see subjectivities and technologies as the results of heterogeneous networks. What is today called “the turn to things” and the “material culture turn” began in the 1980s as theorists across the social sciences and humanities recognized and attempted to theorize the material heterogeneity of agencies and structures and produced a number of now-famous articles, edited collections and founded journals (e.g., Appadurai, 1986; Callon, 1980, 1986a, 1986b; Fyfe & Law, 1988; Latour, 1988; Thompson, 1979).²⁵

Rather than conceptualizing the objects of intellectual property law only as commodities, they may instead offer insight into the social role of objects, or the constitutive role of objects in what Karin Knorr Cetina (1997; 2001) terms “postsocial” relations. Writing with Urs Bruegger, Knorr Cetina (1997) argues that objects are “sources of the self, of relational intimacy, of shared subjectivity and of social integration” (p. 9). Instead of the purely human process of social subjectivification, “objectualization” emphasizes the generative and stabilizing role of objects. While objects may be increasingly socialized as knowledge-bearers and regulatory agents, their active role is not always welcome in particular fields of practice. Law in one of the key sites in which regulatory objects and reproductive entities become objects of anxiety, that is, objects whose social role is perceived as a potential threat.

In response to the postmodern celebration of difference, Hardt and Negri (2000) argue that contemporary forms of rule do not need essentialized subjectivities to exercise

²⁵ For an overview of these “turns,” see Preda (1999) and Straw (1999).

power. Rather, contemporary regimes of power embrace difference, hybridity and fragmentation. The paradox of contemporary sovereignty is that “while it unifies and envelops within itself every element of social life (thus losing its capacity effectively to mediate different social forces), at that very moment reveals a new context, a new milieu of maximum plurality and uncontainable singularization – a milieu of the event” (p. 25). When the notion of right emerges in the contexts of globalization, it must be framed as acting in a state of exception, that is, as a kind of juridical and police force, rather than a political and military force. In critical studies of law, scholars have recognized this limitation of recognizing and affirming the difference, and have attempted to analyze the manner in which differences are recoded as cultural rather than natural essences, which opens up new modes of ordering the world through the production of types or kinds, such as brands (Lury, 2000). Rather than highlighting processes of differentiation, scholars have shifted their focus to distributions of difference and transmutations of qualitative difference into quantitative difference and vice versa.

This shift from difference to distribution has had a tremendous impact on theories of juridical power and subjectivity. As Alain Pottage (1998) notes in his analysis of Emmanuel Levinas’s notion of the self, “In seeking to manufacture difference out of similarity, the business of conferring human rights gives rise to a strange paradox” (p. 15). The paradox of human rights is that in order to express the “absolute uniqueness of the person,” the regime of human rights must “leave each human being unique in his own genre” (as cited in Pottage, p. 15). “Human” is required to distribute this bundle of (universal and absolute) rights, but the universalizing category of “human” can only be permitted to partially define the subject so each individual is identified within her or his

own (irreducible) “genre.”²⁶ More generally, in legal studies, law is considered to be a type of “technology” or a group of technologies (including communicative forms like narrative) which produce and modify subjectivities over time. In fact, the concept of legal subjectivity can be understood as a “reproductive technology” in the sense that it reproduces (legal) persons (e.g. Boyle, 1991; Carver, 1996; Davies & Naffine, 2001). In this framework, the importance of law in shaping the subject of reproduction and in attitudinal and affective shifts towards reproduction can be thoroughly explored. The legal system is a crucial site for the traffic of metaphors that shape the subject of reproduction in, for instance, the importation of the authorial metaphor from intellectual property law to settle parental disputes concerning children produced through surrogate motherhood, in the application of the logic of recycling to transnational adoption law, and in the reconceptualization of bodies as sources of information that can be owned by someone other than the “source” (Rose, 1996; Vasseleu, 2001; Boyle).

Just as Peters (1999, 2004) opened up political theory and theology as a source of communication theory, I reinterpret legal decisions in terms of the models of communication, creativity and subjectivity on which law’s symbolic order depends. Peter Goodrich’s (1996) approach to legal semiotics, which focuses on the manner in which the meaning of legal things, persons and events are produced and constrained, has been tremendously helpful in my analysis of legal discourse. However, following Gitelman (2004), I suggest that what is at stake in many cases is not only law’s symbolic order but also the meanings of reproductive materials. As Gitelman argues, reproducing humanness in a player piano was just as problematic for copyright holders and musicians as the

²⁶ Deleuze and Guattari make a similar argument about contemporary power, as summarized by Hardt and Negri (2000), “the individual points are singularized in a thousand plateaus” (p. 26).

reproduction of humanness in the form of MP3s. Both peaks in reproductive anxiety are indicative of a lack of consensus about what Gitelman calls material meanings, a concept designed to overcome the long-standing opposition between meaning as either an inherent property of an artifact or as function of context.

Feminist theory

If celebrations about the end of the original/copy dualism anticipated the liberation of the creative subject to invent him or herself through appropriationist cultural practices, the source of exhilaration in 1970s radical feminism was the emancipation of an androgynous subject within an androgynous culture (Tong, 1998, pp. 48-9). The implications of reproductive technologies for women's subjectivity became a key debate among feminists with the emergence of in vitro fertilization in the 1970s.

Historiographically, there seems to be consensus about the relative degree of anxiety in feminist studies of technologies in different decades.²⁷ What is important for my purposes, however, is the manner in which debates about biological reproductivity increasingly became enmeshed with debates of electronic, digital and genetic reproductivity. The central argument of my project – that the mediation of embodied subjectivity in the convergence of biological and cultural reproductivity generates anxiety about the status and uniqueness of the human – is based on feminist theories of reproductivity as a mode of subject-formation (and erasure).

²⁷ For Wajcman (2007) feminist approaches to technology in the 1990s were celebratory (“cyberfeminism”) whereas contemporary feminist technoscience is more sceptical of the notion of technology as tools of liberation. Gill Kirkup (2000) similarly describes the 1970s and 1980s as a period of technophobia, whereas the 1990s was characterized by “technomania.”

Recent feminist scholarship has relativized scientific accounts of reproductive biology, pointing in particular to the visualization practices of science which construct foetal patients, “test tube babies” and infants as independent entities by erasing women’s subjectivity and bodies. Contrary to scientific visualizations of biological reproduction, these entities cannot exist apart from a maternal environment (Sophia, 2000). The reality of reproductive entities and events depends on epistemologies rooted in historically- and culturally-specific ways of seeing. Feminist researchers have shown that knowledge about reproductive biology is contingent upon reproductive culture and, in particular, visualization strategies based on the standards of scientific realism (Roof, 2004). The virtualization of photography undermines the authority of these imaging techniques as well as the power relations they support. What Kember (1998) calls “virtual anxiety” emerges when the technologies used to contain the threatening other become contaminated or even synonymous with that threat (p. 7). These are valuable insights which point to institutions as sites of reproductive anxiety as well as actors that attempt to assuage anxiety about new reproductive technologies.

Feminist studies of technoscience are also rich resources for understanding the productive and critical dimension of anxiety, even if this insight is sometimes based on the assumption of an essentialized masculine subject. Anxiety can be put to work in the production and activation of laws of affective movement, that is, the “grammar” or spacing of cultural experience (Lury, 1998). In her book-length study of popular and specialized, fictional and non-fictional discourses about reproductive technologies, Valerie Hartouni (1997) demonstrates how the imaginary and the real are intertwined by visualization techniques that enable medical, legal and cultural institutions to inscribe the

body with naturalized meanings (e.g., the womb-as-container) while rejecting and/or stigmatizing others.²⁸ Anxieties as well as myths circulate through the whole spectrum of discourses, and their effect is not uniform. Hartouni suggests, for instance, that anxieties and myths can in some cases be used as affective and cultural resources in struggles against regimes of reproduction and conventional definitions of life, rather than merely preparing subjects for their position within an existing regime of reproduction.²⁹

Examples of the productive and critical function of reproductive anxiety can be found in literature on both cultural and biological reproduction by feminist theorists. For instance, Janet Gallagher (1987) suggests in the context of IVF that anxiety stimulates public responses to reproductive technologies. In this view, once affect is translated into communicable forms (images, debates, news reports, etc.) it can generate public discourse about what precisely is problematic about a particular technology or technique. Hazel Baslington (1996) elaborates this idea with her concept of “anxiety overflow.” A society, according to Baslington, can only cope with a certain number of contentious technologies. When anxiety about reproductive technologies outstrips the capacity of patriarchal society to generate consensus about their implementation and implications, support for such technologies will diminish, not only within the academy but also among

²⁸ The techniques are primarily visual for Hartouni. Legal and commercial meanings assume that the foetus is a “product” of the womb, which only makes sense when visual and linguistic objectifications of the womb have been naturalized. The womb-as-container can be understood as one of many manifestations of what Roof (2004) calls “depth technologies” which privilege “the deep” as the locus of meaning, truth and reality. This association in turn valorizes the labor of rendition through scientific and representational realism: “The increasing technological nature of renditions of depth demonstrates that what has been at stake with rendition all along has not simply been portrayal, but rather a specific kind of realistic portrayal” (p. 34).

²⁹ The notion of anxiety as productive of discourses and subjectivities is also deployed by Athena Athanasiou (2006) in a study of the politicized anxiety about overpopulation in Greece, which generates mechanisms of governance, nationalist narratives as well as gendered subjectivities, all of which are normative but are highly contested.

health professionals. Anxiety, in this view, can generate resistance that actually impedes the “medicalization” of reproduction.

As this line of work demonstrates, patriarchal discourses of reproduction and technology can be targeted within a broader project of deconstruction of the philosophy of science, art and technology as displaced male anxiety. While many science fiction and horror films seem to be articulating a fear of reproductive technologies (from cyborgs to telephones) what they are really articulating, or so these scholars suggest, is a specifically male anxiety about female sexuality, reproductive capacities, and the maternal function (Huysen, 1986; Doane, 2000 [1990]). In this account, reproductive anxiety functions to displace male anxieties between technological and female agency. Representations of reproduction often reinforce patriarchal society by displacing male anxieties about female reproductive power onto “things” in order to make them seem universal (e.g., worries about out-of-control technologies). Anxieties about the “maternal function” propel technological innovation; the teleology of technology in patriarchal society is the appropriation of the maternal function through what Lury (1998) calls “autoreproduction”.

Feminist approaches to reproductive technologies and anxieties have thus been characterized by a tension between relativization and essentialization.³⁰ Once this tension is recognized, it is not surprising that some feminist scholars suggest that reproductive anxiety is a specifically male anxiety that stems from an “ancient” fear of difference, a proposition which appears to essentialize rather than relativize maleness. Balsamo (2000)

³⁰ As Emily Martin (2001 [1987]) argues, discourse about the reproduction is “the medium of events which only women experience and which perhaps for that reason are rarely spoken of – menstruation, childbirth, and menopause” (p. 22). This is clearly an articulation of need to preserve the authenticity of women’s experiences.

for instance, argues that cyborgs (both the human-machine actor as well as the organism-information system) are enduring “relics of an age obsessed with replication” (p. 149). She then suggests that cyborgs (a category in which she includes fictional replicants, children’s toys as well as feminist figurations of subjectivity) are postmodern culture’s way of articulating “ancient anxieties about human differences,” and that they “are a product of cultural fears and desires that run deep within our psychic unconscious” (p. 149). Representing “unfamiliar ‘otherness’” persists because knowledge cannot be all-encompassing or universal.³¹

As Judy Wajcman (2007) points out, gender essentialism and technical determinism weaken otherwise provocative and insightful studies of technoscience. While the history of reproductive technologies in male-dominated institutions and societies continues to shape contemporary modes and regimes of reproduction, the origin of reproductive technologies does not determine their subjective effects. Following the sociology of science and technology, Wajcman suggests that technology and subjectivity should be conceptualized as technoscientific “co-productions.”

If the 1960s and 1970s put the categories of gender, sex and race into question, then the 1980s can be characterized as a period in which this critical movement expanded to the category of “things” (artifacts, devices, techniques, etc.) and of “the nonhuman” (nonhuman animals as well as machines, networks, organizations, etc.). While some scholars (e.g., Casper, 1994) believe that there are important differences between the oppression of things and people, Law (1991) suggests that sceptical and anxious

³¹ This is not new. The recognition that human knowledge is limited has been a persistent theme in theology and philosophy. Freud’s twist on Hamlet is perhaps the most well-known iteration of this notion: “There are more things in heaven and earth than are dreamed of in your philosophy” (as cited in Haughton [2003], p. viii).

responses provoked by the turn to things as oppressed entities demonstrate that “speciesism” and human supremacy are deeply-entrenched in the academy (as well as outside of it). It is this “turn to things” as well as the emergence of cybernetics as a kind of master discipline that made questions of reproduction particularly important in a wide variety of academic discourses. Since the cybernetic interconnectedness of biological and cultural reproductivity provoked anxiety about ethical and political questions relating to the nonhuman and the materiality of the social, it is no surprise that feminists theorists were among the first to address the problem of heterogeneity (e.g., Haraway, (2000) [1985]).

However, like the recognition of epistemological relativism, new problems emerge from the turn to things. Anxieties about uncertain agency (e.g., authorial attribution and deconstruction, uniqueness, metaphoric traffic between humans and nonhumans, erasures/silences of certain elements of heterogeneous actor-network), which characterize contemporary studies of reproduction stem from the recognition of material heterogeneity. These anxieties were particularly pronounced in feminist philosophy during the 1980s. In Gill Kirkup’s (2000) admittedly simplified summary of this shift, the 1970s and 1980s were characterized by “technomania” or a positive essentialization of technological reproduction and a negative essentialization of biological reproduction. This is perhaps most clear in Shulamith Firestone’s (1970) affirmation of reproductive technologies as a means of liberating women from the biological constraints that facilitate patriarchal oppression. Feminist perspectives of reproduction became increasingly “technophobic,” a fear of technologies of reproduction based on the negative

essentialization of technological reproduction (an extension of patriarchal control) and positive essentialization of motherhood.³²

For feminist thinkers confronting alliances in the 1980s between medical science's imaginings of reproduction and anti-abortion movements, there was a need to either "restore" boundaries or "re-engineer" material overlaps between biological and cultural reproductivity. As Rosalind Pollack Petchesky (2000) puts it, "we have to restore women to a central place in the pregnancy scene. To do this, we must create new images that recontextualize the foetus: that place it back into the uterus, and the uterus back into the woman's body and her body back into its social space" (p. 187). These nonhuman delegates – images of the foetus that underlined its status as a human non-person by showing its total dependence on maternal bodies – successfully led to a cascade of simplified inscriptions, in particular, a legal brief that represented thousands of right-to-abortion letters, which then mobilized a "procession of real women before the [US Supreme] court's eyes" (p. 187). This tradition stems from notions of bodily fragmentation is a form of alienation, which is pathological and oppressive (e.g., Martin, 2001 [1987]).

Other feminist theorists in the 1980s, in particular Donna Haraway (2000 [1985]), were suspicious of this model of embodied subjectivity based on restored unity of femaleness, and advocated a strategy based on what Peters would call "making do with fragments" (p. 60). Following Haraway, the horrors of patriarchal engineering of reproductive biology should not deter feminist theorists from engaging in counter-

³² In her critical survey of feminist theories of reproductive technology, Kathryn Woodward (2000) cites the Feminist International Network of Resistance to Reproductive and Genetic Engineering (FINRAGE) and Gena Corea's (1985) *The Mother Machine* as examples of the essentialist and "fundamentalist" turn in the 1980s.

engineering or what she calls “coding” in order to generate new kinds of embodied subjectivity from human and nonhuman materials. Following Martin, one should instead view the differences between the human and the nonhuman as a distance to be maintained and respected.

In the 1980s, a new concept, reproductive media, subsumes biology and culture; this is the decisive turn in the recent history of reproduction, an institutional, technological and political convergence that gave contemporary reproductive anxiety its unique form. The interconnectedness of biology and culture in reproductive media became a defining characteristic of virtual culture. Reproductive biology and reproductive culture became intertwined as certain “quantities of information” as Haraway (2000 [1985]) noted in the 1980s. Haraway’s *Manifesto*, and to some extent Martin’s (2001 [1987]) ethnographic work on reproductive biology, testify to the rapid universalization of the cybernetic as a way of reconceptualizing cells, organs, consciousnesses, cultures, societies, and so on, as integrated systems. These early insights have to a large extent been confirmed in recent feminist studies of science. As Jackie Stacy (2000) writes: “Whilst both the mechanical and the informational continue to shape different aspects of biomedicine, the widespread conceptualization of the body as an information system has now become fundamental to medical discourses of the body” (p. 129). Based on the logic of immunology and cybernetic notions of communication as control, the body is increasingly conceptualized as an “information network” in which, to borrow Haraway’s terms, the interconnectedness of a biological cell, an image and a technological device is more important than their qualitative differences. They are distinguished, Haraway would argue, by their material boundaries which have variable

(and measurable) permeability to information. The human and nonhuman are reconceptualized not as a dichotomous pair but as material overlaps that can be subdivided into quantities of information (humanoid replicas, nonhuman proxies, human non-persons, etc.).

Reproductive anxiety is aggravated by the recognition of the heterogeneity of the social, compounded by the notion that materials are capable of organizing and reproducing themselves (see Chapter 5). The conceptualization of bodies as transformable and reproducible by manipulating the permeability of their boundaries to information generates concerns about seemingly non-invasive but very public visualizations of bodily interiors. Thus, hopes and fears about the materiality of reproduction imbue academic discourses with anxiety today in part because of the shift in the 1980s towards what Manuel DeLanda calls “matter as capable of self-organization” (as cited in Stacey, 2000, p. 131). The more heterogeneous the social seems to be, the more human contact with the nonhuman becomes visible and worrying.

Scholars in the 1990s began to reconceptualise humanness in terms of distribution. Monica Casper (1994), responding to the turn to things (particularly actor-network theory’s version), articulates a notion of human-as-subject and subject-as-process, which has motivated my analysis of reproductivity as a mode of reconfiguring the human.

I would like to suggest that human is a constructed (and often contested) identity or subject position, rather than a fixed, natural state of being. It is social, historical, political, contextual, fluid, and often technologically mediated, and it has much to do with both power and its distribution. As such, it is similar to (and often subsumes) other social categories such as gender, race, class, sexuality, and so on, many of which have been usefully analyzed and deconstructed ...
Grounding the construction of social identities and subject positions in concrete

practice enables us to locally examine their origins and the mechanisms by which they are given shape, form, and durability. (p. 841)

While deconstructions of gender, sex, race and so forth have become commonplace in critical scholarship, scholars have not subjected “human” to the same deconstructive intensity. Casper reconceptualizes “human” in terms of *processes* (formation, distribution, mediation) and *relations* (social, historical, political, etc.)

Distributions provoke scholarly anxiety in this framework because historical and contemporary technologies and regimes of reproduction are perceived to be dehumanizing. Focusing on distributions rather than differences enables feminist scholars to examine how differences are distributed, or how they are turned into distributions. The emergence of this framework, sometimes referred to as vital politics, signifies a shift in reproductive anxiety from existential anxieties about the dehumanizing effects of reproductive techniques, institutions, etc., to the distribution of life or vitality among humans and nonhumans through reproductive media.

Vital politics addresses what Peters (1999) identifies as the central debates of contemporary communication theory:

What is at stake in debates about communication is the status of the human being, our place in a universe populated by simians and cyborgs, fetuses and the brain-dead, angels and UFOs, ‘primitives’ and smart machines, the dead the distant (...) The failure to recognize the paranormal and the inhuman as founding questions for communication theory in our time goes together with the failure to recognize the inhuman when it stares back at you in the mirror. Both are containment strategies, props supporting a dangerously brittle identity (...) recognition of the other is not a simple matter of perception but involves the founding of the human order. Determining the range of creatures we will communicate with is a political question, perhaps *the* political question. (pp. 229-30)

As in previous sections, I argued that this “range of creatures” is not exclusively determined by technological developments but comes about as a result of shifts in intellectual culture. The defining characteristic of vital politics is its theorization of human as “living proof” of the distribution of difference and other processes that assign and contain qualities that constitute “human,” “nonhuman,” and “inhuman.”

According to Mariam Fraser, Sarah Kember and Celia Lury (2006), the appeal of “process thinking” in the late 20th and early 21st centuries can be attributed to an impasse that had been reached in the critique of scientific materialism.

On the one hand, scientific materialism continues to gain ground, regardless of the disasters (ecologies, ‘artificial’, ethical) that pursue it. On the other, neither ‘culture’ nor the ‘subject’ (or the subject as it is personified in the artist or scientist, a company, a class or a nation, in language or in discourse) has proved an adequate starting point for inquiry or critique. Thinking in terms of process, in contradistinction to both of these positions, recognizes the *relations* between the traditions that privilege culture, on the one hand, or nature, on the other ... and attempts to displace the bifurcations they install. (p. 3)

Although scholars commonly assert that previously naturalized categories have been relativized (in fact, the notion of naturalization presupposes relativization), academic anxieties about reproduction stem from the ongoing distribution of essentialized differences and the distribution of roles, rights, responsibilities, capacities and so forth according to those differences. This would seem to be an instance of (re)naturalization, but as Lury (2000) suggests, naturalization misses the *cultural essentialism* of contemporary distributions of race, gender and species, that is, the way in which qualities are redefined as *expressions* of cultural rather than biological “essences” that can be

combined to form signs, owned as intellectual property, and consumed as part of the performance of identity.³³

Feminist theory provides three key insights which inform my approach to reproductivity: (1) unlike the other bodies of literature, feminist theory often conceptualizes reproductive anxiety as a productive tension rather than as a state of “unpleasure” from which to escape; (2) feminist theory also suggests that reproductive anxiety is felt in particular institutions, invested in particular figurations of the subject and knowledge, under certain conditions of socio-technical change; and (3), feminist technoscience has characterized the convergence of biological and cultural reproductivity as a cybernetic process, oriented towards control but nevertheless open to unpredictably complex feedback and feedforward loops with signification, consumption, embodiment and representation.

The main limitation of certain feminist approaches to reproductive anxiety is that it is often considered to be a consequence of masculine subjectivity. This assumes that control over the world via copying, replication and simulation is an essentially masculine characteristic and that, moreover, technoscience and other institutions which produce and regulate these technologies are always masculinized.³⁴ Here, feminist theorists miss a crucial opportunity for critique of social codes and norms of gender, since shifts in

³³ Kellner (1992) argues that promotional culture is filled with figures “changing their identities at will ... yet there is a certain continuity in the looks, gendering, and behaviour celebrated in the cultural industries” (p. 173). For Lury, it is misleading to construe this continuity as the naturalization of subject-positions. What Kellner and Lury highlight is the manner in which the flux and the stability of identity are supposedly rooted in cultural rather than biological difference.

³⁴ The notion of reproductive anxiety in this work was inspired by Roof and Doane, both of whom analyze reproductive anxieties across popular culture. The appeal of their work from the perspective of my work is that they attempt to draw connections between what seem to be very different concerns and worries. The key drawback, however, is that anxieties are tied to masculine preoccupations with origin, identity and continuity in Doane’s case and with the symbolic order of artistic tradition that supports masculinity in Roof’s case.

reproductive labour could in principle be organized according to feminist values. Radical feminist calls for technology based on female values (e.g., nurturing) and socialist feminism's suspicion of information technology as inculcating male value by virtue of their invention by male-dominated technoscience highlight the difficulty of analyzing technological artifacts as political without falling back on essentialisms and obscuring the agency of actors that are excluded from the design process. Feminist technoscience as exemplified by Lury, Hayles, Kember, and others points in the direction of the co-production of subjectivity and technology, which allows the analyst to interrogate the construction of identities in design, in use, and in the enforcement of boundaries between design and use.

Psychology

Like feminist theory, psychology offers more insight than the other bodies of literature into the source, functions and dynamics of reproductive anxiety. The growing consensus that anxiety is not necessarily dysfunctional and pathological is one of the major characteristics of contemporary sociology and psychology.³⁵ However, much of the

³⁵ Klaus Boehnke, Shalom Schwartz, Claudia Stromberg and Lilach Sagiv (1998) distinguish worrying from anxiety (the former has positive and negative function while the latter seems to be entirely negative). For my purposes, worrying and anxiety may be understood as closely related or even equivalent. In their literature review, the authors write that one of the key facets of worries is "the domain of life to which a worry refers (...) Work in sociology, developmental psychology, psychopathology of adolescence, and social psychology suggests that worries are not necessarily pathological or dysfunctional ... certain types of worries might be related to positive mental health ... worries about problems close to self (e.g., my getting cancer, bad grades, or looking ugly) correlated with poor mental health among adolescents, as reported by their parents. In contrast, worries about wider socio-political problems (e.g., pollution, hunger in the world) correlated with positive mental health (...) How might the types of worries that correlate positively with mental health differ from those that correlate negatively with mental health? We postulate that the crucial distinction between these types of worries is not the life domain. Rather, as suggested by the studies reviewed, it is the object toward which the worry is directed: who or what is threatened. What we call "micro" worries have as their object the self or those with whom the person closely identifies (the in-group or extensions of the self). We hypothesize that micro worries relate positively to anxiety and to other indicators of poor mental health and negatively to indicators of psychological well-being. What we call

literature surveyed below does not engage with the productive and critical functions of anxiety which I found in Freud and feminist theory and often suggests that it is an excessive and undesirable affect stemming from investments in what are often assumed to be repressive and hegemonic forms of subjectivity. Literature that considers reproductive anxiety as an agent rather than an effect can be broken into two broad categories: (1) reproductive anxiety as immunological; (2) reproductive anxiety as a productive tension and as a communicative agent. I focus on work that attends to these functions of anxiety in subject-formation and communication, which offers an alternative to the much more common notion of anxiety as a symptom of psychic distress from which the subject should be freed.

Any capacity ascribed to reproductive anxiety that offers the subject a form of protection from a specific kind danger may be considered “immunological.” In the opening of “A Small History of Photography,” Benjamin (1979 [1931]) noted that early commentators denounced the new techniques based on their “philistine notion of art” (i.e., art versus technology). This anxiety recurs throughout the history of reproductive media, and, as Benjamin pointed out, it performs an immunological function. Drawing from psychoanalysis and Marxism, Benjamin argued that anxiety about photography based on this “fetishistic and fundamentally anti-technical concept of art” helped to “legitimize the photographer before the very tribunal he was in the process of overturning” (p. 241). Similarly, the heated debate about the aesthetic value of photographs largely took place around a concept of “photography-as-art” which protected by means of distraction the emergence of “art-as-photography,” or the transformation,

“macro” worries have as their object entities external to the self, specifically the wider society, world, or universe. We hypothesize that macro worries relate positively to indicators of well-being and negatively to indicators of anxiety and poor mental health” (pp. 747-8).

commodification and control of the art world by means of photographic reproduction (p. 253). “In the final analysis, mechanical reproduction is a technique of diminution that helps men to achieve control over works of art without whose aid they could no longer be used” (p. 253).

In the 1930s, through the medium of childhood memoirs, Benjamin seemed to be developing a psychological version of Louis Pasteur’s immunization techniques (Turk, 2007). The “psychic immunology” or “innervation” discussed by Benjamin (along with Georg Simmel and other social theorists) suggests that aesthetic experience can prevent future trauma (Hansen, 1999, 2004). For Johannes Turk (2007), Benjamin ushered in the “Age of Immunology,” wherein “The critic turns into an immunologist, and his task is to exploit and mobilize the resources of immunization against the impact of traumatic events” (p. 143). In this view, cultural experience generates anxiety, but does so in order to articulate “new forms of feeling and existing that enable us to face our time. Dislocation and historical ruptures have become the hallmark of an existence in need of protection” (*Ibid.*). The critic-as-immunologist does not dismiss anxiety as the result of historical amnesia but homoeopathically mediates the anxiety of his or her research subjects through theory and analysis to develop new structures of feeling and new frameworks of experience for critical engagement with socio-technical change.

Like Freud, Benjamin saw the manner in which photography and cinema could operate as body extensions or prosthetics of the human faculty of apprehension, which prevents shock and trauma by appropriating the new into relations of semblance with past events. Turk finds the same immunological memory at work in Freud’s theory of affect. The manner in which conceptualizations of anxiety’s sources inform notions of its

functions is clearer in Turk's interpretation of Freud than in most literature reviewed here:

Freud pointed out that anxiety is a psychological preparation for a traumatic situation that can counteract possible damage resulting from it ... he elaborates this concept of anxiety and gives a complex theory of this affect: anxiety is reproduced each time that helplessness, reminiscent of one's birth, is experienced. This is an economic definition, as birth meets a psychic organism that has not yet formed and that experiences nothing but a huge quantity of irritation. But there is a second origin of anxiety: the Ego reproduces this affect each time a situation of helplessness threatens to occur. This second form of anxiety moves from the repetition of a past event in the present to the expectation of a repetition of the past in the future. Freud calls the resulting affect a signal. (p. 144)

Freud later developed this theory of affect into a "biological semiotics" wherein scenes of danger provoke anxieties as well as the recollection of the memories which anxieties "signal"; these affective memories/signals change over time and provide a flexible interpretive matrix within which the subject can make sense of future events without overexcitation or trauma.

The defensive and immunological property of anxiety was developed into a set of techniques by Benjamin and Freud to foster the affective capacity of anticipation of future loss, pain, helplessness, uncertainty, vulnerability and so forth. In concert with the immunological properties of memory, anxiety enables the subject to anticipate a repetition of the past in a new form. Literature is one of the primary media for this kind of "affective education," wherein the subject develops an interpretive framework of anxiety-based signals, and the affective capacity to anticipate and cope with what Freud (1959 [1926]) called "unpleasure" in the future.

If Turk is right to suggest that anxious responses provoked by literature are part of a defensive mechanism against overexcitation or trauma, then scholarly literature is no exception. Historical approaches to media and communication, for example, reduce one's

susceptibility to overexcitation or fear in the face of new forms of communication, mediation and reproduction. This is one of the implications of Adrian Johns's (2002) essay on anti-piracy campaigns against unauthorized reproduction of sheet music in the 19th century, as well as Gitelman's (2004) essay on the controversy about unauthorized reproduction, automation and artificiality of music in the emergence of player piano rolls around the turn of the century. These historical case studies of unauthorized reproduction operate (and, in Johns's case, are explicitly framed) as "antidotes" to overexcitation about piracy in contemporary culture. Immunology operates in these cases as anti-anxiety therapy for a society and an academy that is assumed to be prone to panic about the new and unfamiliar. However, taken too far, the critic-as-immunologist desensitizes analysis to the specificity and meaning of contemporary anxieties.

Certain feminist theorists of reproductive anxiety have underlined the ideological function of immunology in patriarchal society. For instance, it has been claimed that the inoculation of men against an anticipated event (i.e., the reclaiming of reproductive capacities by women) undermines attempts to reframe mothering (caring and raising rather than giving birth) as a "cultural choice" (Bundtzen, p. 106). The evidence of this immunological function presented by feminist studies of science seems compelling. One need not focus on the obvious examples of male reproductive anxiety ("birthing" the first atomic bomb, "Little Boy") but at the whole gamut of technologies and their "objective" accounts of reality to see how destructive this aspect of male subjectivity can be for women (and men).³⁶ The immunological function of reproductive anxiety can thus have disastrous implications, not only in technoscience, but also in aesthetics. Indeed, while

³⁶ Jane Caputi (1994) goes beyond the familiar gendering of the bomb, and explores the relationship between "atomic fathers," nuclear families and incest in popular culture.

Allen Weiss (2000) wants to examine “radiophony’s” suppressed history of disarticulation, transformation and mutation (which he opposes to articulation, communication and representation), this suppressed history bears a striking resemblance to the “mainstream” histories and practices of cultural reproduction, which distributes pain along the lines of gender.³⁷

For early psychoanalysts, anxiety derives and is shaped by a traumatic event in the past (e.g., birth trauma). Construed as trauma, birth becomes an event that is repressed and is not fully experienced until it returns through various neurotic symptoms.³⁸ “Pre-traumatic stress” is a type of anticipation-anxiety that seems to precede the traumatic event. As Paul Saint-Amour (2000) suggests (in relation to the uncanny feeling of anticipation of a nuclear event in Japan), pre-traumatic stress manifests itself in “the literally preposterous phenomenon of traumatic symptoms – denial, dissociation, fragmentation, repression, the compulsive repetition of extreme violence – that exist not in the wake of a past event, but in the shadow of a future one” (p. 61). These are precisely the symptoms that contemporary feminist psychoanalytic theories of technology and

³⁷ Weiss (2000) compares Rabelais’s 16th century account of seafarers’ experience of voices in the air with radiophonic art: “Though his companions wish to preserve some of these words in oil, Pantagruel says that it is not worth saving what is always plentiful at hand. Can we not see in this scenario the phantasm at the origins of radiophonic art, where the word is embalmed and speech immortalized? Only the slit of throat, the terminal loss of body, indeed death, permits an eternal return of the voice. This return is situated at the origins of modernism, where the particular characteristics of recorded sound – disembodiment, alienation, repetition, eternalization, temporal malleability, and so forth – simultaneously transform age-old metaphysical and theological paradigms, and offer unheard of formal and practice aesthetic possibilities” (p. 9). Weiss argues that the dominant history of radio is about representing the body and encourages instead a study of radio as transforming and even annihilating the body. While the shift from representational concerns to studies of technological transformation of the body is certainly a novel approach, Weiss’s introduction (unlike the other contributions to this special issue) does not underline the uneven distribution of bodily annihilation or the distribution of empowering and constraining transformations of the body that follow the vectors of gender distribution.

³⁸ Freud (1959 [1926]) contested this view, which at the time had become widely accepted in the Vienna-based community of psychoanalytic theorists and therapists. He acknowledges that he is in part responsible for misguided notion that birth, as the original and universal trauma, gives anxiety its affective shape and psychical function. However, in his later work, he was highly doubtful whether birth trauma has any significant influence on anxiety, suggesting that sexual inhibitions are the agents of anxiety-symptoms, which are given shape by individually-specific threats or dangers.

culture associate with reproductive anxiety, conceptualized as a specifically male anxiety acquired by both men and women either through socialization or through ancient psychic residue, and which expresses itself in cultural forms, technological developments, medical practices and knowledge, as well as conceptualizations and representations of bodies (e.g., Bundtzen, 2000 [1987]; Doane, 2000 [1990]; Huyssen, 1986).³⁹

As discussed in previous sections, the problem with the notion of reproductive anxiety as specifically male depends on an essentialized figuration of male subjectivity. This framework also tends to give far too much weight to patriarchy in the production of subjectivities, glossing over other important institutional, material and symbolic vectors of subjectification and patterns in the distribution of anxiety.

Key theorists of reproductive anxiety in literary studies, in particular Judith Roof (1996) and Catherine Liu (2000), are informed by post-structuralist reinterpretations of psychoanalysis. In this view, reproduction occupies a central position in the conceptualization of the subject and of the Symbolic order. According to Roof

The terms provided by Lacan's paternal metaphor are themselves the symptoms of a compensation in the field of reproduction, as reproduction provides the model for social order (the family, kinship, legacy, property) and as the paternal metaphor represents the figure whose absence founds the metaphor that characterizes order itself. Reproduction in its various mechanical, artistic, and biological guises becomes the terrain for the Symbolic's renegotiation, again through the beset figure of the paternal metaphor. Its various ancillary features – gender, the name, prohibition, lack – become the players in a field of shifting systems as the mechanical is superceded by the digital, as visual metonymies become the invisible operations that install fundamental changes in the relation between reproduction, time, and a decreasingly visible mechanics. (p. 15).

³⁹ Bundtzen's (2000) analysis of *Aliens* (1986) argues that these specifically male anxieties are internalized by men and women: "If the terrors of the film are, as I've tried to indicate, grounded in archetypal fears of women's otherness, her alien body and its natural functions, no amount of physical abuse, fire power, and nuclear explosions will provide an audience with psychological catharsis (...) Women's reproductive capacity is a potential threat, not only to woman herself ... but also, it is implied, to civilization, technological progress, the futuristic world depicted by *Aliens*" (p. 107).

Through a modified Lacanian framework, Roof analyzes how artistic movements, science fiction film, vampire stories and discourses of DNA articulate anxiety about the Symbolic (dis)order introduced by digital and genetic multiples. Roof underscores important transformations in reproductivity, in particular, the reconfiguration of the real and the visible, existence and perception. However, the power accorded to paternal figures and to patriarchy in social order as well as the technological determinism which underlies notions of the digital and the genetic as inherently disruptive are problematic since they close inquiry precisely where it should open up.

Freud (1973 [1919]) locates another starting point for thinking about reproductive anxiety in the experience of the uncanny. Initially conceptualized as an aesthetic experience, Freud goes on to argue that it is an experience or feeling (a subcategory of fright): “the uncanny is that class of the frightening which leads back to what is known of old and long familiar” (p. 220). For Freud, the feeling of something uncanny has nothing to do with the thing itself but either with revived infantile complexes (repressed feelings, memories, experiences) or “primitive beliefs” which, after been overcome, are reconfirmed. Freud does not explain why these two sorts of revived materials produce the same experience. He suggests both types of experience are rare, but isn’t able to suggest anything about experience of the uncanny in cultures where magic, animistic beliefs, etc. are sanctioned. Finally, rather than engaging with experiences of the uncanny in everyday life (these are even rarer than in fiction), he based his thesis on his reading of “The Sandman,” a fictional story, which leads him back to where he began: aesthetics.

Psychoanalytic approaches to reproductivity tend to apply concepts like the uncanny to the analysis of representations of reproduction in art, literature and film. Liu

for instance, suggests that “Machines can always be read as uncanny doubles of our own inanimation, but more important, for Benjamin the nature of experience itself under high capitalism is forged in the crucible of mass production, mass reproducibility, and homogenization” (p. 22). However, Liu does not read machines or engage in artefact analysis. Instead she analyzes representations of machines and machinic figurations of humans and of human activities in literature and film. Her main concern is the analysis of a moralizing topography that emerges in literature through the connection of moral failure with mechanical repetition. The technologies and regimes of reproduction appear to imprint themselves so thoroughly on literary discourse that it seems sufficient for analysis to remain there rather than incorporating elements of the technical artifacts, practices and regulations of reproductivity.

The prevalence of psychoanalytic feminism in studies of reproductive anxiety is due in part to the significance of reproductivity in studies of gender and technology and the purchase that psychoanalysis has upon understandings of anxiety. Since reproduction implies stabilization, “many are concerned with durability, the way in which the quantitative may be converted, for a time, into the great qualitative distinctions or differences” (Law, p. 18). The production of gender differences occurs to a large extent in the determination of how the traffic between biological and cultural reproductivity stops or settles into “great qualitative difference.” In one of Peters’s (1999) exceptionally lucid summaries of the history of ideas about communication, he notes that

Socrates is alarmed at the dispersive properties of the written word. This line of argument taps into an archaic set of anxieties: secured paternity versus polymorphous promiscuity. For Socrates, as for many thinkers since, dialogue (fertile coupling) is the norm; dissemination (spilled seed) is the deviation. As elsewhere in the Platonic corpus, Socrates appropriates images of female reproduction (calling himself a midwife who delivers the ideas with which all

men are pregnant) as his preferred model of intellectual birthing over the indiscriminate irresponsibility of a Lysias. (p. 49)

Peters underlines a common patriarchal anxiety about forms of distribution that do not enable paternity lineage to be established with certainty. Reproductive anxiety in this case is about the manner in which modes of reproduction seem to threaten ideals of sexuality (procreative rather than “wasted” *jouissance*) and invite death (the result of indiscriminate scatter).

Critical studies of medical science separate biology from culture in order to elucidate the manner in which cultural values, beliefs and ideologies shape the purportedly objective accounts of reproduction in the life sciences and their application in reproductive medicine and therapy. Hazel Baslington (1996) suggests that the framing of surrogacy in the 1980s as deviant by reporters and some health experts was in part due to the (dominant) “ideal” mode of biological reproduction, “the traditional family form, women’s roles, sexuality, and procreation” (p. 678). Similar studies have elucidated the manner in which innovation in medical science increasingly transforms aspects of human reproduction into sources of existential anxiety (e.g., Athanasiou, 2006; Helén, 2004). Reproductive anxiety in this framework is an expression of the dread of dehumanization. In her study of foetal surgery, Ilpo Helén argues that medical institutions accept technical responsibilities but shift ethical concerns to patients, who become anxious subjects within this distribution of authority, responsibility, choice and discretion.

Due in part to their common use of psychoanalytic theories of subjectivity, the source of anxiety in feminist studies of biological reproduction overlaps with feminist critiques of aesthetic ideology, as articulated clearly by Geulen (1996): “The immortal life of poetry rests on the mortality or even the death of women and children” (p. 163).

Similarly, Louise Levesque-Lopman (1993) argues “The ‘common-sense’ perception of new procreative technologies as valuable, necessary, life-affirming, and ‘successful’ reflects trivialization, avoidance, and near-annihilation of the birthing woman as a human subject” (p. 330). Both are concerned with physical and symbolic violence directed at women’s bodies and the erasure of subjectivity. Scholarly anxiety in such studies stems from the perceived dehumanization or the treatment of the person as a thing, which in turn derives from an ethico-political principle of the inviolability of the person.

Psychoanalysis provides many tools for theorizing the relationship between reproductivity, subjectivity and anxiety. The key insight I take from psychoanalysis is that anxiety is not a disorder and can be a vital function. While contemporary psychoanalytic approaches to reproductivity do not give much attention to the implications of Freud’s revised theory of anxiety, my analyses of law, science and popular culture examine how anxiety can motivate the reconfiguration of technology and subjectivity. Feminist psychoanalytic interpretations of reproduction in literature and film suggest that reproductive anxieties are manifestations of more fundamental crises of origin, identity and continuity. Thus, feminist psychoanalysis enables finer distinctions between reproductive anxieties to be made in the analysis of reproductive technologies and regimes.

Conclusion

Biotechnology and digitalization have helped to renew scholarly debates about the politics, technologies, regulation, etc. of reproduction. In media and cultural studies, reproduction has been thematized, problematized and theorized in relation to subjectivity, but anxiety appears as neither a modality nor a mode of subject-constitution. Indeed,

anxiety rarely appears at all in media and cultural studies research on reproduction unless it leads to a full blown public controversy. Theorists such as Mark Poster (1990) and Sherry Turkle (1984, 1995) provide accounts of the subject in digital cultures, but questions about how and why anxiety emerges out of this destabilization of the subject remain unclear. The relationship between anxiety and information technology has not been the primary concern of contemporary media and cultural theorists. Anxiety is presented as the consequence of an attachment to “old” media cultures (especially print culture) and its (fixed) forms of subjectivity.

Given the paucity of research on anxiety in relation to cultural reproductivity, I found feminist theories of reproductivity instructive. This body of literature offers several key points that inform my study. First, feminist work on reproductivity focuses on the differentiation, gendering and stratification of reproductive techniques, labour and decision-making. The boundary between cultural and biological reproductivity overlap to a far greater extent than discussions of technical reproduction usually suggest but the ongoing symbolic, institutional and technological differentiation of reproductivity is an important component of gender binarism in social ordering. Second, as a consequence of the first insight, feminist research also highlights asymmetries and unevenness in the distribution of reproductive anxiety. Not all anxieties are about the loss of privileged subjectivity. Some are instead about development of new forms of power exercised through reproductive science, law and technology which threaten the autonomy of others. Third, since the division of reproductive labor, practices, techniques, etc has played a key role in the performance of gendered subjectivities, feminist research suggests that reproductivity may also be an important element of other dimensions of subjectivity, such

as human/nonhuman. Based on these insights, feminist theorists suggest that reproductive anxiety derives from the blurring of biological reproductivity (which is coded as natural, bodily, organic, etc.) and cultural reproductivity (coded as artificial, incorporeal, machinic, etc.) since this upsets the foundation of gendered subjectivities and social relations, divisions and hierarchies.

Feminist researchers have also reflected upon their own anxieties, exploring the critical and productive role that anxiety plays in technoscience as well as in activism and critical scholarship. To some extent, reproductive anxiety in the academy appears to shift from apprehension in early critical theory and in feminist accounts of technoscience in the 1970s to anti-anxiety in early work on informational reproductivity in the 1980s. Feminist accounts of ebb and flow of anxieties tend to characterize contemporary research (late 1990s onwards) as informed by an awareness of the pitfalls of cyber-idealism and technological determinism.

Various kinds of essentialism have nevertheless shaped contemporary feminist approaches to reproductive media. When framed as a monolithic and all-encompassing regime, “the digital” appears to subvert the symbolic order that propped up traditional forms of masculine, individual and discrete subjectivity and generates considerable anxiety as a result. Even though “the digital” problematizes the division of biological and cultural reproduction, technical determinism and gender essentialism creep back into the analysis. It has been suggested by Roof, Nakamura and others that reproductive anxiety should not be read as a broad cultural anxiety because it is actually the anxiety of a privileged subject (e.g., men and Westerners) who unconsciously worries about the loss of privilege in virtual cultures that challenge and reconfigure traditional identity

hierarchies. Indeed, some reproductive anxieties are about the loss of privileged subjectivity, but masculinity is not the only form of subjectivity whose privilege is being troubled by contemporary reproductive techniques and practices.

In studies of reproductivity, anxiety is often displaced. It belongs to other times, other media ages and other social groups whose privilege is waning. Anxiety in this view communicates attachment to ways of thinking and modes of subjectification that are on their way out; people would not be so anxious if they understood the real impact of new media, “its ability to constitute and multiply the identity of the individual and thereby to promote his/her control” (Poster, 1993, p. 64). To exaggerate slightly the manner that narratives of media history sometimes treat the matter, it could be said that anxieties are old or ancient fears dressed up in new clothes or as symptoms of attachment to oppressive forms of subjectivity.

Simplifications, displacements and generalizations played a role in the critique of the disembodiment thesis and other problematic ways of conceptualizing virtualization. In this study, I take a different route. I explore the possibility that anxiety marks a shift in virtual culture away from the excitement of boundary disruption towards apprehension about the implications of such disruptions in specific fields of practice. In addition to this historiographic function, anxiety enables the virtual to be considered in terms of capacity, potentiality and liminality. It thus offers a way of repositioning virtuality as a theoretical frame through which subjects and objects affect each others’ emergence, transformation and performance. As Hayles suggests in her analysis of Norbert Wiener’s work, anxiety indicates tension between the dissolution and recuperation of boundaries, differences, categories, etc. as well as assumptions about the subject underlying those processes in

law, science and popular culture. “Where should the cybernetic dissolution of boundaries stop? At what point does the anxiety provoked by dissolution overcome the ecstasy?” (p. 85).

Across the disciplinary spectrum, relatively few theorists positively value anxiety. Again, taking a cue from Peters (1999), I engage with the possibility that reproductive anxieties may articulate a wider range of worries, not just about death, but about law in the broad sense of paternal order (vs. polymorphous promiscuity), the sovereignty of the human subject, and control over traces of personality. Anxieties may be extremely productive. Anxiety arising from an epistemological crisis can lead to technological innovation (e.g., photography and phonography) which in turn enables transformations of various elements of human subjectivity (e.g., memory, embodiment, the optical and aural unconscious). Existential anxiety or anxiety about dehumanization, depersonalization and death arguably stimulates the development of digital and genetic forms of reproduction. Worries about the uniqueness of the human subject, however, are not necessarily existential anxieties; they are anxieties not about literal death but about the potential for radical transformations of the human subject.

It is tempting to draw a trajectory of decreasing academic anxiety from the 1980s onwards. For every theorist who used Benjamin’s “artwork” essay as the basis for a critique of the loss of aura and authenticity, another would assert the opposite: technological reproduction makes culturally-specific forms of authenticity possible.⁴⁰ In

⁴⁰ For Benjamin, mechanical reproduction leads to a loss of aura/tradition, which is regrettable but also potentially emancipatory and exhilarating. For Frith, technological developments are often regarded with suspicion in music cultures centred on moral/aesthetic values of authenticity because “technological changes increase the opportunities for fakery” (p. 267). Frith critiques rock culture’s notion of authenticity and its simplistic opposition between art and technology; every new style presents itself as more authentic than its predecessor; the aesthetics of rock are founded upon oppositions between natural/artificial, community/alienation, self-expression/soul-less. These foundations can be traced to cultural criticism of

this chapter, I argued that characterizing the literature in this way leaves out a great deal of (legitimately) anxious literature about reproduction across the social sciences and humanities. Even if discussions of reproduction have affectively “cooled off,” this may be a sign of historical amnesia. The problem with celebrating bio-informational reproductive capacities and popular forms of recombinant art at the expense of an historical awareness of the political history of copying, reproduction and appropriation has already been well-documented in cultural studies, legal studies, postcolonial studies, anthropology, and other fields (e.g., Coombe, 1996, 1998; Root, 1996).⁴¹ Instead of rehearsing that critique, in the next chapter, I develop an alternative way of analyzing the politics of reproductivity which opens up technological design as a mode of subjectification and socio-technical ordering.

The concept of reproductivity as I use it in this project draws from theorists of cultural reproduction who have underlined the manner in which reproductive technologies are developed through the discursive, material and informational treatment of parts of human bodies in the process of technological development (e.g., Sterne, 2003a; Boyle, 1996; Peters, 2004) and from research on biological reproduction which highlights the importance of communication media in the representation and discursive construction of the subject (e.g., Casper, 1994, 1998; Martin, 2001 [1987]; Squier, 1996).

1920s and 30s. Frith is probably referring to the Frankfurt School, but his critique of Adorno and his associates is tinged with irony: authenticity was eventually incorporated into “mass culture ideology.” Frith’s counter-argument is that technological developments made rock culture’s notion of authenticity possible (the studio, for example, became the central instrument of “art rock”) and enabled musicians resist corporate control of music.

⁴¹ Coombe (1996) writes: “The postmodern celebration of pastiche and montage – mimetic juxtapositions of alterity in recordings and reworkings of regimes of signification – must remain cognizant of the imperialist histories in which many commodified forms of available cultural difference were originally forged” (p. 218). At the same time, however, Coombe advocates “ever new and more imaginative” forms of alterity (i.e., recoding and reworking) to counter the commercial transformation of cultural alterity into “mere mimetic multiplication of possibilities” (p. 219).

My project speaks more directly to work to work on the integration of cultural and biological reproduction as bio-informational systems in which new entities, kinds and “classes” emerge (Hansen, 2006; Hayles, 1999; Knorr Cetina & Bruegger, 1997; Law, 1991; Lury, 1998, 1999; Fraser, Kember & Lury, 2006; Franklin, Lury & Stacey, 2000; Roof, 1996). While Casper, Martin and many other scholars make a strong case for maintaining differences between biological and cultural reproductivity and between humans and nonhumans, the latter work suggests that these boundaries are nevertheless being dissolved and redrawn and that further research should concentrate on the resulting configurations of human subjectivity.

3. Theory and methodology: Mobilizing reproductive anxiety in the study of virtual culture

In the previous chapter, I developed several critiques of media and cultural studies approaches to reproduction and reproductive anxiety by drawing upon literature in other disciplines. I argued that work on reproductivity has been constrained by questions about effects, impacts and histories of the digital. Reproductive anxiety in media and cultural studies tends to be framed as a reaction to the disruptive impact of digital reproductivity, although scholars offer conflicting assessments about the historical novelty of the digital and its disruptiveness. In contrast to the slippery term “digital,” Manovich’s (2001) “new media object,” defined in terms of numeric representation (rather than discrete bits, common code, non-degradable reproduction, etc.) enables more precise distinctions to be made between “new” and “old” reproductive techniques and anxieties about them. However, this version of the digital would still be computer-centric and implies that digital culture expresses the technical logic of computers. Moreover, since my study analyzes the role of transformations and erasures as well as stabilizations and reinscriptions of people and things in the generation of anxiety, a sharp distinction between new and old will not be very helpful.

What I want to put into focus in this chapter are the cultural practices through which people and things are modelled and enacted as informational entities. First, I introduce work on virtuality and highlight problematic notions of technological effect, historical change and emancipation that have been associated with the process of virtualization. However, I use Hayles’ work to demonstrate the usefulness of the concept of virtuality in addressing the by-now habitual mode of treating people and things as

mixtures of materiality and information. Second, I outline several approaches to the question of how and why reproductivity generates anxiety. Actor-network theory provides a unique way of conceptualizing anxiety as a response to law in the broad sense of a moral and epistemological imperative to separate people and things and treat them as fundamentally different in order to preserve the semblance of purely human subjects and societies. The concept of translation in actor-network theory also allows me to explore the positive value of anxiety in the negotiation of social-technical ordering. Finally, the chapter turns to the subject of virtual culture. Reproductive anxiety is in part a response to the growing importance of things in the constitution of subjects.

Based on Hayles' semiotics of virtuality as well as ANT-inspired accounts of subjectivity, I suggest that empirical analysis of virtual culture should be attentive to the dissolution of the subject's boundaries as well as their reinscription. This highlights a key methodological problem. Who defines what is human and what is not? Definitions of the human in law, science and popular culture vary depending on the speaker and the setting. Patterns can, however, be traced by focusing on the manner in which technologies operate as programs for action incorporated into human bodies and inscribed into code and machine. This framework allows me to analyze tactical definitions of the human in law and science without assuming that this corresponds directly to the manner in which "authentic" humanness is actually performed in work, commerce and cultural practice.

I begin with the problem of subjectivity as formulated by contemporary social and cultural theorists. Using ANT, I highlight the manner in which social constructivist models of subjectivity tend to ignore the implications of materialities and non-human agency for the constitution, figuration and autonomy of the human subject. However,

ANT seems to overcompensate for the absence of “things” by refusing to engage in debates about subjectivity. This is a missed opportunity. In the remainder of the chapter, I borrow ANT’s conceptualization of the historical transformation of sociotechnical relations and translate it into a theory of the subjectivity in which the capacity to reproduce, or reproductivity, can be understood as an historically-specific configuration of subjectivity. In order to theorize the manner in which reproductivity generates anxiety, I draw from Hayles’ (1999) interpretation of cybernetic anxieties. Although ANT’s history of sociotechnical relations is highly suggestive of certain commonalities or shared foundations of reproductive anxieties, Hayles’ “semotics of virtuality” provides a much more flexible framework in which to engage with specificities of reproductive anxieties and differences between reproductive anxieties.

Theorizing virtual culture

Discourse, materiality and decentred subjects

Since social scientists “highjacked” epistemology in the 1960s, subjectivity has been considered an important site in which to theorize qualities and capacities associated with human nature as effects, agents and sites of the exercise of power. According to Michel Foucault (1982), who is often invoked in discussions of the subject, the objective of his work on institutional knowledges was to examine power from the point of view of the human being on which it was exercised, to explore the practices and processes through which human beings become specific sorts of subjects (the sick, the insane, the

criminal, etc.).⁴² Work inspired by Foucault tends to attack the centred self rooted in reason as well as the discourses that appear to fix the subject and give it a “core” in various forms such as a soul, mind, ego and so forth. The assumption underlying many critiques of legal and scientific modes of subjectification is that these institutional discourses and practices are “too technical” to articulate the human subject. The critique of institutional subjectivity implies that there is a form of subjectivity that can be positively valued. What sort of subject is this exactly? As Mark Poster (1993) argues, theorists who challenge techniques of subjectification (including Foucault in his later work) uphold an ethics of self-creation in which discourses re-centre rather than ce-centre the subject. Although theorists reject platitudes of authentic subjectivity (e.g., “just be yourself,” which implies a pre-given and centred subject that only needs to be discovered and expressed), the ethical principle of being free to engage in self-creation or self-constitution implies an author-like figure who persists over time and is the source from which the will and desire to appropriate codes, norms and discourses into moral engagements with the self spring forth. The 20th century has been characterized by tremendous changes in the mode of subjectification and self-constitution and, like many other theorists of subjectivity, Poster finds Foucault’s work particularly helpful for

⁴² Although Foucault’s concept of subjectivity is used in many fields, legal studies has made substantial contributions and revisions of this theory in relation to reproduction. Legal studies and literary studies overlap considerably in research on the historical, economic, political and cultural consequences of the invention and uses of authorship and other forms of legal subjectivity that are crucial to the current regime of copying (e.g. Aoki, 1996; Coombe, 1991). Unfortunately, many researchers of the history of copyright view law and aesthetics as rival forms of subjectivity, implicitly privileging the later as a more fundamental component of human being that has been constrained by the juridical and economic rationalities of capitalism (e.g., Woodmansee & Jaszi, 1994). Despite these shortcomings, legal studies remains a rich source of explanations about how law and regulation are integral to subjectivity rather than external, impersonal, or “too technical” constraints upon a more fundamental level of subjectivity (e.g. Saunders, 1992). Legal studies also approaches technology and reproduction through the lens of conceptions of subjectivity, particularly in theories of copyright law and other forms of intellectual property (e.g. Loewenstein, 2002; Boyle, 1996).

understanding these changes, in particular, the emphasis on language and changes in the structure of language – what Poster calls the Mode of Information.

Poster's argument that subjectivities should be treated as linguistic formations because the Mode of Information produces them that way dovetails nicely with the post-structuralist notion of the subject as constituted by discourse. Discourse theory advances a type of social constructivism which accords to language the capacity to make subjects, objects and worlds. Language becomes opaque and substance-like in discourse theory. Although it appears to its subjects as a transparent window into a reality, language produces subjects who become conduits for institutional discourses, such as reproduction as a social duty or, more recently, "responsible reproduction." For theorists such as Valerie Hartouni (1997) and Susan Squier (1994), scientific, commercial and regulatory discourses converge to make individuals subject to reproductive power.⁴³

⁴³ Discourse-as-constitutive of the world stems from Foucault's theorization of discourse's role in the exercise and reproduction of power during the early 1970s. Foucault (1980 [1972]) summarized this part of his work as follows:

[I]n any society, there are manifold relations of power which permeate, characterise and constitute the social body, and these relations of power cannot themselves be established, consolidated nor implemented without the production, accumulation, circulation and functioning of discourse. There can be no possible exercise of power without a certain economy of discourses of truth which operates through and on the basis of this association. We are subjected to the production of truth through power and we cannot exercise power except through the production of truth. (p. 93).

Discourse has since been combined with other theories (such as Goffman's symbolic interactionist framework) and has been elaborated into a theory, methodology and indeed an epistemology in which the relationship between language and reality is "constitutive" rather than "reflective". Wetherall (2001) summarizes this framework:

As accounts and discourses become available and widely shared, they become social realities to be reckoned with; they become efficacious in future events. The account enters the discursive economy to be circulated, exchanged stifled, marginalized or, perhaps, comes to dominate over other possible accounts and is thus marked as the 'definitive truth'. In discourse research, decisions about the truth and falsity of descriptions are typically suspended. Discourse analysts are much more interested in studying the process of construction itself, how 'truths' emerge, how social realities and identities are built and the consequences of these, than working out what 'really happened'. Part of what is meant, then, by the 'turn to discourse' is this epistemological stance which reflects the broader cultural and intellectual shifts of postmodernism. (p. 16)

While there are merits to flattening out various forms of discourse in the analysis of reproductivity, there is a gap in scholarly understandings of the relationship between discursive constructions of reproduction and the interest in the body as a key site in processes of subjectification. The constructivist frameworks that emphasize the power of discourse have difficulty explaining how exactly images of, for example, babies in bottles impact reproductive practices, the treatment of the human body, and the production of subjectivities in biomedical institutions. As Suzanne Barnard (2000) argues, constructivist approaches tend to treat materiality as discursive “all the way down.” What could be called the “everything is discourse” approach is limited in its ability to distinguish between “social-discursive practices and technologies which intervene directly and immediately with the body’s materiality and those which intervene in more indirect and mediated forms over time” (p. 672). For Barnard, a theory of bodily materialization is needed in order to critically engage with contemporary “images of the material body as infinitely transformable, reproducible and replaceable” (p. 674). Poststructuralist approaches to materiality (i.e., materiality as just one more discursive construction) are unwittingly complicit with the “virtualization” of the body (i.e., the body as infinitely reproducible, malleable, replaceable). Virtualization sets the stage for the exercise of power through materializations of bodies according to essentialist materialist assumptions, at which point there is little that a critical discourse analyst can do about it. Attention should be redirected, Barnard argues, to the manner in which discursive practices and technologies of materialization are mutually implicated in “the ongoing (re)production of subjectivities” (p. 674).⁴⁴

⁴⁴ While I agree with Barnard’s critique of certain kinds of discourse analysis, it would be overly simplistic to say that all uses of discourse theory ignore materiality. Keller (1992), for example, relies heavily on

Although Barnard leaves out some important work in discursive theories of subjectivity to make her case, to the extent that theorists treat the subject as produced by language and theorize reproductive technologies in terms of linguistic effects, materiality will tend to be an add-on or after thought. Moreover, it sets up signification in a way that predisposes the analyst to consider only language-bearing entities as agential. Discourse theory decentres the subject by separating language from intentionality, but enlarges the domain of linguistic production to include everything. The result is that the human subject, although decentred, is the only entity capable of producing and resisting discourses.

The subject can also be decentred by detaching agency from intention, which allows me to treat the technical objects of reproduction as agential, and the subjects, who, if they act intentionally, are created that way by the heterogeneous collective which produces differences and classes like intentional/nonintentional. This is the position of actor-network theory, which initially emerged in European sociology as an alternative methodology for research on science and technology and later became a theory of role of scientific knowledge and technology in social life. Although ANT made numerous contributions to the field of science and technology studies, it is best known for its attempt to rethink the relationship between society and technology without resorting to technical determinism or social constructivism. ANT suggested that sociologists should examine how the technological, natural and social worlds are produced through a process called *translation* whereby one or a few actors become spokespersons for a multitude of others by defining and linking their identities in increasingly simplified and fixed forms.

discourse analysis in her theories of gender, science and technology, but she nevertheless makes the ontological argument that there is something like a material reality and that no system of representation can “reflect” it because making it meaningful involves selection.

Based on the core concept of translation and the redefinition of action and actors in a way that pointed to the sociality of nonhumans, the history of subjectivity and technology could be revised. I focus here on the implications of the representational meaning of translation, deferring the discussion of the historiographic meaning to the next section.

The concept of translation also referred to the shifting of properties (skills, competences, abilities, etc.) between human and nonhuman entities in order to produce more durable socio-technical networks (Callon, 1986a, 1986b; Latour, 1986). The researchers gradually generalized their findings into a broader theory of technoscientific power, focusing on the mundane practices that have enabled scientists and technologists to make themselves indispensable to the social order by drawing power from associations of humans and nonhumans. Latour (1993) developed a “mythology” of techniques as an alternative to story of scientific progress and of alienation. Historically, the relations between humans and nonhumans have become increasingly intimate, not more distant, alienated, rationalized, etc., through technical mediation or the translation of identities, goals and interests across human and nonhuman agents.

Through translation, nonhumans acquire social roles in a series of gradual shifts in the elementary link between entities from “a provisionally less reliable one to a longer-lasting, more faithful one” (Latour writing under pseudonym Johnson, 1988, p. 306). Echoing Innis (1949), Latour (1986a) writes, “[T]he durability of the definition of the clan depends upon the duration of the resources used to make it hold together” (p. 275). From the perspective of communications theory, ANT appears to present a radicalized but simplified version of Harold Innis’s media history by drawing ethical questions out of the history of human-nonhuman partnerships, demanding, for instance, some sort of

institutional recognition of the agency of “missing masses” (particularly machines) and suggesting that nonhumans deserve much of the credit for stabilizing social negotiations (Law, 1991; Latour, 1993). What matters at this stage is that the concept of “mediator” or “translating agent” makes explicit what was already at the heart of a new definition of “actor” in actor-network theory. An “actor”, as Callon and Latour (1981) define it, is “any element which bends space around itself, makes other elements dependent upon itself and translates their will into a language of its own. An actor makes changes in the set of elements and concepts habitually used to describe the social and natural worlds ... it imposes its own space and time” (p. 286). Redefining “actor” in terms of the capacity to enlist others into the performance of a definition of reality enables ANT to treat science as culture while at the same time highlighting the specificity of its world-building techniques. In other words, redefinitions of “actor” came about as ANT attempted to account for the power of science by examining its mundane techniques rather than pointing to capital, social structures, political interests, and so on, as underwriting scientific worldviews.

Through a combination of ethnographic research in laboratories and media history, the importance of certain practices of producing and managing inscriptions became the focus of ANT inquiries into the historical emergence of scientific hegemony. Scientific knowledge is indeed constructed, but it is constructed in such a way as to make the transformations of its inscriptions invisible. At the end of a long chain of inscriptions, knowledge is embodied by charts, graphs, drawings, records, maps, etc., all of which are characterized by simplification, combinability, and relative portability. Scientific power thus turns out to hinge on the most innocuous and mundane of activities, *inscription*,

which in science is directed toward the embodiment of knowledge in “things” that are resistant to change over time and space. The *immutable mobile* emphasizes the constraining and enabling links between mediators, a kind of “meta-translation” that figures strongly in art, religion and science and which enables certain relations to be kept constant and others to be discarded or suppressed. As Latour (1988) writes,

Mobiles that are becoming immutable – painted scenes, planets, account books, anatomical plates, printed books, etched plates – are tracing a new space that has the strange characteristic of establishing new continuous links with each of these discrete and heterogeneous novelties. Of course, neither perspective, nor printing, nor etching, nor Copernican astronomy, nor double entry book keeping, are enough to explain any of the others. Serious historians can always point out the gap between those discontinuous innovations – and they are right. What they miss, however, is that each of these inventions, of more immutable more mobile elements is creating a new specific type of space that allows them to *merge with the other* in a specific homogenizing way. The question of their obvious differences is thus less pertinent than that of their ability to tie in with one another. (p. 29)

It is the alignment of these mediators which distinguishes certain locations as “centres of translation,” and which distinguishes centres and regimes of translation from each other (Law, 1986; Latour, 1998). In the final stages of these alignments of mediators, an assemblage of humans and nonhumans reaches a critical mass or optimal concentration in both the sense that there is a large number of actors being mobilized but also in the sense that the representatives now speak for multitudes. However, the stability of the assemblage is bound up with the stability of its representational chains, a long chain of mediators and intermediaries, each of which must behave according to the claims made by their representatives. Such durable links may be obtained through different types of mediations, and not just through scientific practice. But ANT researchers explored how the particular mediations of scientific practice have turned laboratories into an obligatory

point of passage for all kinds of diverse and conflicting interests and goals, including theological and aesthetic ones.⁴⁵

Although actor-network theory generally avoids discussions of subjectivity, I use it in this study as a resource for rethinking the role of reproductivity in constituting and dispersing subjectivity. ANT provides a novel explanation of why reproductivity frequently generates anxieties about human subjectivity and, more importantly, how reproductive anxieties can become resources in strategic definitions of reality. Although ANT was primarily concerned with explaining power, in particular the power generated through scientific practice, it can be “mined” to develop a theory of subjectivity as a material and discursive distribution.

The subject-as-distribution is neither a gory explosion of Cartesian subjectivity nor is it a simple transposition of the characteristics of media (e.g., distributed networks) to the subject. Rather, the distributed subject emerges in ANT as part of a broader attempt to highlight the role of things in the constitution of events, actions and actors in everyday life. ANT case studies are full of thick descriptions of scientific labour, in particular, the struggle to represent nonhumans such as microbes, nuclear power, rat livers, electric cars and scallops, all of which have struggled against their re-presentation in science, and in some cases break the chain of inscriptions that binds them to scientists. For ANT, scientific representation is always political because it silences the multitude and allows one or a few actors to acquire authority to speak on behalf of the rest.

⁴⁵ Latour (1998) distinguishes religious, artistic and scientific mediations while at the same time noting how all have absorbed the language of science (p. 433). All along, the ANT researchers were making certain arguments with regard to changes in the location of the “centres of translation” or strategic loci over the course of history, arguing, for example, that the laboratory has displaced “the palace” (or Parliament) as the centre of translation (Callon, Law & Rip, 1986b, p. 229).

By redefining representation as production-by-linking, ANT detaches signification from language. Signification is broader than language and includes the sphere of behaviors and trajectories through which nonhumans modify each others' courses of action and those of the humans with whom they are entangled. In order to represent, to present again, entities that can link, create pathways, go away and return, etc. In this sense, nonhumans engage in non-linguistic *translation*, or the "displacement, drift, invention, mediation, the creation of a link that did not exist before and that to some degree modifies the original two" (Latour, 1999, p. 179). In contrast to social constructivism, translation-based frameworks highlight the manner in which social, natural and technical realities are "co-produced" by breaking down representations into scripts for action which are inscribed in people and things and which they in turn perform as reality.

Since translation refers to a broad range of links and ways of linking, the researcher does not have to take a stand on the question of the precise relationship between subject and object. As a way of drawing attention to influences and relations that are ignored by conventional sociological accounts of subjectivity and social relations, the constitutive role of objects has periodically been emphasized (e.g., Knorr Cetina & Bruegger, 1997). Translation does not rule out these possibilities, but it suggests that one type of subject-object relation should not be taken as representative of all subject-object relations. Similarly, subjects and objects that appear to be distinct at one moment of translation can become at another moment be considered as identical. This transformation of subject and objects through a series of sociotechnical arrangements from disinterest to alignment to fusion allows me to conceptualize transformations of the human as a

consequence of “deconstructions” (opening up black boxes and scrutinizing the history of links between “parts”) as well as reinscriptions in unlikely places such as law, science and popular culture but without making the actors appear to be operating according to the logic of post-structuralist philosophy.

Emphasizing shifts in macro-level social forces and structures to explain variations and patterns in micro-level social identities leaves little room between levels of analysis for the non-social and the nonhuman, except, as Mike Michael (1996) notes, as “mere targets of deconstruction” (p. 46). With the concept of translation, it becomes clear that deconstruction of a unified whole into multiple parts that do not have any necessary links is only one part of the story. It leaves out the reverse direction, the transformative linking, as well as the history of successive changes in the nature of these links, which allows the researcher to explore the processes through which links are coordinated, fixed and black-boxed. Reproductive technologies, practices and events proceed towards black-boxing (forgetting the history of subject-object relations that constitute them) or towards unbundling (re-presenting that history) depending, as Latour (1999) writes, on the nature of the crisis they encounter.

In a translation-based framework, the emphasis is on the “associative action” or the techniques of people and things in explanations of the power to define and enact realities. As Michael (1996) puts it,

Actor-network theory certainly is concerned to disentangle the ways that the “powerful” become so, but it does this by attempting to reveal the heterogeneous materials and processes which are mobilized by certain actors to persuade others, to shape them as particular sorts of beings with particular sorts of interests, properties and knowledges. However, what these “powerful” (and “powerless”) are – what their make-up is, their distributed-ness across networks, the extent to which they straddle the boundaries of the human and the nonhuman, the degree to which they can be afforded “rights” or “worth” and so on (and “who” does the

affording) – is seen as a matter of historical contingency and argument and struggle. In the process, actor-network theory reveals how things might have been otherwise; it is from this exposition of contingency that critique derives. (p. 49)

In Michael's summation, actor-network theory and social constructivism do not present opposing perspectives of subjectivity. Rather, ANT proposes that constructivism should be applied to settings and discourses that tend to be construed as the origin of subjectivities, and that an account of the construction of social reality requires the conceptualization and inclusion of what is conventionally regarded as naturalizations (i.e., the non-social and the nonhuman). The radicalized notion of symmetry – the analytic equivalence of human and nonhuman action – is designed to emphasize the active role of nonhumans in social life.

The rejection of macro-level actors and the refusal to engage with constitution of subjectivity removes the axis of reference that is normally used to theorize the politics, social impact, meanings, and so on, of reproductive technologies. In its effort to persuade sociology to take “things” seriously, ANT regularly ridicules and antagonizes conventional conceptualizations of the relation between humans and nonhumans as for example, tool-making, constructing, determining, constraining, etc. These terms presuppose a particular figuration of action and actor in which “active objects” or the “sociality of things” is nonsensical since objects are by definition passive non-actors. “Normal anthropological usage presupposes in action a ‘making-be’ for which it induced, by extension, a *subject* with appropriate competencies and an *object*, which thanks to the actor has now gone from potentiality to actuality” (Latour, 1996, p. 237). In order to problematize attribution, action needs to be reconceptualized in terms of the sharing and distribution of actions to others, such that “to act is to be perpetually taken over by what

one does ... we are *exceeded* by what we create. To act is to mediate another action ... Thus it is not the case that there are actors on the one side and fields of forces on the other. There are only actors – actants – any one of which can only ‘proceed to action’ by association with others who may surprise or exceed him/her/it” (p. 237).

Translation: Linking anxieties

Although contemporary ANT-inspired researchers underline the importance of affective ties to object-worlds in the production of subjectivities, neither ANT nor ANT-inspired literature has much to say about anxiety. However, there are three ways of understanding anxiety from the point of view of technical mediation: (1) anxiety may be understood as an effect of the problematization or destabilization of a particular aspect of reality, which is the foundation for the new delegations of action, new characterizations of those delegations and new forms of human and nonhuman autonomy; (2) anxiety derives from the opacity of technologies when they tentatively acquire a degree of stability and are on their way to being black-boxed, or through destabilizations and subsequent openings of black-boxed associations, which become problematizations enacted by knowledge cultures; and (3), following Latour’s notion of the Great Divide, many cultural anxieties may be understood as affective responses to the perceived transgression of the boundary between humans and nonhumans, the social and the technical.

In order to advance an ANTian account of reproductive anxiety, it is necessary to introduce a second meaning and use of “translation.” Against the critiques of scholars

such as Harry Collins and Steven Yearly (1992a, 1992b), who argue that resistance against natural, social and technological forces is the key to human agency, Latour (1993) along with a growing number of actor-network researchers have defended their basic thesis that human society is the result of the socialization of nonhumans, that is, the shifting of an increasing number of actions, skills and competences to nonhuman materials and entities. Moreover, as Mariana Valverde (2005) points out, since ANT was never intended to be an all-encompassing theory of technology, “it does not need to be either accepted or rejected. It can merely be mined. An actor-network analysis is never a complete and total picture” (p. 421).

ANT’s minimal definition of agency – the capacity to perform an action – is helpful in reconceptualizing technology as the shifting or delegation of scripts to an assemblage of humans and nonhumans. However, as J. Macgregor Wise (1997) points out, one of the major problems with this version of technology is that agency seems to be equally distributed between humans and nonhuman while the focus of so many ANT case studies of technological development is the scientist or engineer who organizes these assemblages. “How do we account for differences (even similarities) in agency, in the distribution of agency? And how do we do this without recourse to abstract macro-actors such [as] social forces, which Latour rejects?” (p. 59).

The problem of tracing historical differentiations and distributions of agency can be at least partially addressed through Latour’s (1990, 1986b, 1988, 1998) concept of the “immutable mobiles” and the reinterpretation of media history in terms of the trend toward the creation of larger, more inclusive “meeting places” for different entities and of techniques for “conserving a constant through successive transformations of the medium”

(1987, p. 117; 1998, p. 425). In scientific practice, mediators are aligned in such a way as to produce the semblance of an unmediated object.

Reproductive anxieties emerge out of strategic “problematizations” in law and science, which frame a problem to be solved but also set up the problematic area of reality as something which must be solved in a particular way in order for diverse actors to meet their goals. The associative action of problematization transforms the goals and interests of the actors. But, crucially, problematizations may cause anxieties at one stage and then enlist, link, merge and transform anxieties in another stage to form a new alliance. For example, in the development of the MP3 audio coding scheme, the “hunting grounds” for a common digital code were marked off by scientific certainties, derived primarily from psychoacoustics. Not long after the standard was approved, MP3 was incorporated into a new problematization of reality – the imminent demise of the music industry – in order to shore up public support for the development of online distribution. Corporations like Apple in turn used anxieties about rampant piracy and about being caught to build its problematization of peer-based distribution and offer its online store as the solution. More recently, anxieties about piracy have been incorporated into new problematizations of subcultural distinction in online music scenes. Problematizations are composed of particular figurations of the subject performing particular actions enabled by particular things. Thus the deceivable ear of the human listener was crucial to the development of MP3, just as the anonymous “end-user” of “piracy networks” was central to copyright owners’ problematization of MP3, and the intentionality of the creative subject was key to the problematization of “higher-level automation” in software studios. Humanness may be subtracted from the technological in particular performances of

reality, but in fact technology is constitutive of human transformation/potentiality and continuity/stabilization.⁴⁶

Definitions of the human in technical mediation do not always lead to discursive figurations. They can instead generate technical objects which bind subjects and objects together in a more durable way. But a technology can frequently break down and lead to a crisis of identity between entities and shift attention to difference. Technologies are constitutive of those forms of agency that are considered to be uniquely human (thinking, intentionality, self-consciousness, etc.) and yet they are often opaque and “unmenable to mastery” (Latour, 2002, p. 252). Like all technologies, reproductive technologies generate anxiety because of their opacity, the unknown mediations that have been folded into them, and because of the contingency they introduce into one’s actions. As Latour (2002) writes, “Technologies bombard human beings with a ceaseless offer of previously unheard-of positions – engagements, suggestions, allowances, interdictions, habits, positions, alienations, prescriptions, calculations, memories” (p. 253). Since reproductive technologies overtly announce their capacity to capture, modify, transform, etc. the human subject, they accentuate the regulatory or constitutive role of things in the human action. Anxiety about reproductive technologies may thus be understood as a side effect of the specific roles assigned to humans and nonhumans in this association.

In the analyses in subsequent chapters, reproductive anxiety often manifests itself as a delayed response to *hybridization*, or increases in the durability or scale of human-nonhuman associations introduced by engineers. Bio-informational reproductivity provokes anxieties because its processes and entities strike people as monstrous. ANT

⁴⁶ Latour (2002) writes, “Without technologies, human beings would not be as they are, since they would be contemporaneous with their actions, limited solely to proximal interactions” (p. 252).

addresses the issue of monstrosity directly. What Latour calls the Great Divide (which more or less corresponds to C.P. Snow's "two cultures") emerged from modern science and philosophy in which subjects and objects are classed as either human or nonhuman. It is not just that human and nonhuman are considered to be foundational differences, but that there is a vast gap separating subjects and objects, expanding to the point of incommensurability. This gap is maintained through techniques of *purification*, that is, the reorganization and presentation of hybrid collectivities according to the "pure" categories of society/nature, people/things, humans/nonhuman. The "modern constitution" forbids hybrids to appear as such on the grounds that they are dangerous to the order of people and things. To treat things as people or people as things is logically and morally wrong. Since bio-informational reproductivity relies on and contributes to the production of human-nonhuman couplings, and since the reproduced entities often appear as mixtures of the human and the nonhuman, technical reproduction continually transgresses the Great Divide. As Nina Lykke (2000) puts it, "The constant emergence of hybrids, including non-human humans, presents a never-ending threat to the modern construction of the great divide" (p. 77).

Hybridization alone does not make something monstrous. It is the publicity of the hybrid as such that makes it monstrous, for it indicates a breach of the order of differences. Benjamin noted that photography was recognized as art by redefining art in terms of mechanical reproduction. The anxiety-provoking potential of photography was minimized by zooming in on creation as an action of an inspired individual, which is opposed to the "less creative," hobbyist forms of photography which is in turn regarded as technical mediation (e.g., the production of links between signs and things). More

generally, innovation in modern society occurs through heterogeneous engineering, or the production of hybrids or mixtures of nature and society as well as humans and nonhumans. But these hybridizations would not be possible given the humanist aversion to anything that does not fit neatly into the categories of Nature and Society. These categories form what Latour (1993) calls the “modern constitution” which authorizes the production of hybrids by reducing the manner in which they appear to confound the great divide.

To undertake hybridization, it is always necessary to believe that it has no serious consequences for the constitutional order. There are two ways of taking this precaution. The first consists in thoroughly thinking through the close connections between the social and the natural order so that no dangerous hybrid will be introduced carelessly. The second one consists in bracketing off entirely the work of hybridization on the one hand and the dual social and natural order on the other. (p. 41)

Innovations (including those in reproduction) depend upon purification as well as hybridization to maintain a sense of ontological security or at least the appearance that the modern constitution is intact. In this framework, reproductive anxiety stems not only from the hybridity of technologies (e.g., the “technologization” of biological reproductivity) but also from the seemingly reckless manner of giving such hybrids a public life without taking precautionary/purifying measures (see Figure 1).

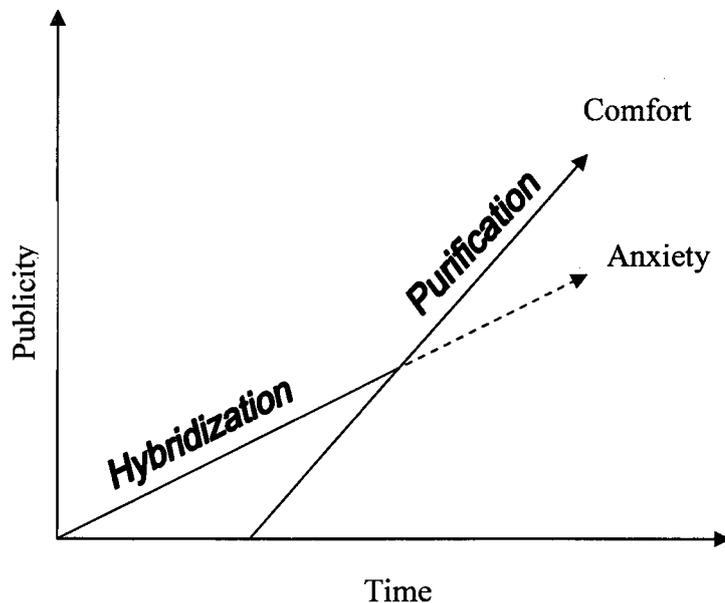


Figure 1: Hybridization/purification model of reproductive anxiety. Anxiety generated over time as a result of increased hybridization and publicity. Comfort is restored by the public display of processes of purification. Adapted from Latour (1993).

An ANTian explanation of reproductive anxiety would thus point to the failure of the Modern Constitution to maintain the semblance of purity. Against the conventional view that hybridity is disruptive of modern order, the Great Divide ensures the continuous production of human-nonhuman associations by making them seem as though they are pure.

If, on the contrary, our Constitution authorizes anything, it is surely the accelerated socialization of nonhumans, because it never allows them to appear as elements of 'real society'. By rendering mixtures unthinkable, by emptying, sweeping, cleaning and purifying the arena that is opened in the central space defined by their three sources of power, the moderns allowed the practice of mediation to recombine all possible monsters without letting them have any effect on the social fabric, or even any contact with it. Bizarre as these monsters may be, they posed no problem because they did not exist publicly and because their monstrous consequences remained untraceable. (p. 42)

Thus, “meddling with the human reproductive system” may seem less monstrous than tinkering with the formats of sound recordings, not because human reproduction is “more natural” or protected from technological “meddling” than nonhuman reproduction, but because innovations/hybridizations in human reproductivity are subjected to a more rigorous purification process before stepping on the public stage.

One of the findings of my literature review was that reproductive anxiety tends to be conceptualized negatively, that is, as something selves and societies would be better off without, and that it is attributed to essentialized figurations of subjectivity. In contrast, anxiety can be conceptualized as a resource in the production of alliances in scientific and legal problematization, and, more importantly, as an effect of localized stabilizations and destabilizations of the relations between humans and nonhumans. Rather than reducing reproductivity to its supposedly inherent disruptiveness or certain forms of subjectivity to their allegedly primordial anxieties and desires, reproductivity can instead be conceptualized as the capacity of human and nonhuman assemblages. The degree to which technical reproductivity generates anxiety depends on the manner in which it is purified according the modern constitution. As discussed below, reproductive anxiety is not just a matter of technological change, but a change in signification, consumption, embodiment and representation, and, as theorized by Hayles, the feedback and feedforward loops between these processes and technological change. It is thus useful to conceptualize these various processes and practices of reproduction as governed by a regime that regulates the traffic between the human and the nonhuman.

While ANT makes a strong case for the inclusion of nonhuman in studies of social organization, it tends to flatten out all nonhumans and mediators and is thus ill-

equipped for the study of their differences.⁴⁷ This much is admitted by Latour (1998) in his remarks about the trend in the sociology of science and technology to unfold a performance of socio-technical reality into innumerable mediations.⁴⁸ In this project, I attempt to explain how it is that certain kinds of reproductive practices, technologies and entities become extremely contentious while the development and introduction of others occurs without much discussion. While transgressions of the Great Divide provide a partial explanation as to how certain reproductive media come to matter, the overall tendency in ANT is to focus on the similarities between them, especially the broad trend towards immutable mobility.⁴⁹

In order to examine how human agency is transformed by specific reproductive media, the “medium” needs to be expanded from its regular sense to include the “scenography,” “setting,” “institutionalized transaction” or “alignment of mediators” which produce particular kinds of subjects and objects and regulate the differentiation and distribution of agency. Latour (1998) argues that religious and aesthetic mediation (person-making) produce fundamentally different kinds of subjects and objects than

⁴⁷ Latour (1988) writes, “If we are in society it is because we live among those delegates, very few of which look like fellow humans. If sociology is the study of society it has to take full account of those crowds of non-humans mingled with humans. To take full account of this retinue of delegates, sociologists have to look carefully at their conflicts over who is the most representative” (p. 16)

⁴⁸ “It seems to me that, as a scholarly community, we begin to know pretty well how to multiply the mediators (especially in the work on visualization in science), but we have no clear idea yet of how to account for the various ways in which the same mediators are telescoped, unfolded, embedded into one another. We cannot simply say that ‘all of them’ count in the making of an observation. If we were stopping at that, something would be missing from the mere deployment of heterogeneous associations” (p.424).

⁴⁹ Latour’s (1990, 1986b, 1988, 1998) concept of the “immutable mobile” – which derives in part from Eistenstein’s history of the printing press and which shares with Innis’s medium theory a view of communication media as productive of spatial and temporal orientations – is one of the ways in which ANT theorists have addressed the question of relative importance or the representativity of particular mediators. With immutable mobiles, Latour dispenses with the carefully constructed typologies of media familiar to communications scholars but retains an emphasis on number. The number of interests that are folded into a definition of reality determines the degree to which the primary actor’s goals will drift (1987, p. 117). Number is also important in the sense that there has been an historical process toward the creation of larger, more inclusive “meeting places” for different entities and of techniques for “conserving a constant through successive transformations of the medium” (1998, p. 425).

scientific mediation (information-transfer). A “regime of translation” is an institutionalized transaction that makes one particular movement of inscriptions definitive of the differentiation and distribution of agency. Regimes can be elucidated by the examining the material meanings or “arrows” that direct and hold attention and shape the disposition of the reader, viewer or listener.

Incorporation and inscription: Distinguishing anxieties

The term “virtual” was widely used in the late 1990s and early 2000s to describe what Steve Woolgar (2002) calls “epithetized” activities (virtual learning, working, sex, etc.) and institutions (virtual university, government, economy, etc.), which imply drastic and sweeping historical change enabled by the proliferation of information technologies. Scholars often use “virtual” as a way of putting “new” and “old” activities in opposition with each other, generally focusing on the “upshot” of technological change (p. 3).⁵⁰ But virtuality is also an ontological claim; “virtual” usually means “not real.”⁵¹ For example, Ron Burnett uses the virtual/real dualism to consider a variety of “immersive environments” (including MRIs and P2P networks) as virtual reality. “The quality of the experience is largely the result of what I call a middle space, which combines the virtual and the real into an environment of visualization that has the potential to displace conventional notions of subjectivity ... The result is a continuum of experiences that are generated by a variety of creative choices on the part of viewers and users” (p. xx). This understanding of the virtual can be regarded as an opportunity to critically examine what researchers and research subjects assume about the real. However, as demonstrated by

⁵⁰ Kember (1998) is a notable exception.

⁵¹ In Deleuze’s work, and work inspired by him, the virtual is not opposed to the real. The virtual refers instead to affectivity (the capacity to affect) and potential actualizations in a process of becoming.

popular and scholarly usage around the turn of the century, “virtual” lends itself to a view of information and materiality as opposed to one another, conjuring images of informationalized subjects and worlds cut loose from the world of atoms and flesh. Policing the (mis)use of “virtual” might be worthwhile as part of a broader ideology critique of cyberculture, information society and so forth. I take a different route, following Hayles (1999) and Peters (1999), considering the manner in which virtuality operates not only as a type of mediated space but also as a program of action, enacting a particular model of subjectivity and information.

Virtuality needs to be defined carefully so that different versions of humanness performed in relation to different conceptions of information can be analyzed without making them conform to the analyst’s definition of virtuality as, for example, a desire for disembodied transcendence (Giles, 2007), action without accountability (Horner, 2001), recovery of the Lacanian Real (Law, 2006), and so on. The emergence of concepts of virtuality in American cybernetics provides an early instance of anxiety deriving from a fundamental tension between the subject’s desire to bypass once and for all problems of reproducing (and mediating more generally) the world and the subject’s attachment to a world that can be reproduced. As I argue below, cybernetics established an enduring problematization of communication in heterogeneous assemblages. The concept of virtuality in cybernetics allows me to trace historical patterns in conceptualizations of human subjectivity in relation to information processes and entities in a way that the digital, with notoriously slippery meanings and wide range of uses, does not.

It is no accident that some of the most critical and productive uses of virtuality emerged out of the interrogation of virtuality in cybernetics. Cybernetics was an attempt

to make humans, machines and animals more regulable by translating their actions into the predictive language of information theory. Subjectivity became a zone of potentiality and choice subject to a new regime of prediction and feedback. This generated a unique sense of virtuality as way of conceptualizing change, emergence and becoming in terms of information processes.

Orit Halpern (2006) and N. Katherine Hayles (1999) have reinterpreted the work of early cyberneticians in light of the popularization of technologies and cultural forms based on virtuality and other cybernetic principles. Their work highlights the manner in which the cybernetic repudiation of the reproductive vocation of science betrays the cyberneticians' attachments and anxieties. As Halpern writes, cybernetics did not so much bypass the question of reproductivity so much as it redefined reproductivity in terms of information and transmission.

Wiener's texts, and the work of his compatriots in cybernetics and the neurosciences, serve as useful vehicles, therefore, to begin investigating this historic attachment and displacement of older technical questions of documentation, inscription, and perception into terms of information and communication. The relationship – explicitly detailed in the work of many early cyberneticians – between the record, the diagram, and communication bridges between our contemporary discourses about archiving, screens, and interactivity and historical concerns with memory, temporality, and representation. (p. 286)

Early cybernetics marks a break in the idea of communication from the sharing of thoughts and feelings to “communication as a question of potentiality and choice” which in turn “became the guiding framework for thinking about digital communication” (Halpern, p. 288). The obsession with predicting and controlling conditions of potentiality by operating on a world of information processes culminated in the production of information technologies and the reconfiguration of the subject as user.

Genetic and digital reproductivity enact cybernetic virtuality not only because they are process-based, self-referential and so forth but because they embody the cybernetic disposition toward the containment of chance, choice and potentiality. One sense of *virtual reproductivity* derives from the manner in which biotechnical and digital media translate the problems of inscribing, storing and recording into probabilistic and computational terms. In contrast to the more common notion of the virtual as opposed to the real, virtuality as zone of potentiality construed in informational terms does not simply disrupt conventional notions of subjectivity but rather, as Hayles demonstrates in her reading of cybernetic philosophy, opens up conflicting ways of revising subjectivity. Virtuality does not dissolve the subject into information. Rather, as the history of cybernetics demonstrates (especially in Hayles' reading of it), when the conditions of life are conceptualized in terms of information processes, the conventional foundations of the human subject, such as self-possession and, more recently, DNA, can be questioned. But cybernetic alternatives like homeostasis, reflexivity and self-organization appear to disrupt as much as they recuperate. The result was a series of anxieties about human identity, uniqueness, agency and supremacy as well as what Hayles calls "technoconceptual" solutions to these concerns.

Virtuality allows me to theorize the anxieties of disparate individuals, groups and institutions in relation to the historical relationship between subjectivity and technology. Although cyberneticians rarely used the term "virtual," it has been used by Halpern, Hayles and others to highlight the importance of information which is not necessarily digital (numeric, discrete, coded, etc.) in cybernetic figurations of the subject and its agency, materiality, environment, language, representation, and so forth. Most, if not all,

contemporary boundary disputes about reproductivity parallel and repeat, often unwittingly, cybernetic anxieties, worries and concerns. These concerns include the problems discussed in the previous chapter (epistemological relativism, the heterogeneity of the social and distribution of agency to parts and processes). As Halpern argues, Wiener, like Freud and Henri Bergson, responded to problems of knowledge production posed by new conceptualizations of the relationship between memory, perception, experience and action, as well as the division and redistribution of these subjective tasks to humans and machines in cinema and sound recording.⁵² Underlying the fantasy of control through informationalization there are two cybernetic anxieties which have also emerged in contemporary discourses of reproductivity: (1) the “haunting” of virtuality by the “old” problems of reproduction, including recording, memory and representation, and; (2) the problem of containing the boundary-disruptions of virtualization.

Through the lens of virtuality, the discursive and material links between biotechnical, digital and electronic technologies are more important than their differences. Together, they mobilize the cybernetic program of prediction through continuous modulation of becoming (e.g., erasure and reinscription) in the process of reproduction. As I will soon show in my analyses of law, science and popular culture, these reproductive technologies intensify anxieties which were once contained within the specialized discourse of the cybernetic about the indeterminate source of action in an assemblage of increasingly active psyches, memories, machines and organisms.

In this study, I use Hayles’ “strategic definition” of the virtual, which emphasizes the interplay between information and materiality in contemporary culture but does not

⁵² Along with Freudian psychoanalysis and Bersonian philosophy, cybernetics can be understood as a program that “contributed to the very possibility of technicizing perception, and even thought – as later efforts in artificial intelligence and cognitive psychology would demonstrate” (Halpern, p. 296).

deem some technologies to be more significant than others on the basis of technical characteristics. “Virtuality is the cultural perception that material objects are interpenetrated by information patterns” (pp. 13-14). Later in her book, Hayles offers a “semiotics of virtuality” based on this definition, using the cybernetic dialectics – presence/absence and pattern/randomness – as complementary poles in a semiotic square. Hayles sets up the square so that the interplay between the dialectics produces four synthetic terms: (1) *materiality*, referring to “the signifying power of materialities and to the materiality of signifying practices;” (2) *mutation*, or a change in presence caused by the intervention of randomness; (3) *hyperreality*, in the Baudrillardian sense of the collapse of signifier and signified, original and copy; and, (4) *information*, which includes “both the technical meaning of information and the more general perception that information is a code carried by physical markers but also extractable from them” (pp. 249-50). The two dialectics and four synthetic terms allow Hayles to transpose different and conflicting notions of virtuality in notions of the cybernetic to the analysis of popular culture (in particular, science fiction literature).

Although I do not use the semiotic square in this study, I find the broader framework that Hayles extrapolates from her reading of cybernetics extremely helpful for reconceptualizing virtuality as a set of possible configurations of the subject and technology along with the anxieties that stem from disruptions of those configurations. Virtuality as a way of perceiving embodied subjectivity in relation to information allows me to focus on the manner in which particular versions of virtuality are problematized, mobilized, negotiated or ignored altogether in the way people worry and argue about reproductivity.

Cultural-historic and political economic approaches to virtuality tend to gloss over differences in anxieties. This is an intentional move designed to challenge the notion cultivated by media promotionalism that in virtual culture everything is new. Adrian Johns suggests that the controversy about peer-to-peer file-sharing is a repeat of the late 19th century sheet music piracy panic. In his theory of “virtual class” (as opposed to classless notions of virtual capitalism), Arthur Kroker (1996) writes that, along with the “coming-to-be of virtuality,” the stratification of labour emerges “as body dumps or hypertexted bodies, virtualizers or data trash” (p. 168). In contrast, Hayles’ concept of virtuality suggests that reproductive anxieties may be clustered around common processes and events but that one particular reproductive anxiety cannot stand in for all other reproductive anxieties. Hayles’ schema allows me to trace out different aspects of virtuality that generate anxiety and to link anxieties without making them identical. For instance, anxieties about mutation caused by, for example, accidents in reproductive processes and anxieties about the demotion of the original by a surfeit of copies may be understood to articulate different aspects of the disruption of *incorporation*, in particular, disruptions of “body boundaries.” Anxieties about materiality provoked by the shift in human capacities to nonhumans (e.g., artificial intelligence) and information anxieties generated by the shift in nonhuman qualities to humans (e.g., genetically engineered humans) stem from the movement of *inscriptions* between humans and nonhumans and the manner in which they seem to determine fleshy materiality.

Hayles’ semiotics of virtuality is intended to work as a “wire-frame” that is flexible enough to adapt to different texts, sites, practices, etc. in empirical analysis. The disembodiment thesis as well as the critiques of it can be put aside unless the actors

actually invoke that particular perception of the relationship between bodies and information. I use the term “bio-informational” to describe subjectivities and reproductive technologies since the actors tend to argue and worry about the proper mode of constituting subjects in informational terms based on their experiences of embodiment. *Bio-informational* refers to a class of reproductive technologies that affect the composition of subjects and the configuration of socio-technical networks by marking boundaries across information and materiality and by exploiting the material overlaps and the traffic of capacities and qualities between humans and nonhumans.

After tracing out numerous anxieties about the dissolution and mutation of the human subject in cybernetic literature and science fiction, Hayles suggests that, notwithstanding the important differences in the source and articulation of anxiety, a generalization may be made about the relationship between subjectivity and anxiety.

Only if one thinks of the subject as an autonomous self independent of the environment is only likely to experience the panic performed by Norbert Wiener’s *Cybernetics* and Bernard Wolfe’s *Limbo*. This view of the self authorizes the fear that if the boundaries are breached at all, there will be nothing to stop the self’s complete dissolution. By contrast, when the human is seen as part of a distributed system, the full expression of human capability can be seen precisely to *depend* on the splice rather than being imperilled by it. (original emphasis, p. 290)

As a general rule, Hayles’ formulation works: if the autonomy of the human depends on closure from the environment, the subject will tend to be anxious since this autonomy/closure can only exist on a backdrop of dependence/openness. Debates about how courts should treat claims about unconscious copying in copyright disputes, ownership claims to genetically modified organisms, and programs that accomplish the “splice” of music remixing for the user all suggest that anxieties are not just about boundary disputes but about the knowledge cultures (law and science in particular) that

produce, authorize and regulate distributed subjects and objects. Hayles' dualism between inscription (the apparent mobility of traces) and incorporation (the reconfiguration of parts and wholes) can be pushed further to explore the implications of knowledge cultures for subjectivity. Knowledge cultures such as hardware and software development, genetic engineering, standardization organizations, and legal systems are points within the distributed networks of people and things where inscriptions acquire significant force and are mobilized on a greater scale. While I agree with Hayles that disruptions of the bounded subject should be welcomed as ways of troubling the centred subject that has underwritten many exploitative regimes, anxieties about bio-informational reproductivity are not always articulations of a nostalgic yearning for Cartesian certitude, unity and control. In order to use Hayles' account of the subject in relation to inscription and embodiment in virtual culture, this study remains open to the possibility that some anxieties are legitimate worries about how splicing is steered toward some results and not others.

There are many ways to decentre the subject. Hayles' critique of the division of information and materiality and the reconfiguration of cybernetics in terms of the emergence of the nonhuman is one strategy. In the next section, I suggest that another route towards an exploration of how "we" have never been (purely) human. Although cybernetic philosophy generated very clear maps of virtual life (i.e., self-regulation and self-organization) and the accompanying anxieties about boundaries and behaviours, it would be overly simplistic to argue that the emergence of cybernetic virtuality is the first time that the human subject's relationship with the nonhuman has been radically revised. (As Hayles points out, the most radical notions of subjectivity in cybernetics – that the

self is a comforting story we tell ourselves to cover up the absence of selfhood – appears to be derived from Buddhism) Drawing from actor-network theory, I suggest in the next section that it is not so much the de-differentiation of the human and the nonhuman in cybernetics and in contemporary bio-informational reproductivity that generates anxiety, but rather the degree to which reproductive hybrids are publicly visible as such. The most effective anti-anxiety strategy may be, as Hayles suggests, to accept the entanglement of the humans with the nonhuman, to redefine the human as a communication circuit rather than as a homogenous and bounded figure. As an ethical and political principle, I agree with Hayles. But histories of reproductive techniques tell a different story: the more entangled humans become with nonhumans, the more elaborate the rituals of purification become. In order to situate reproductive anxiety within the historical relationship between subjectivity and technology, the development of these rituals and their function within the technoscientific regimes needs to be accounted for. By drawing from ANT's alternative history of the mingling of the human and the nonhuman, I suggest that purification processes are as important to the revision of the human subject as hybridization.

ANT's overly-reductive approach to questions of subjectivity and humanness can be amended by drawing from theories of the embodied and historical relationship technology and subjectivity as exemplified by Hayles. The subject in this "corrected" ANTian framework is defined by technology and language, or physical and incorporeal manipulations (p. 70). Embodiment is mediated by the subject's two modes of manipulation, inscription and incorporation, producing frameworks of experience which subtend the development of new systems of discourse and technology. Hansen similarly argues that the human subject is formed by the affective capacities of embodiment and by

its virtual dimension which is the capacity to “be in excess of its actual state.” The subject is configured and reconfigured by historically-specific socio-technical assemblages and by the human capacity to make affective investments and to make choices about how to represent itself and others.

Anxieties in the bio-informational regime

In a recent special issue of *Critical Studies in Media Communication* on virtuality, guest editors Robert Brookey and Toby Miller (2009) reassure the reader that the essays have been brought together in order to challenge the notion that virtuality (in this case, online gaming) enables the subject to depart from ideology, economy, power relations, and other social forces.

There is a strong tendency among many scholars of cyberspace to offer it up as a new utopia. Online communities have often been celebrated as spaces that allow for an unbound human experience, spaces in which individuals are able to form identities and express themselves without the constraints found in the ‘real world.’ With the emergence and growing popularity of massive multiplayer online role-playing games, this celebration seems to have grown in intensity. We are here to crash the party. (p. 101)

In each article, the authors complicate what Robert Brookey and Kristopher Cannon (2009) call the “liberatory perspective” by tracing out the manner in which the world of atoms, bodies, labour, money, exploitation, etc. imprints itself on virtual worlds. Being critical, in this view, seems to mean putting the constraints of “real” and “virtual” worlds in view. But, as I have argued thus far in this chapter, at the root of overly simplistic notions of virtuality is the simplified relationship between subjectivity and technology: the notion of subjectivity and technology as socially constructed (rather than sociotechnically constructed); the self as a discursive construct (rather than an effect of

discourse and materiality); politics as a struggle over meaning (rather than as a struggle over signification in which non-linguistic entities participate); and, technology as a set of enablements and constraints for human action (rather than as a program for action for humans and nonhumans). Without an alternative to these simplified relations, critical studies leaves the foundations of the “liberatory perspective” largely unchallenged.

If “virtuality” is shorthand for informational reproductivity and the new materialities that are emerging from it, then scholarly work in this area has been far less fanciful than the above characterization suggests. Following Peters’s (1999) argument that communication is one of the key fields in which to theorize “the place of the human within the great network of being” (p. 229), it comes as no surprise that subjectivity – the self as both the subject and object of knowledge – has become a crucial concept in theorizing the implications of information technologies. Contemporary theorizations of subjectivity in communication often focus on computer-based media. The seemingly contagious, mimetic relationship between technology and subjectivity takes an extreme form in academic literature about digital technologies and computers as “second selves”, active agents, “objects to think with” or intelligent agents (e.g. Poster, 1990; Turkle, 1984, 1995). The general point of this literature is that computer-mediated communication poses certain difficulties for the centred, unitary, possessive and individualistic subject of liberal humanism.

The computer has thus figured centrally in theories of what is “new” about new media and about the forms of subjectivity enabled by new media (e.g., Hansen, 2006; Manovich, 2001). As discussed in Chapter 2, theories of digital culture tend to figure computers as key agents in the disruption and transformation of subjectivity (e.g.,

Baudrillard, 2000; Cubitt, 1998; Curtis, 2004; Roof, 1996). But computer-centric notions of subjectivity can easily slip into what Rabinovitz and Geil (2004) call “the rhetoric of amnesia,” which

provides a vision of the future that relieves anxiety over any imagined loss of control; in the celebration of revolution and uniqueness, it promises a new future rife with limitless possibilities. In its dystopian guise, the rhetoric of amnesia removes all agency from social subjects: a new technologically deterministic course of history takes the future out of our hands. In either case, the rhetoric of amnesia erases the complex interplay among the institutions – economic, juridical, and political – that selected, authorized, and deployed specific technologies over other possibilities and secured their development in highly specific ways for explicit purposes over time. (p. 2)

How can this tendency towards historical amnesia in the analysis of technology be problematized? Rather than pointing out that the material world remains despite the rhetoric of virtuality, a more forceful critique of historically amnesic notions of virtuality-as-disembodiment can be developed reconceptualizing virtuality in relation to questions of materiality and embodied experiences, as outlined by David Beer (2008).

The movement from the physical artefacts of the past, which adorned our homes, filled the spaces of our everyday lives, toward digitalized and compressed – mobile and virtual – cultural artefacts, although complex, indicates some reconfiguration of the corporeality, temporality and spatiality of contemporary cultural formations and practices. The problem now is how to conduct research that captures the complexity of the reconfigurations as they become normalized ... (p. 79)

Drawing from Bergsonian and Deleuzian philosophy, Hansen (2006) makes a similar move by distinguishing virtual and digital. “[T]he virtual is a quality of human (and more generally, organic) life and can only erroneously be equated with technology. Far from being a synonym of the digital, the virtual must be understood as that capacity, so fundamental to human existence to be in excess of one’s actual state” (p. 51). As discussed in the previous section, Hayles suggests that this “excess” or potentiality can be

conceptualized as feedforward and feedback between processes of technologies of (re)production, signification, consumption, embodiment, and representation. Following these recent reformulations of virtuality in terms of the modulation of bodies and information, *virtual culture* can be defined as a set of reproductive practices which treat the bio-informational not only as “real” but as having an authoritative epistemological value in the interpretation of identities, actions, behaviors, intentions and events.

The tendency toward historical amnesia in computer-centric notions of virtuality can also be problematized by focusing on events in which the routine use of objects as instruments is confounded, leading the actors to retrace their steps, open up black-boxes and confront the entanglement of the human with the nonhuman. Copyright and patent cases requires plaintiffs to provide proof of infringement, which leads to a story, which is often contested, about how a particular set of actions emerged out of a network of people and things. Black-boxes become unstable as their component parts diverge from their predefined course of action. In these moments, actors will carry out a controlled “deconstruction” of subject-object relations (e.g., the “who-doing-what” of property), scrutinizing the links that have been forged between parts, emphasizing disjunctures and gaps that were previously forgotten and invisible. When an arrangement or assemblage goes into this kind of “crisis mode,” descriptions of the object act as retroactive histories. What was once a taken-for-granted object belonging to a taken-for-granted subject and a set of indisputable differences between humans and nonhumans suddenly erupts into a struggle between competing problematizations which enact different histories.

Like action theories, actor-network theory undermines centred subjectivity by tracing the manner in which actions, relations, beliefs, etc. are shifted into things.

However, ANT highlights the heterogeneity of the “networks which produce emerging action from an indeterminate source” (Gomart & Hennion, p. 225). Virtuality, or the conceptualization of bodies and materials more generally as intersecting with information, is congruent with the ontology of translation, which posits a unified field through in which actions emerge, shift and transform. However, the concept of translation foregrounds the interplay between, on the one hand, the strategic manipulations of the discursive and material overlaps between entities and, on the other hand, the manner in which entities form unexpected alliances and deviate from roles prescribed to them. Law (1994) notes that analyses of translation in technoscientific practice enables a productive and sustained engagement with transformations and stabilizations of the human subject.

[W]e can start to explore *how* it is that machines come to be machines; and what it means to label something as a machine rather than as a person. And it turns out that, when you start to ask questions like this, the distinction between the two is variable ... to ask about the distinction between people and machines is, in part, an inquiry into the character of agency: what it is, or what it takes, to be a human being. (original emphasis, pp. 10-11)

Instead of beginning with a set of propositions about human nature or an imperative to undermine such propositions, I can trace the manner in which humanness is negotiated and stabilized through practices of naming, ordering, arranging. Rather than flattening out reproductive anxieties into a set of discourses about property, creativity, technology, etc. which circulate through people and order events, ANT provides conceptual tools to explore how anxiety emerges as an effect of particular ways of reconfiguring Society and Technology, People and Things.

Translation opens up an enormous range of theoretical possibilities for the study for the study of reproductive anxiety. Instead of asking what it is about certain reproductive technologies that cause so much anxiety or why so many anxious discourses currently circulate through the notion of reproductivity, I can instead ask how the routine and black-boxed alignments, convergences, transformations and displacements of the subjects and objects of technical reproductivity have been broken down and opened up. Anxiety can be considered as both a consequence and effect of the inter-definition of human and nonhuman identities as well as the resource in the formation of identities. Through a translational lens, it appears that Freud was right in at least one key way; anxiety from past experiences of instability can be used to produce expectations of what will become of the world and of the subject within it.

Latour's alternative mythology of techniques provides a narrative of technology in which humans and nonhumans become increasingly entangled through eleven stages of technical mediation, culminating in the current "political ecology" characterized by the enrolment of nonhumans into a system of legal rights which addresses imbalances and asymmetries that were instituted during industrialization and other stages of technical mediation. Giving plants legal rights is an example of translation as the sharing of sociality with nonhumans, which consequently alters the shape of the collectivity and, in this case, the meaning of legal rights, since humanness and sentience are no longer prerequisites for a rights-bearing subject. The awkwardness of using subjectivity in relation to plants is compounded by the feeling that a terrible mistake is being made here, that things are being mixed up. But the subject-object dualism allows me to analyze empirically the way people and things get mixed up. The point is not to make nonhumans

into subjects, but to resist the notion that subjects and objects are getting further apart (objectivity, alienation) while remaining focused on the various ways that humans and nonhumans become intertwined on an expanding scale, generating feelings of instability (Latour, 1999, p. 201).

The cultural reproduction of nature through habituated action and narrative and representational techniques has been the focus of ANT and science studies more generally in their effort to explore science as an expert or knowledge culture. What is currently taking shape in science studies, feminist technoscience and ANT is the exploration of the biological reproduction of culture, that is, the manner in which inventions, rights, delegations of tasks, sociality and so forth become parts of the living things in which they intervene. This type of reproductivity, epitomized by biotechnology, is virtual in the sense that it translates the difference between life and science, object and knowledge, into a matter of different levels of informational coding.

Bio-informational reproductivity may be understood in terms of production of object-oriented social relations or what Knorr Cetina calls the postsocial. For Knorr Cetina, knowledge societies are not just societies full of experts and expert knowledge; they emerge from the ongoing dispersal of knowledge into all areas of social life to “inform” the subject faced with an increasing range of possible courses of action. As Knorr Cetina and Bruegger (1997) write, “the terms of reference of the individualization debate may need to be revised. Individualization then intertwines with objectualization – with an increasing orientation towards objects as sources of the self, of relational intimacy, of shared subjectivity and of social integration” (p. 9).⁵³ Further, “Object

⁵³ The commonplace notion of agency in sociology is tied to the power to choose different course of action. As Henrik Bruun and Richard Langlais (2003) write, “Within the social sciences, agency is often associated

worlds also make up the embedding environments in which expert work is carried out, thus constituting something like an emotional home for expert selves” (*Ibid.*).

The object-in-process or epistemic thing characteristic of expert cultures has become commonplace. As Manovich (2001) points out, the new media object consists of programmable, modular and variable information. Similarly, Knorr Cetina and Bruegger underline important changes in the notion of “object” in everyday life: “today’s technology ... are simultaneously things-to-be-used and things-in-a-process-of-transformation: they undergo continual processes of development and investigation” (p. 10). The notion of postsocial relations or transitions suggests that contemporary senses of selfhood and sociality are increasingly object-centred, that is, objects increasingly become sources of individualized and shared subjectivity. For Knorr Cetina and Bruegger, the driving force behind “objectualization” is the “spread of expert contexts and knowledge cultures throughout society” (p. 23). What makes objects increasingly social is that they are knowledge objects rather than commodities or instruments. However, some of these knowledge objects are “high technology devices”; aspects of the expert knowledge cultures from which they originate “may carry over into daily life, turning an instrument or a commodity into an epistemic everyday thing” (p. 24). Virtual culture consists of precisely this type of everyday mingling of subjects and objects. However, changes in the notion of objects as sources of the self leads to a crisis of “thingness” and of human uniqueness and agency. In terms of technical mediation, the black-boxed associations that gave the semblance of passive objects and active subjects

with the power to choose, that is, to the power to act in one way even though one could have acted differently” (p. 33). ANT suggests that the range of choices is constrained by experts who translate their interests and goals into facts and artifacts.

are being problematized by seemingly active objects which have consequences for “purity” of human society.

The focus of ANT case studies is typically on the translation of interests and goals. It thus carries over part of the rational subject in what ANT researchers sometimes call “conventional sociology.” But the principle of translation can be extended to encompass the capacities of the affective body – its attachments, investments, anxieties – as part of the inter-definition of entities. This modification allows me to consider the importance of anxiety in the problematization of reality, in the attraction or “interressement” of diverging and sometimes conflicting actors, in the actual enrolment of actors in particular subject-object and self/other relationships, and in the mobilization of actors in the performance of reality. Anxieties become resources for the production and representation of selves and others and in the construction of networks.

ANT can only be twisted so far to study affect and anxiety. But in my study of copyright and patent disputes as well as the contested use of intelligent machines in mash-up culture, there are commonalities and resonances between the different settings which cannot be explained in purely ANT terms. When courts confront musical inscriptions that seem to use the subject’s unconscious to reproduce themselves or with genetic inventions that have some of the qualities of legal subjects (self-generation, self-organization), routine proceedings are interrupted. The shifting inscriptions and reconfigurations of bodies also interrupt the farmers when they encounter “volunteer” plants containing gene technologies as well as musicians they see that elements of the creative process can be performed by machines. Reproductive anxieties in these cases have specific implications for the identity and capacity of practitioners within particular

fields of practice. Reproductive anxiety is bound up with performance anxiety typical of any professional task in which a particular challenge outstrips the actor's skills and knowledge.

To make sense of this overlap between anxieties about humanness and anxieties about the performance of particular kinds of institutional and cultural identities, anxiety can be mapped onto a broader affective spectrum. As theorized by social psychologist Mihály Csikszentmihályi (2007), the phenomenology of "flow" or the experience that professional dancers, surgeons, artists, scholars, etc. describe when they are engaged in their work occurs when the task they are performing allows them to use a high degree of skill, but not to the point where the challenge outstrips their skills. When challenges outstrip skills, knowledge, and, I would add, authority, the subject begins to feel anxious. Challenges that do not require the actor's full set of skills, knowledge, authority, etc., lead to a sense of being in control but not necessarily being engaged (see Figure 2).

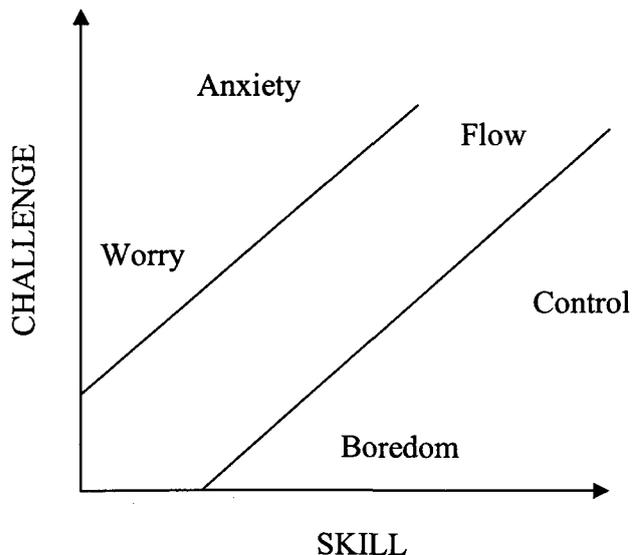


Figure 2: Phenomenology of flow, as theorized by Csikszentmihályi's (2007).

In contrast to those who worry that virtuality induces people to engage in careless behaviour, Csíkszentmihályi's schema suggests that the embodied experience of immersion, whether in an online environment or a courtroom, is characterized by the focusing of attention on a limited field, full concentration, and freedom from worry about failure. In Csíkszentmihályi's schema, flow experience becomes autotelic, but it is structured by clear goals at each step, immediate feedback to one's actions and balance between challenges and skills. I suggest that virtuality is typically experienced not as "flow" but rather as an interruption of professional and habituated action. These interruptions can be mapped out along Latour's sequence of technical mediation (from disinterested to black-boxed entities) to explore the manner in which skills are shifted between the human and the nonhuman to form new courses of action and new actors to perform them. But the experience of anxiety in law, farming and popular culture generated by bio-informational reproductivity is often articulated in ways that emphasize the paucity of human skill and knowledge required to re-establish boundaries and patterned behaviour.

The euphemistic notion in Latour's historic-mythic narrative of technological innovation in terms of the development of human-nonhuman "intimacy" overcompensates for the alienation story and suggests that this ever-tightening network of humans and nonhumans is inevitable. I suggest instead that reproductive anxieties are one of the ways that actors mark their unease about the scale and form of bio-informational entanglements. As Hayles' critical re-reading of cybernetic literature suggests, bio-informational reproductivity can be performed in various ways leading to different anxieties. Contemporary anxieties about what will become of the human in

contemporary practices, techniques and regimes of reproductivity emerged in cybernetics, which was a political project of redefining and controlling human and nonhuman life. Hayles' provides a typology of anxieties which links them to a set of institutional investments in particular conceptualizations of human-nonhuman relations. In contrast to virtuality-as-disembodiment (and the critiques of this discourse), virtuality in Hayles' view is a condition that should prompt us to consider the transformation of the body within virtual culture's regime (a system of rules, codes and patterned interaction) of (re)production, signification, consumption, and representation. In this sense, virtual culture refers to a subjective experience of the body as "penetrated by," or folded into, information. Bio-informational reproductivity exploits the material and semiotic overlaps between humans and nonhumans, which generates anxiety about new kinds of vulnerabilities of the subject, whose intentionality seems to be increasingly anticipated and pre-programmed in artifacts and environments.

Bio-informational reproductivity provokes anxiety by foregrounding the subject's mediation through inscription and incorporation, and the impossibility of a subject prior to mediation. Bio-informational reproductivity has this much in common with "person-making," since the "arrows" of mediation do not point to a world beyond mediation but rather to the "person at hand." This person, however, is multiplied, taken apart, recombined, dispersed and recollected, etc. "Person-*transformation*" is thus a more appropriate way of characterizing the virtuality opened up by the alignment of biological and cultural reproduction, since the object is a "limbo zone," as Mitchell (2003) calls it, rather than the "calculable World" or "presence-giving." The subject of virtual culture is

neither the “calculating Mind” nor “the person receiving the gift of presence” but the “the human in question.”

A methodology for analyzing reproductive anxieties

While much has been made of ANT's radicalization of the principle of symmetry (talking about people and things, society and nature in the same terms so as to avoid positing the determination of one by the other), this project's goal is to analyze how the human subject is defined in relation to reproductivity, which requires an engagement with two, less-commented upon methodological principles in the ANTian repertoire: "free association" and "agnosticism." As defined by Callon (1986), free association is the abandonment of all *a priori* distinctions between the natural and the social. "Instead of imposing a pre-established grid of analysis upon these, the observer follows the actors in order to identify the manner in which these define and associate the different elements by which they build and explain their world, whether it be social or natural" (p. 201). In this project, I "follow the actors" in their problematization and reinscription of the human subject in reproductive controversies by using Peters' notion of reproduction as a litmus test of humanness. This methodological convergence allows me to explore the key problematic of this dissertation: how do changes in the reproductivity at the intersection of materiality and information affect legal, scientific and popular configurations (definitions, models and performances) of the human and the nonhuman?

If printing supports an Enlightenment ideal of autonomous, self-possessive individualistic subjectivity and if contemporary modes of ethical sociality take that ideal as the norm, then practices and techniques of reproductivity will seem emancipatory as long as they enhance that particular configuration of the human. However, when technological reproduction problematizes this ideal and leads instead to a blurry notion of humanness that extends into nonhuman forms, the autonomy and identity and of the

human subject becomes worryingly fragile. Reproducing humanness, then, is a useful way of investigating what Rabinovitz and Geil (2004) call “the politics of the history of the relationships between machines and human subjectivity that have resulted in the present moment” (p. 12). There is an ongoing struggle in virtual culture to determine what counts as human in relation to machines and other nonhuman life forms.

This struggle has led to the debates and controversies of the “present moment” about what can and should be reproduced in nonhuman form. Hayles (1999) persuasively argues that the recent history of these struggles has been shaped by the discourses and programs of action in cybernetics, and demonstrates how the problem of defining the human in science fiction generates questions that correspond to cybernetic anxieties. But the struggle to define humanness takes diverse forms, and some of them bear very little resemblance to cybernetic philosophy or fiction inspired by it. Struggles to define what is human and what is not also emerge in law, engineering and popular culture in events that involve mundane things, like sheet music, plants and audio standards, which do not fit even the most expansive definitions of artificial life.

The problematization and redefinition of the human has been explored primarily in philosophy, technoscience and popular culture. Law hasn't figured as strongly in studies of human-nonhuman configurations even though law plays a key role in the authorization, redefinition and enactment of such configurations. My empirical work focuses on the interplay of legal mediations of sociotechnical reality, which operates as a central “way-station” between the relatively fluid associations of humans and nonhumans in everyday life and the more formalized definitions of those relationships in science. As Ted Striphas and Kembrew McLeod (2006) suggest,

as both an ever-expanding array of objects/ideas and as a specific set of legal categories, intellectual property performs vigorous work on the many overlapping 'diagrams' that, together, organize space, time, everyday life – even life itself. Another way of putting this would be to say that intellectual property disturbs material and epistemological boundaries, recodes existing significations and patterns of information flow, and helps to actualize nascent modes of thought, conduct, affect, expression, and embodiment ... IP law empowers human beings to invest in, invent, mass produce, and claim limited legal monopolies over specific life forms – much as we can with nonliving things like a pair of scissors, a microprocessor, or some other useful contraption. (p. 122)

Like technical reproduction more generally, intellectual property has been expanded (through time by extending the term of protection and across space through incorporations of bio-informational processes as subject to the monopoly rights to copy). Through its temporal and spatial expansion, "fortification" (e.g., the reinforcement of owner's rights in the design of systems and artifacts) and mobilization in contemporary technological and economic networks, intellectual property has become the dominant framework through human uniqueness and supremacy is being enforced. Pointing to patented organisms, Striphas and McLeod suggest that analyses of intellectual property should be attuned to law's reinforcement of existing notions of life as well as the role of law in the emergence of new forms of life. "The legal protections given to these organisms signal an increasingly intensive, practical synthesis of cultural and *agricultural* production, or a blurring of sorts that simultaneously resuscitates and transmogrifies an almost pre-modern understanding of culture as 'the tending of something, basically crops or animals'" (*Ibid.*). The Raymond Williams quotation is significant; "culture" in "cultural studies" needs to be expanded and considered in relation changing concepts of nature and society in order to explore the hybrids that are authorized, purified and publicized through intellectual property disputes.

Disputes about infringement of intellectual property focus attention on the uncertain source of action, and these events tend to be mediated in such a way as to generate sympathetic accounts of human-nonhuman entanglements while simultaneously inventing new “homes” for human subjectivity. Since litigants, lawmakers and jurists rarely invoke cybernetic principles or science fiction themes, the analyst should be attentive to variety of discursive figurations and material arrangements of the virtual through which notions of humanness are being problematized and revised. In this way, the legal mediation of reproductive events in intellectual property disputes can be reinterpreted as a test of humanness as the source of significant or meaningful action.

As Hayles shows in her analysis of science fiction, popular culture may be understood as a mixture of philosophical inquiry and empirical experimentation with new technologies on the senses, expression, perception, memory and autonomy. There are countless possibilities in popular culture for the analysis of reproductive anxiety as problematizations of the human subject. However, in order to support my conceptualization of reproductive anxiety as a characteristic element of virtual culture, I focus on a cultural space which, on the surface, appears to celebrate bio-informational reproduction: mash-up remixing. “Outsiders” worry about mash-up remixing (because it is often unauthorized or because it is vulnerable to copyright litigation), but participants tend to present themselves as unworried about the legal or aesthetic impact of their work. I suggest, however, that participants in this online remix scene are intensely anxious not only about technical reproductivity because new kinds of materiality and presence that emerge from this particular junction of tele- and recording techniques do not appear to support conventional figurations of the creative subject and social order. As a result, new

tests are developed to test the subject's humanness by way of the creativity demonstrated through listening and linking.

As discussed above, a technical object from an ANT perspective is a program for action, a division of skills, capacities, and competencies into a network of humans and nonhumans. Although few engineers outside of android science and artificial life consider themselves to be setting standards for what counts as human, they routinely negotiate and attempt to fix the human in the form of a "user." If division of the human and the nonhuman is a political act, then engineering is "politics by other means." Technical objects need not be full-fledged humanoids to have political ramifications for the Great Divide. Engineering has its own ways of testing and evaluating performances of the human, many of which attract little attention thanks to the purification rituals that make hybrids seem less threatening. The engineering of seeming innocuous reproductive technologies should also, according to ANT, be rich sites for the analysis of when and where Society and Technology, People and Things are introduced to make hybridization harmless to the modern constitution.

A translation-based framework opens up new methodological possibilities and redefines the analytic work in the study of reproductive technologies and discourses about them. Attempts in cultural, legal and communication studies to critically analyze reproductive technologies and regulation by policing the movement of metaphors (work, invention, recycling, nature, etc.) in discourses of intellectual property often fall back on concepts that implicitly reinforce the world-as-property. By developing a framework based on the concept of translation, I can instead explore the wider range of

transformations and stabilizations of the human subject that take place in law, science and popular culture.

Litmus tests of humanness

Actor-network theory, despite its pitfalls, offers extremely productive tools for analyzing the links, crossovers, and the drawing of boundaries between modes of reproduction. Although ANT's notion of agency is politically problematic and its human/nonhuman dualism is ahistorical, it provides a unique set of methodological principles (agnosticism, generalized symmetry and free association) that allow me to examine why and how the category of human is associated with certain kinds of materials and practices of reproduction but not others. By adapting what ANT researchers (e.g. Law & Benschop, 1997) refer to as the analysis of ontological politics to Peters' reproductive litmus tests, I intend to answer Rabinovich and Geil's (2004) call for a study of digital culture that is attentive to the political history of the relationship between subjectivity and technology.

The concern with isolating humanness and testing the boundaries of the uniquely human via technical reproductivity predates the emergence of virtual culture. As Peters (1999; 2004) argues, the history of technical reproduction is a history of filters or subtractions of the properties of humans from reproductions. This led to a series of tentative settlements on the question of what is uniquely human (e.g. intentionality, touch, consciousness, autonomy, etc.).⁵⁴ Using Peters's framework, it should be possible

⁵⁴ A forerunner of Peters's notion of humanness can be found in the work of Bergson, which provides the basis for Hansen's (2006) philosophy of new media art: "According to Bergson, the world is composed of an aggregate of images, and perception demarcates the selection of a subset of this aggregate by a 'centre of indetermination.' The philosophical problem [Bergson] faces is how to reconcile the specific aggregate of images that appears to my body functioning as such a centre of indetermination and the aggregate of

to redefine virtual culture in terms of the properties which informationalized reproductions of humans do not possess and which are subsequently deemed to be “uniquely” human because they are irreproducible in nonhuman form.

By definition, a litmus test uses only one indicator to gauge the presence of a particular substance (e.g., litmus paper to determine degrees of acidity). A litmus test designed to isolate humanness is more complicated for a number of reasons: (1) the composition of humanness is in part a result of tests of reproducibility, rather than something that exists independently or in advance of those tests; (2) the level and nature of reproducibility that is permitted to be put to the test is determined by the perceived threat that it poses to existing definitions of humanness, and; (3) the results of litmus tests of human reproducibility are cumulative, even if the tests themselves seem to be done in a case-by-case or *ad-hoc* way.

The usefulness of the litmus test can be summarized as follows. If the human cannot be reduced to core set of qualities once and for all, then it can be deduced from the remainder of technical reproduction. The task of the analyst in this case is to examine how the human is subtracted from reproductions over time and in different contexts.

Peters’s theory can be translated into a formula for *litmus tests of humanness*:

images that comprises the universe as a whole ... His solution is to reconfigure perception as a *diminution* or *subtraction* from the universe of images: what distinguishes my perception of a material object from that object as it is in itself is not something internal to my brain or something added by me (as it is for idealist positions), but the fact that I can perceive it only by isolating certain of its aspects, leaving the rest aside ... If the affective body introduces specific constraints on what can constitute relevant aspects of an image, then it can legitimately be said to condition its own deduction from the universe of images. Indeed, Bergson’s theorization of perception as an act of subtraction installs the affective body smack in the center of the general deduction of perception” (pp. 4-5). Following this theory of self-constitution, reproduction is doubly important. They act as signals of relevance for the affective body by circulating human-likeness in the “universe of images”. By producing human-likeness in non-human form, they may aid the process of deducing the human from the “universe of images,” which is fundamentally not image-based but rather resides in the affective body.

Human¹ – technical reproduction = human²

The human is a set of assumptions about the embodied actions, capacities, competencies, etc. that count as elements of the subject and the social, but these qualities are the remainder of attempts to reproduce the human by technical means. In other words, mediations of the subject through speech, texts, images, sound recordings, and so on, never reproduce the human in its entirety. Any given definition of the human (human²) is actually an elaborated, amplified, valorized, etc. version of the remains of previous attempts to incorporate the human (human¹) into technical reproductions.

This formula works well in some cases, such as the “noncomputable” consciousness of neurophysiology, or the manner in which virtual agents respond to humans in digital media (Binkely, 2007). As Ron Burnett (2005) argues, “To the extent that a device can talk back to a human and images can mediate the conversation, some fragment of the thinking process is being moved from humans to their machines” (p. xix). The human as the “fleshy remainder” of technical reproductivity is perhaps most suitable for attempts in engineering and android science to repair relationships between humans and machines by giving them human-like bodies. The general rule of thumb in this field of practice is to provide cues of nonhumans in the android’s looks or behavior since near-perfect simulations apparently have a high mortality salience and thus scare rather than soothe their human interlocutors.

The formula does not work as well in cases where human qualities like empathy are reproduced and lead to a sense that nonhumans are more “human” than we are. The engineers of litmus tests do not begin with a blank slate. In a culture which believes that action and even perception can be automated (Hansen, 2006), affectivity becomes an

appealing vestige for uniquely human experience. Recognizing that reproductive litmus tests are “rigged” in the sense that certain qualities that are assumed to be uniquely human are determined in advance is one of the central aims of this project.

To suggest that all preconceptions of the uniquely human are results of prior litmus tests seems to attribute too much significance to technologies of reproduction in the determination of what is human. Litmus tests, like reproductive technologies more broadly, begin as problematizations that link together representatives of memory, consciousness, the soul, experience, embodiment and other elements that at one time or another were considered to be uniquely human. Moreover, the results of reproductive litmus tests do not, by themselves, determine what is human and what is not. Some parts of the human subject remain outside the realm of the reproducible. This “remainder” is not due to the technical insufficiency of reproduction, or because some properties of humans can only be reproduced “naturally.” Rather, reproductive litmus tests frequently run up against anxieties about previous settlements of human-nonhuman difference. *Irreproducibility* is a zone demarcated as much by attachments and anxieties as by technical limitations. In short, litmus tests are biased towards certain conceptions of the human subject resulting from the political history of subjectivity and technology; the results of these tests need to be interpreted with this history in mind.

ANT’s key methodological principles emphasize the importance of allowing actors to speak in their own terms about the natural, social and technological worlds, and allowing them to combine elements of those worlds in ways that might be ignored and excluded in “conventional sociology.” Similarly, Peters’ litmus test is a way of conceptualizing the epistemological implications of zones of human irreproducibility.

Both approaches allow the researcher to “follow the actors” as they conduct their own litmus tests of what cannot or should not be reproduced in nonhuman form. The rhetoric of amnesia in ANT can be offset by focusing empirical research on the political history of litmus tests, that is, the regulatory mechanisms, power relations, cultural values and belief systems which determine the qualities, capacities and actions that can or cannot be reproduced in nonhuman form.

The ANT framework can thus be amended to explore and problematize attributions of humanness, or, as Monica Casper (1994) puts it, to “investigate the attribution of human and nonhuman to heterogeneous entities” and the manner in which humanity is constructed in contemporary techniques of reproduction “with personhood, agency, gender, and other attributes defined as important criteria” (p. 840). Each “test” in which irreproducibility is used as an indicator of the human tends to legitimate a particular institution’s or cultural space’s pre-existing concept of humanness. Reproductive controversies erupt when the results of litmus tests do not conform to the pre-existing definitions of humanness which are used to legitimate and organize regulatory, creative or commercial activity. In such cases, the litmus test leads to a “hot” affective response rather than to the blasé attitude towards copying, technical reproduction and simulation which characterized earlier theories of digital culture.

Each chapter will thus examine the extent to which the results of litmus tests undermine existing definitions of humanness and subsequently lead to new litmus tests as well as to new notions of humanness: (1) in musical plagiarism cases the key human attribute at stake is not originality but memory, so the chapter uses theories of memory in order to explore how technologies of reproduction trouble and/or bolster the author-as-

owner, which is copyright's version of the bounded subject of the Enlightenment; (2) the figures of the unwitting agrarian plagiarist and the living commodity (e.g., transgenic canola) produced by clashes over the marketing of transgenic technology in Canada and in other countries trouble the usual categorization of human beings into groups of owners, users and infringers and nonhumans as useful and artificial inventions in patent law, and; (3) authorial subjectivity or the "author-function" is redefined in music scenes as well as in the software industry as formerly irreproducible human qualities are transferred to machines or codes.

Each chapter will demonstrate how different institutions and cultural spaces begin their litmus tests with presumptions about the specific qualities that make a particular entity human. Since scholars tend to critique these presumptions, as well as the results of the litmus tests, from a wide variety of theoretical perspectives, each chapter requires additional theoretical resources and secondary literature to make sense of the controversy. One of the discursive sites in which courts and legal scholars make their assumptions about humanness most evident is the caselaw on cryptomnesia or unconscious plagiarism. My analysis examines the line of psychoanalytic thought from which the concept of cryptomnesia was originally developed and how copyright law uses the concept to "explain away" exact reproductions in the work of different musical composers in order to preserve its figurations of memory and of the author. Rather than rehearsing the many arguments that have been made against the regulation (or lack thereof) of genetically-modified food, my chapter on transgenic seeds focuses on a patent infringement lawsuit that went to the Supreme Court of Canada, as well as the journalistic and advocacy group discourse surrounding it, to examine the construction of certain forms of reproduction as

dangerous, unruly or unnatural, and rendering the locus of agency between humans and nonhumans uncertain. The chapter on digital music cultures uses histories of sound reproduction to highlight the manner in which musicians alter notions of aesthetic subjectivity and practices of authorial attribution as a result of the incorporation of listening in to the zone of digital reproduction and automation.

Like a test of acidity, reproductive technologies can be used as tests of affectivity about changing notions of humanness in digital culture, ranging from “hot” to “cool.” Some of the most important contributions in recent actor-network theory (e.g., Casper, 1994; Gomart & Hennion, 1999; Hetherington, 1999; Michael, 1996; Tuitt, 2006) prioritize attachment, affect and notions of care in the study of actor-networks. Like Hansen’s work, these redefinitions of the human/nonhuman divide exemplify virtual culture’s attempt to develop new forms of subjectivity that are not grounded in identity, rational thought, self-determination and other hallmarks of the Enlightenment conceptions of humanness.

Since my substantive chapters treat academic, legal, scientific and popular accounts of reproduction as even-handedly as possible, it is necessary to engage at this point with the fundamental methodological question of whether or not interpretation in cultural research can bypass “theoretical ventriloquism,” which often follows from presuppositions about the social experience of the audience or about forms of subjectivity reflected and/or imposed upon audiences by cultural texts (Cecil, 2003, pp. 55-8, 66). In other words, without attending to the manner in which “real” audiences interpret legal documents and news stories, my analysis is liable to displace the audience’s actual logic and practice with my conceptualizations of them. What can the analyst do with texts in

the absence of their audiences? Even empirical audience research, which seeks out or collects “real” audiences, cannot overcome the fundamental hermeneutic problem that stems from the gap between textual production and reception. As Peters (1999) puts it, “Hermeneutics ... is the art of literary correspondence where no reply is possible. Since the text’s intended audience is gone, it can be read only in conditions of eavesdropping” (p. 150).

Legal events do not have an audience in the same way as cultural texts. The broader controversy has to be reconstructed by arranging legal decisions, news reports, scholarly commentary and, in some cases, scientific documents. Although the audience is absent, I can trace how texts are produced, mobilized, authorized or discredited by actors in the various settings I explore here. The action in courtrooms, engineering symposiums and online message boards is largely about the alignment of mediators to produce particular kinds of objects and persons, or to contest these alignments and the worlds and actors they produce. In order to follow the actors, I have to reconstruct the settings in which they produced and circulated inscriptions, keeping in mind that much of what was excluded remains inaccessible.

Another, perhaps more pressing, methodological concern in my study of anxieties is the displacement of the actors’ (jurists, scientists, farmers and remixers) ways of talking about humanness, nonhuman agency and information with similar notions developed in the academy. Drawing from Bourdieu’s categories of the academic and the practical, Jonathan Sterne (2003b) insists that distinctions between fields of logic and practice are necessary to prevent theoretical ventriloquism. “If we do not distinguish between academic logic and practical logic (or rather, if we do not recognize academic

logic as only one kind of practical logic), we wind up writing as if the people we study are running around making use of concepts we devised in the process of studying them!” (p. 375). It is necessary, Sterne argues, to retain the distinction between the academic and the practical to prevent the imposition of concepts from intellectual culture onto popular culture.

Even if the distinction between the academic and the practical seems to become blurry at times (e.g., references to “deconstruction” in mash-up culture) it is necessary to keep it in place so that academic concepts are not projected onto other fields, where the same or similar words perform different kinds of work. The same methodological principle should be extended to the analysis of the relationship between academic and other specialized fields of practice (e.g., law, science, design, etc.), so that the specific role of seemingly similar concepts can be discerned. If those differences are ignored, then it would seem that, for instance, the notions of inscription and obligatory passage points in genetics are corollaries of the notions of nonhuman agency in ANT or of the cyborg in contemporary feminist theory. The critical work that these concepts perform in the social sciences and humanities is lost when they are projected wholecloth onto the entities produced by technoscience. Reification – or the use of academic concepts as if they simply name material things in other fields – is the result of this kind of boundary blurring.

At the level of the interpretation of meaning, analyses are always open to the critique of arbitrariness, conceptual displacement, and theoretical ventriloquism even if interpretation is based on empirical audience research (notions of authenticity, resistance, etc. are enacted by the subject and the analyst need only document them as such). An

alternative approach is to examine why texts matter, and how they come to matter, in particular situations, rather attempting to decode meanings. In a similar way as Foucault (1972/1980) analyzes the process of subjectification by examining the specific mechanisms it uses to produce and circulate of knowledge, ANT asks “how texts were able, historically, to become emissaries that are durable, transportable and forceful, and therefore crucial agents of social control” (Callon, Law & Rip, 1986b, p. 229).⁵⁵ Texts and other cultural productions provide an *index* of the affective mood surrounding different kinds and technologies of reproduction, which in turn informs the analyst about the kinds of subjectivity that are being contested in different modes of reproduction. Affect displayed and provoked through cultural works can also be used as a *criterion* for determining actors’ degree of attachment to particular ways of differentiating humans and nonhumans in reproductive controversies. The purpose of using affect in this project is not to locate authentic experience. The point rather is to use it as an epistemological category, as a way of mapping out the degree to which different figurations and redistributions of agency are mobilized in different spaces as the boundaries between biological, cultural and social reproduction become increasingly blurry in digital culture.

As discussed in the literature review, there are several book-length studies of reproduction that stand out as methodological models for my project, in particular, Seltzer’s (1993) use of 19th century naturalist fiction to study “melodramas of uncertain agency” at the intersection of market and machine culture, Roof’s (1996) examination of controversies about unauthorized reproduction as anxieties about masculinity, and Hayles (1999) analysis of parallel anxieties in cybernetic philosophy and science fiction. These

⁵⁵ Latour (1990) also emphasizes the importance of how texts come to matter, encouraging an ongoing examination of the conditions in which “we might expect changes in the writing and imaging procedures to make any difference at all in the way we argue, prove, and believe” (p. 23).

studies, along with those of Catherine Liu (2000) and Celia Lury (1998), provide templates for my research on reproduction as a site in which musicians, journalists and regulatory agents display considerable anxiety about a wide range of social phenomena. Thus, while the key notion of agency is derived from sociology (in particular, ANT), I have been inspired to examine anxieties about reproductivity across seemingly disparate sites (law, music, design) by drawing from work on reproductivity in cultural studies. Peters' (1999; 2005) method of mining religious, political and philosophical texts as sources of communication theory has encouraged me to examine law and design in a similar way, examining figurations of the human and the nonhuman by piecing together discussions of technology, bodies, consciousness, intentions and memory.

In terms of the subject matter and selection of case studies, Roof's work is quite similar to my study. However, Roof, like many other theorists discussed in my literature review, argues that reproductive controversies in contemporary society are part of a broader crisis of masculinity precipitated by digital reproduction. Roof raises, but quickly leaves, a key question which has been the focal point of many studies of digital reproduction, that is, whether such a thing as a reproduction can exist in digital culture. It is not surprising that her book does not return to this question; Roof needs the concept of reproduction to argue that subcategories of reproduction (mechanical, anonymous, unauthorized, etc.) have the potential to disrupt the authority of male-dominated artistic tradition. However, her concern with legitimating the conceptual figuration of reproduction as disruptive leads to a displacement of empirical analysis with increasingly abstract figurations of reproduction. Roof's conceptualization of reproduction as a

principle of disruption continually leads back to the question of why this disruptive potential does not materialize in her case studies.⁵⁶

Although Roof's book provides a useful template for my own analysis of reproduction, I will follow actor-network network theorists and let the actors speak for themselves, rather than imputing an underlying rationale (such as a principled rebellion against copyright or patent law, or against masculine art) to reproductive practices in advance. I have thus selected a broad array of institutional contexts and cultural spaces in order to account for the heterogeneity of conceptualizations of reproduction and the fluidity of the links or relays that specific actors attempt to make between reproduction and humanness can be thoroughly explored. Although they operate as case studies of the redefinition of humanness in relation to reproduction in digital culture, they also function as litmus tests of humanness since techniques of copying, simulating and replicating call into question the uniqueness of human qualities such as intentionality, language use, feeling, memory and consciousness.

The chapters operate as litmus tests in three key ways. First, they test the type ("hot" or "cool") and degree of affective responses to reproduction in digital culture and thus question the postmodern thesis that digital culture is marked by an acceptance of the collapse of dualisms that constituted modern subjectivity, such as human/nonhuman,

⁵⁶ "'Eye' hunger begets a different economy from the more traditional notion of art as soulful self-expression; eye hunger initiates a prolific horizontal scansion, an inclusive repertory of barely touched images, or images reproduced so as to look barely mediated. Reference and allusion are immediate and multiple instead of layered with historical legacy. But as Benjamin's example of Fascist art suggests, this visual abundance and technological generation betray an anxiety about control, an anxiety Pop artists and their critics resolve by reinscribing the gloss of a more traditional relation between artists and art" (p. 47). But the disruptive potential of Pop art's alliance with mechanical reproduction is easily diffused with "the addition of the name, which functions as a completely compensatory, vengefully metaphorical, correction in mechanical reproduction's malaise. Pop's spectacular metonymies may obscure the metaphorical process of renaming by which artists attempt to regain control of cultural production, but the connection of name and image is, finally, what remains" (p. 52). For a contrasting view of the name game, see Lury (2006).

reality/representation, original/copy. Second, they use anxiety as an indicator of the significance of specific reproductive practices, technologies or rules for the constitution of humanness. Third, each chapter approaches reproduction in each site as a test of the boundaries for aesthetic, regulatory, commercial, etc., subjectivity, following specific actors in cultural spaces to determine what precisely is worrying about reproduction in virtual culture. Based on the literature review, these anxieties likely stem from several different problems associated with reproduction: automatism, fakery, uncertainty about the agents of communication, or, as Seltzer and Roof would suggest, they may be instances of a broader crisis of agency, person-making, or gender. However, in order to respect the line between academic and practical, I use the Great Divide and the emphasis on incorporation and inscription as broad categories in which to organize the chapters rather than considering them as the underlying cause of anxieties, even if the actors are not aware of it.

Although I have selected sites according to Peters' notion of reproduction as a litmus of humanness and I am using actor-network theory to probe the manner in which actors problematize reproduction, I alter the conceptual framework and methodology in each chapter in order to incorporate a broader array of cultural spaces and media texts than studies of digital culture typically allow. This will enable me to discern patterns across institutional contexts and cultural spaces, and track the movement of particular definitions of humanness in relation to modes of reproduction. In other words, the empirical research in the three substantive chapters on cryptomnesia, transgenic seeds, and digital sound are meant to open up the scope of research on reproduction so that I am able to make broader claims about the human subject in virtual culture.

The organization of the substantive chapters

Reproductive anxieties are embodied experiences of instability as the scale of human-nonhuman entanglement increases, but it is also an important marker of the variability of the bio-informational regime and figurations of the human subject within it. The manner in which bio-informational reproductivity alters the scale of heterogeneous networks can be most effectively and convincingly demonstrated through chronological analyzes of reproductive anxieties. Using cases of inadvertent musical plagiarism in copyright lawsuits, which dates back to an infringement lawsuit filed in a US court in 1924, Chapter 4 begins an exploration of historical transformations in the definition of humanness in situations where memory and creativity are put in question by the growing intimacy of humans and nonhumans in the technical reproduction of sound and music. Cryptomnesia highlights the problem of disembedding authorial subjects from radio, photocopiers, phonographs and other inscriptive media that exploit that aural overlaps between machinic and human memory. Copyright law must simultaneously enact a model of humanness based on notions of aesthetic originality while at the same time underwriting the industrial production of interchangeable musical works. The tension between copyright's role as a recognizing institution for authorial subjectivity and its facilitating role in the production of, for example, jingles for television commercials reaches a breaking point in cases where two would-be authors demand recognition for creating what jurists and musicological experts deem to be the "same" work. These strange similarities point, I argue, to the dispersion of subjectivity across a network of actors including other composers, musicians, producers but also institutions and machines and the consequent difficulty of recentring the subject in legal discourses and practices.

The caselaw on cryptomnesia is a forerunner to contemporary anxieties about the legal constitution of individual subjectivity in the litigation of copying in peer-to-peer networks, which increase the scale and pace of human/nonhuman collectivities. Instead of drawing a direct line between cryptomnesia and file-sharing, however, I highlight in Chapter 5 parallel problems in contemporary patent law, wherein biotechnological inventions have generated anxieties about another hallmark of modern subjectivity – intentionality. The Canadian case of Percy Schmeiser, a farmer who was sued by Monsanto for infringing upon its rights to Round-up Ready Canola, gained considerable news attention since it established the degree to which patent rights to genetic inventions trump farmer’s long-established rights to collect seeds on their farms. For my purposes, the case may be read not just as another example of how corporate (ab)uses of intellectual property undermine cultural rights, but also as a dispute about the more fundamental problem of how to draw boundaries between nonhuman and human action. I demonstrate how the reproductive capacity and behavior of the canola plant as well as the multiple roles and identities of biotechnical inventions in industry, farming and law frustrate attempts to represent this provocative object in patent claims, expert discourse and testimony in a way that affirms the discrete existence of the invention and diffuses anxieties about the destabilization of the modern constitution.

In Chapter 6, I follow the actors in mash-up remixing, which was one of the first “virtual” music scenes in the sense that its artifacts, styles and personalities were largely developed through online mediation. Although mash-up remixers typically shrug off allegations of copyright infringement and proudly announce that their work has been subject to cease-and-desist orders as evidence of the notoriety of their online personae, I

focus on several instances where the scale and pace of technical mediation suddenly becomes problematic. Reproductive anxiety in this music scene stems from the increasing delegation of previously human qualities or skills to machines and programs. Although mash-up culture presents itself as decidedly disinterested in originality or authorship, it establishes new definitions of human creativity and new ways of performing the human within an assemblage of “intelligent” machines.

The provocateurs of reproductive anxiety in each chapter can be mapped onto Latour’s (1993) mythic-history of technical mediation to emphasize the trajectory towards increasingly large scale collectivities (see Figure 3). Instead of a modernist disjuncture between subject and object introduced by science and after which humans and nonhuman grow increasingly distant and incommensurable, the chapters focus on the growing “intimacy” of humans and nonhumans and the exchange of properties between them. From the notation of unconscious replication to the production of difference between metabolic reproduction and scientific knowledge to the encoding of the human ear, the source of action – the collectivity – the scale of hybrids increases “down” to cells and “out” to bodily behaviors.

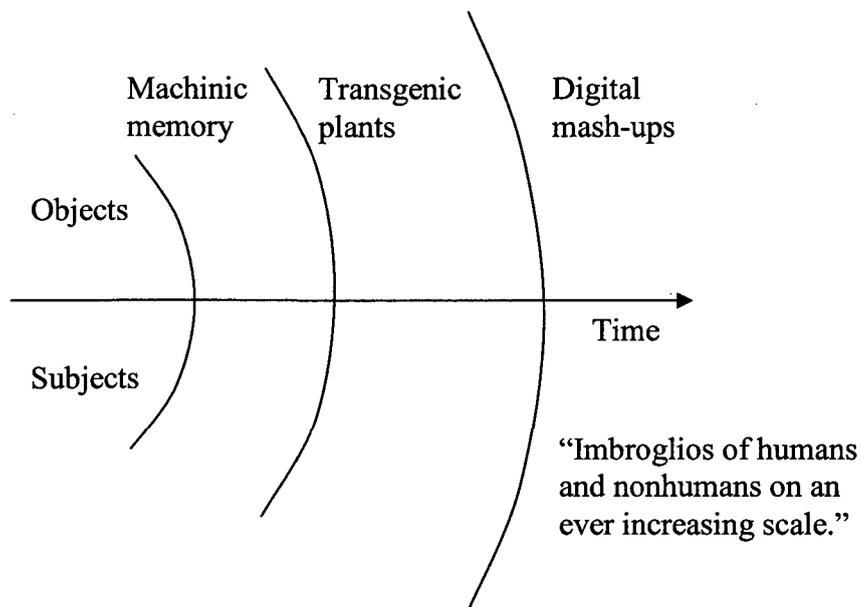


Figure 3: Reconfiguration of the subject/object in terms of hybrid collectivity. Provocative actors stretching the scale of hybrid collectivities over time. Adapted from Latour (1993), p. 201.

The chronology allows me to explore how earlier notions of humanness were constructed in relation to reproductive technologies and to thereby highlight the contested history of contemporary meanings of humanness and reproduction across cultural spaces, institutions and fields of practice. While academic discourse, musical plagiarism, engineering debates about sound and hearing, and digital remix scenes certainly make an eclectic array of research sites, the heterogeneity of sites or fields of practice bolsters my argument that reproductive anxieties are a defining characteristic of virtual culture and, moreover, that these anxieties generate demand for new litmus tests of humanness.

Reproductive anxieties indicate a lack of consensus about the manner in which virtuality signified and embodied. Drawing from Hayles' (1999) semiotics of virtuality, the anxieties in each chapter are part of a problematization of inscription (the mobility

and agency of traces) and of incorporation (the reconfiguration of body boundaries), as the actors negotiate their roles and identities in virtuality. In each chapter, the actors problematize both inscription and incorporation, but the chapters differ in the relative emphasis they put on each process. The problematizations can be further broken into pairs of litmus tests of humanness corresponding to anxieties about different aspects of virtuality. Inscription anxieties are generated by the shifting of scripts for action (e.g., musical notes, DNA, computer code) between humans and nonhumans and by the subordination of life to the script. These anxieties lead to questions about the capacity to discern human and nonhuman behavior and about the implications of humans that behave like machines or machines that behave like humans (p. 251). Incorporation anxieties emerge when the boundaries of the body seem to be disrupted, giving rise to questions about the reduction of humans to parts operating within a larger network and about the human being taken over by its parts (*Ibid.*). In each chapter, the conditions for asking all of these questions are in place, but the questions with which the actors concern themselves with vary depending on the institutional setting and nature of the provocative actor and actions.

Since virtual culture is characterized by the multiplication of mediators between humans and nonhumans as well as between society and nature, the chapters are designed to take account of the heterogeneity of contemporary redefinitions of humanness and reconstitutions and contestations of modern subjectivity which are provoked by these litmus tests. In other words, each chapter examines the specific ways in which reproduction is problematized and how these problematizations amend, modulate or displace older inter-definitions of humans and nonhumans: cryptomnesia in musical

plagiarism lawsuits amends authorial subjectivity to make the rationale underlying its distribution of ownership titles impervious autonomous inscriptions in the form of “hidden memories”; experimental and risky forms of reproduction in gene patents provide the *mis-en-scène* for problematizations and reassertions of the boundaries between code, cells, plants, and farmers; the automation of an increasing number of musical skills leads to redefinitions of creativity subjectivity and adjustments of the author-function in digital music scenes around computer-automated listening. Using the litmus test rather than the case study as the template for my research allows me to capture the variety of definitions of humanness which different institutions and cultural spaces generate by putting certain human qualities to the test of reproduction in nonhuman form.

4. Entangled memories: Cryptomnesia and anxiety in copyright law

Plagiarism and the simulation of presence

Memento (2000), a timely and anxious cinematic meditation on mediation, pushes the unreliable narrator to extremes; we are in the presence of a protagonist who cannot remember anything for more than fifteen minutes. The amnesic Lenny (Guy Pearce) relies on tattoos, notes, photographs, and other inscriptions to “remember” that someone murdered his wife and that he needs to find and kill the murderer. Revenge depends on recollection, highlighted in this film by Lenny’s virtual paralysis at 15 minute intervals when he “can’t make new memories” since having his head smashed into a mirror during a struggle with the murderers. The more disturbing possibility, however, is that in the absence of humanly embodied memory, inscriptions threaten to become autonomous. Lenny repeatedly reminds people of his “condition,” and finds that most people take advantage of his memory loss. In this way, *Memento* underlines the extent to which knowledge and power are dependent upon “working memory,” or the capacity to hold things in mind and to “make new memories” from those mental representations. Without those mnemonic capacities, Lenny is dangerously dependent on reproductive media to guide his actions. The more his memories, intentions and actions are constituted by extrasomatic resources, the more he becomes an *editable subject*. “Working memory” is thus a key faculty of knowledge production in *Memento*, the importance of which is demonstrated through its absence. Lenny is vulnerable to all sorts of unauthorized edits

and partial inscriptions “implanted” in his array of mediators as though they were his own ideas.

Since at least 1924, American jurists have been grappling with similar kinds of “implants” in cases of unconscious musical plagiarism. The concept of *cryptomnesia*, initially outlined in Carl Jung’s (1909 [1970]) theory of creativity, refers to a process of unconscious recollection and recombination. Jung believed that unconscious copying was an ordinary part of the creative process, but since the 1920s, the legal system has used the concept to refer to abnormalities in the creation of cultural works. Jurists usually deploy the concept of cryptomnesia in order to explain how it is possible for composers to plagiarize work which they genuinely believe to be their own. The growing legal and psychological discourse surrounding this concept elucidates institutional assumptions about the proper role of musical memory in the creative process. While the legal system uses cryptomnesia as the exception to prove the rule (that composers do not unintentionally copy from memory), the concept of cryptomnesia also problematizes some of copyright law’s foundational dualisms, such as self/other, experience/expression, creation/copying, and composition/recollection. Rather than accepting the juridical notions of cryptomnesia as a deviation from the creative work, or Jung’s notion of creativity as inherently cryptomnesic, I suggest that cryptomnesia is a way of configuring distributions of memory, creativity and originality in such a way that they are legally regulable. New entanglements of the human and the nonhuman highlight the limits of Western figurations of creative subjectivity and the mechanisms of its production. Creation *ex nihilo*, the calling of things into existence, is not an individual act. Indeed, what cryptomnesia foregrounds is problem of construing creation as a point of origin

since this point is actually a link between prior mediations. Jurists adjust the litmus test of humanness to permit a different form of creation to emerge, one that is based on the production of links and which includes the reproductive processes of memory, machines and material settings. The concern with inadvertent plagiarism among cultural producers, jurists and scholars is part of a broader cultural anxiety about the implications of these distributions for the identity and autonomy of the human.

As musicians and other cultural workers increasingly understand their activities as part of a human-nonhuman assemblage in which actions are shifted across heterogeneous materials, legal systems are called upon to manage unruly hybrids and to evaluate claims about autonomous creation. I suggest that contemporary plagiarism is one of the most disturbing effects of human-nonhuman intimacy in the process of cultural production since it suggests that originality and creativity are increasingly difficult to differentiate from their simulations. This difficulty of discernment is a consequence of the primary mechanism of translation through which hearing, seeing, composing, source monitoring, remembering and other crucial elements of the creative process are delegated to nonhumans. The plagiarized text displaces the mediation of presence and points instead to the absence of a purely human “point location” to which authorial rights might be attributed through the secondary mechanisms of translation.

The 1980s is frequently regarded as a moment in cultural history when the hybridization of production and reproduction, creativity and copying, innovation and repetition, and so forth became normalized and even celebrated (e.g., Harvey, 1990; Schwartz, 1998). Literary critics confronted the international Festivals of Plagiarism while the photographs of photographs by Sherrie Levine and Richard Prince generated

considerable debate about artistic inspiration and commodification (Schwartz, p. 314; Thompson, 2007, pp. 83-4). The line between production and reproduction became particularly blurry in music-making due to the integration of digital samplers, tape recorders, record players and other sound reproduction techniques into the production process (Goodwin, 1988; Sanjek, 1994). At the same time, however, these techniques generated considerable concern about plagiarism. Schwartz downplays these anxieties by noting that they are as old as speech itself and asserting that plagiarism is the irrepressible and inevitable “collateral to acts of replication” (p. 313). But there is a crucial difference between intentionally copying and promoting one’s work as “plagiarized,” accompanied by the protective rhetoric of resistance, and being accused of plagiarizing what was presented as original work. Schwartz is right to point out that the issue at stake in plagiarism cases is not simply ownership, but he does not recognize the ongoing association of plagiarism with pathological communication, symbolic disorder and moral decrepitude.

Plagiarism generates anxieties in professional music-making since works, reputations and careers are at stake, but plagiarism also provokes a professional anxiety among jurists. This anxiety derives in part from what Kember (1998) describes as the affective investment of law and other institutions in recordings as props for positivist thinking. But there is more to law than legal science. As Peter Goodrich (1996) argues, every legal case institutes “a hierarchy or series of priorities for the affectivities or addictions of law,” and many of these affectivities and addictions are textual (p. 157). The perpetual recitation, reference, quotation and production of documents in law is guided by a humanist “love of texts” as transmissions of knowledge and as meanings that

need to be continually renewed. Positivist treatments of texts as instruments in the production of calculable legal objects and calculating legal subjects emerged out of an anxiety about the loss of meaning through spatial and temporal “transmission.”

The concern with communication, and over longer time spans with cultural and legal transmission, is predicated upon an obscure sense of the failure of communication or the loss of meaning within the texts of law ... a distress located vaguely in the extremity or distance that separates legal science or the positivized profession of law from the appreciation or life of its symbols, the poetics of its texts, the imagery of its reason. (p. 156)

Legal science aligns mediators in order to provide access to a world “beyond” the text and the courtroom, which conforms to Latour’s (1998) category of information-transfer or the “transcendent” mode of mediation characteristic of scientific inscription. But law’s “beyond” is, in Goodrich’s terms, “precisely and quite technically the history of legal language, the dogmatic character of the tradition and the power that accumulates over the long term of the institution in its custom, its silence, its unwritten law” (p. 157). Juridical mediators are like religious and aesthetic mediators to the extent that each mediator points to another in a chain that points not to a substance “out there” but to the presence of legal personae. While law has a positivistic vocation to reproduce reality through the gathering of inscriptions and traces, the force of copyright derives from the obscurities, discrepancies and gaps in its quasi-religious parable of aesthetic creation which do not transmit information about reality but re-present the story as requiring constant recitation, quotation, interpretation, rationalization, amendment, etc., in order to renew its meaning. In short, it is the ambiguity of law rather than its clarity that makes it an obligatory point of passage for so many diverse actors over enormous spans of time.

Law thus possesses some of the characteristics of aesthetic, religious and moral mediation, which produce “presence-giving” as the object and the “person receiving the

gift of presence” as its subject. In Goodrich’s view, “[T]he legal conception of sign and of reference is theological in its sources or derivation. The word is explicitly an image and its truth relates to its reference or to the imprint of divinity or inheritance that it retains on its surface” (p. 167). Legal signs are theological in the sense that they refer to presence not to a substance beneath or beyond. The discrepancies between stories and events, models and realities, testimonies and material evidence, recollections and inscriptions, etc., are the enabling conditions for meaning-making in law. Without the gap, there is no need for jurists whose purpose in authorial disputes is to invent scenes, borrow concepts and add characters to rationalize the story of aesthetic creation which is re-presented in every infringement lawsuit.

Certain kinds of plagiarism present an enormous challenge to jurists who try to retell the story of aesthetic creation, and, as I discuss below, new characters are added to the drama to make the story seem reasonable. But following Goodrich, the problem with plagiarism is at the level of mediation, since it casts doubt on the truth imprinted on the “surface” of words, notes, recordings, etc. Overt plagiarism such as the renamed texts in the Festivals of Plagiarism, the re-doubled photographic works of the Levine and Prince, or the musical plagiarism of John Oswald’s Plunderphonics do not present the same kind of danger to law as works which attempt to “pass” as original human expressions. The plagiarized text is not just a copy but a simulation of presence. This is a problem not only for the would-be author but for the entire system of signs through which truth is imprinted like an image on the surface of words, notes, names, etc. Just as a student’s essay, if it appears to be plagiarized, shifts attention from reading to the search for originals and proofs of plagiarism, so too musical plagiarism shifts juridical interpretation

from signs of the presence of a creative, labouring, inspired, honest, etc. subject to the measurement and explanation of its absence.

Like other kinds of copyright infringement lawsuits, cases of cryptomnesia revolve around the establishment of the origin, identity and continuity of a particular work. However, following Latour and Goodrich, I argue that what is at stake in cases of cryptomnesia is nothing less than the origin, identity and continuity of legal figurations of the creative subject (the *personae* of copyright legislation) and of the persons who perform the drama of uncertain authorship in caselaw. Like cases of mistaken identity analyzed by Goodrich, the mis-take of someone else's expression for one's own inventions can, from the point of view of law, damage the subject, or, more precisely, the soul.

[T]he soul was harmed by the theft of symbols. More abstractly, the dissociation of signifier from signified was a disrespect and a threat to the order of transmission. The breach of contract, in other words, was in essence a breach of a much deeper order of contract or contraction, that of the social and specifically that of the symbolic. If word and referent, signifier and signified, were to become unattached then the law would fail as also would the order of generations, of meaning and of inheritance upon which law is based. (p. 170)

Although reproductive technologies and the abundant promotional culture surrounding them urge the subject to recombine traces without regard for origin, identity and continuity, such shifts in textual production can be regarded as disrespectful and threatening to the models of signification on which basic legal processes are legitimated, such as the differentiation of degrees of presence and absence of, for example, "similarity" as defined by copyright. For Roof (1996), the metonymy of digital reproduction (discrete representation) disrupts the masculine aesthetic tradition as a way

of organizing cultural works as well as the metaphoric paternity instituted by law and other literary practices between author and text.

Roof's work, as well as Goodrich's, points to a more fundamental question regarding the relationship between technology, knowledge, and agency. If, as Carla Hesse (2002) argues, intellectual property only becomes thinkable when knowledge is considered to be a human production rather than a divine gift, then what are the consequences of producing nonhuman-knowledge-bearers and nonhuman "co-producers" of cultural works?

The intermingling of humans with their nonhuman proxies is precisely where most intellectual property disputes begin. Intellectual property is one of the key sites in which hybrids are "purified." Attributions of authorship are ways of purifying the social process of knowledge production from nonhumans, distributing agency to particular entities called "persons" (which are actually human-nonhuman assemblages), and thus maintaining the semblance that the Great Divide is intact. Regimes of bio-informational reproductivity conceptualize the subject in relation to other bodies of information and convert previously naturalized differences into "expressions," which can be owned (Boyle, 1996; Lury 2000). Qualitative differences in subjectivity (e.g., original/unoriginal, proper/pathological) depend upon the transformation of quantities of materialized intellectual labor in, for example, note-by-note comparison of musical compositions in copyright infringement lawsuits, *back* into what Law (1991) calls the "great quantitative differences" (e.g., human/nonhuman, author/plagiarist). At the most general level, legal subjectivity can be understood as a "reproductive technology" in the sense that it multiplies, modifies and assembles supposedly uniquely human qualities that

constitute subjectivity which can be quantified in terms of “degrees of difference” from nonhumans to distribute property rights in human materials (e.g. Boyle, 1991; Carver, 1996; Davies & Naffine, 2001).

The Canadian and American legal systems have traditionally approached authorial disputes over musical works through a combination of oral testimony, written documents, and sound recordings to evaluate the *cause* and *degree* of similarity between works. The increasing intimacy of human and nonhuman memory characteristic of virtual culture troubles the usual means by which courts differentiate degrees of similarity and difference in works in order to attribute responsibility, accountability and ownership. This material heterogeneity of the creative subject is most legible in cases wherein courts characterize copying as “unintentional,” “inadvertent” or “unconscious,” thus shifting agency out of the human subject into a various reproductive media with which the person has had contact.

Nevertheless, in its positivistic mode of producing objects and subjects, law identifies one author and text as the “cause” while the plagiarist and plagiarized text are considered its “effects.” Courts first rule out a “common cause” (the possibility that both works are “effects” of an as-yet-unmentioned “cause”) as well as “independent creation” (an acausal connection that is explained away in terms of probability and chance) since the probability of two works having the same source in the unconscious minds of the composers is increased by changing patterns in musical consumption. When similarities pile up through inscription techniques, but the defendant does not conform to the type of person designated as “plagiarist” (e.g., his/her desire to maintain a reputation within an artistic community supposedly outweighs the temptation to plagiarize) and denies

copying, new qualitative differences are produced, such as the unconscious or cryptomnesiac plagiarist and the conscious plagiarist.⁵⁷

The figure of the cryptomnesiac derives from Jung's theory of creativity as the unconscious recombination of cultural forms and experiences. In many ways, Jung anticipates virtual culture's model of creativity as recombination or hybridization which Mitchell (2003) finds in genetic art (as well as the transgenic engineers these artists mimic) and which is routinely promoted by magazines like *Wired*. Marilyn Strathern (1992) finds a similar model of creativity in cultural theory and notes that although hybridization is not new, the way we think and feel about it is. "Texts that once celebrated the integration of cultural artifacts have been displaced by deliberate attention to the uniqueness of fragments. Creativity can only lie in their recombination" (p. 109). Following this logic, it should come as no surprise that jurists appropriate cryptomnesia, leave the rest of Jung's theory of creativity behind, and use unconscious plagiarism as an aberration or exception to the ordinary process of creativity.

The importation of cryptomnesia into musical copyright infringement cases can be understood as a response to the legal anxiety provoked by shifting relations between humans and nonhumans in cultural production, which in turn suggests a shift in signification that conflicts with the alignment of mediators in law. The increasing invocation of the concept of cryptomnesia in musical plagiarism cases has an ambiguous effect on legal models of communication and creativity. On the one hand, it works as an effective conceptual "patch" with which jurists mend holes in the idealized creative

⁵⁷ In his discussion of synchronicity, or "meaningful coincidences," Jung (1969 [1960]) had difficulty with "educated people" who were exposed to the various symbols whose synchronistic occurrence Jung sought to attribute to a non-causal connection. Courts have taken Jung's concept of cryptomnesia but not synchronicity and have failed to recognize that, for Jung, people are more likely to duplicate when they have been "educated" or exposed to a wide range of material.

subject of copyright which appear with increasing frequency due to the public appearance of the creative subject as a hybrid (human-nonhuman, artist-copyist). As Lury (1993) argues, cultural industries no longer distribute works to unknown audiences but “virtually include” audiences, most recently through participatory media which supposedly characterizes “Web 2.0.”

One of the defining characteristics of the rhetoric of empowerment through digitalization is the shift from “audience” to “user” in description of the subject. It is worth noting the origins of the term “user.” As Burnett (2005) puts it, “The notion of the user has its origins in a reductive model of human subjectivity and is essentially an engineering term” (p. xviii). “Users” are also legal subjects attributed with different rights and responsibilities than owners. Through the transmutation of the quantities into qualities and vice versa, law can undermine ownership claims made by “virtual authors.” The concept of cryptomnesia enables courts to reinforce that figuration of the human subject by explaining away hybridization as the periodic contamination of cultural production. On the other hand, since cryptomnesia implies a very close relationship between memory and creativity, it must be used carefully by jurists so as to maintain the boundaries between creation and reproduction.

Law’s anxieties about transmission, models of signification and modes of differentiation and distribution are an important part of the recent history of reproductive anxiety. Legal systems are “centres of translation” which regulate the traffic of what Sean Zdenek (2003) calls discursive materials, which provide the “scaffolding” for the subject of reproduction. The figuration of the subject as an author-owner in intellectual property law provides the discursive scaffolding for the possessive individual in a wide variety of

sites where reproductivity becomes a mode of control. It has been circulated through parental disputes concerning children produced through surrogate motherhood, transnational adoption law, and in the reconceptualization of bodies as sources of information that can be owned by someone other than the “source” (Rose, 1996; Vasseleu, 2001; Boyle, 1996). Enrolling authorship into each of these performances of reproductive reality differentiates and distributes agency within an assemblage of humans and nonhumans. However, authorship is also the effect of a series of translations. It is a “secondary mechanism” of translation which attributes the action of a heterogeneous collective to a “point location” that persists over time. Certain parts of certain persons, not all of whom are human, are designated as authors. Intellectual property disputes are particularly important in the determination of what combination of humans and nonhumans constitutes a person.

In the view of many cultural theorists, the juridical figuration of persons as authors-owners of their discourse conceals or misconstrues the way communication actually occurs. Critiques of copyright law generally begin by pointing to a gap between copyright’s model of communication and the “reality” of communication. This argument takes a variety of forms. Some scholars argue that copyright’s model of communication is overly-simplified or “static” and that the figure of the author in particular is abstracted from the web of social relations which actually produces the work’s meaning (e.g., Ross, 1992; Barthes 1977 [1968]). It is more common today to argue that copyright’s model of communication is out of date, maintaining, for example, the notion that copyright provides incentives for creative production when, in practice, it is used to by copyright owners to exploit the rights to works that are already produced and thus discourages

creative production in a variety of ways while providing incentives to invest in, and control, communications infrastructures (e.g., Boyle, 1996; Geller, 1994; Lessig, 1999).

These evaluations are based on what is purported to be a more accurate portrait of the means of communication, which is full of complex and overlapping communicative agents and networks. Joseph Loewenstein (2002) traces this conflict between scholarly and legalistic models of communication to the early 20th century. Since Loewenstein points to the problem of heterogeneity and of distribution in both the complex descriptions provided by researchers and the simplified schematic developed in copyright law, it is worth quoting at length here.

To sum up the conjunctural paradox: in 1909, the Berlin revision of the Berne Convention represented literary culture, for the purposes of law, as a vacuous space with author and a book-buying public at its poles, and with the book as a thin material line of communication between them; in 1909, [bibliographer A.W. Pollard's] *Shakespeare Folios and Quartos* represented literary culture as a space thick with books, with scribes and printers, guildhalls and printshops and bookstalls, proclamations and regulations, actors and acting companies, booksellers and book buyers, a crowded historical field within which one might hope to discern conventions and recurrences and so bring into focus the historically specific lineaments of author and literary work. Legislator and bibliographer offer us two starkly different representations of literary culture, but both, I think, respond to the same conceptual-regulatory crisis, the revolution in reproductive technologies. (pp. 6-7)

Conflicting views of communication (even those that seem antiquated) are responses not only to the proliferation of print but to the multiplication of the media and their implications for the circuit Hayles (1999) traces out between textual production, signification, consumption, embodiment and representation. What is unique about Loewenstein's view is that copyright responds to the crisis of heterogeneity by instituting a simplified model of agentic distributions concentrated around the poles of author and public.

The investment of objects with rights may be intended to organize social activity, but from an ANT perspective, it creates localized destabilizations or problematizations from which the possibility of autonomy emerges in the form of juridical authority, authorial rights, and, as I argue below, the overly-active memory. Attention should be given to the manner in which agential properties are shifted within the *res*, such as the status of a material artifact as a work of authorship, through the movement of inscriptions, and how these movements lead to gradual drifts in human goals, purposes, intentions and, indeed, in the very definition of humanness. Law attempts to coordinate scientific and aesthetic inscription in order to maintain consistency between its ideal-types and the multiple definitions of reality performed before the court. Anxiety derives not strictly from law's attachment to positivist thinking but also from its affective investments (or "addictions") in particular models of signification and particular alignments of mediators which do not transmit information but rather re-present the need to renew the meaning of seemingly antiquated stories about aesthetic creation. Thus it is important to examine how those stories shift in relation to the heterogeneous array of agents in musical production and reproduction. Those shifts are most legible in the legal system's development of conceptual and technical devices which mediate anxiety stemming from the material overlaps between humans and nonhuman.

Copyright, music and memory

Like its American counterpart, Canada's *Copyright Act* is often presented as a balancing act between private ownership and public access by giving the author intellectual property rights in his or her "expressions" but not "ideas," and by granting

these rights for a specified period of time rather than in perpetuity.⁵⁸ Section 3 of the Act lists the various activities included in the author's monopoly right over copying, which Kevin Janus (2003) summarizes as follows: "the sole right to produce, reproduce, perform in public, publish, translate, communicate by telecommunication, and adapt as a film, their work for their lifetime and a period of 50 years following the end of the calendar year of their death" (p. 381). Copyright law maintains the public domain by limiting the term of copyright protection, by granting property rights in expressions but not in ideas, and by exempting certain uses of protected works for research, study, criticism, review, and news reporting (*Ibid.*, p. 387). However, many theorists have argued that copyright law primarily benefits corporate copyright owners who use copyright protection to commercially exploit already-produced works for a period that may exceed a century. In this sense, copyright is a regime of copying which enables cultural industries to manage and regulate the disruptive potential of new reproductive technologies.⁵⁹ Copyright owners nevertheless use the image of the independent creator to legitimate the expansion and strengthening of copyright. As Boyle (1996) writes,

[A] striking feature of the language of romantic authorship is the way it is used to support sweeping intellectual property rights for large corporations (...) The true irony comes when we find that large companies can use the idea of the independent entrepreneurial creator to justify intellectual property rights so expansive that they make it much harder for future independent creators actually to create. (p. xiii)

⁵⁸ R.S.C. 1985, c. C-42.

⁵⁹ "Regime of copying" refers to intellectual property law as well as various industrial practices, such as the distribution of authorial rights according to an evaluation of cultural workers' contributions to the commercial effects of a work. See Lury (1993) for an interpretation of the historical role of copyright as a regime of copying in the development of the cultural industries.

Since legislators in the US and Canada have frequently extended the term of copyright protection, infringement lawsuits play an important role in determining how musicians and audiences relate to and reproduce the musical past.

The difference between perpetual property rights and property rights with perpetually extended terms is negligible. In his analysis of copyright law's impact on musical practices, Paul Théberge (1993) refers to a science fiction short story by Spider Robinson in which perpetual copyright leads, in Robinson's words, to "perpetual racial memory" (as cited in Théberge, p. 40). Théberge then compares this story to *ABKCO v. Harrisongs*, a US copyright case wherein George Harrison was successfully sued by The Chiffons for infringing upon their song "He's So Fine" in his composition of "My Sweet Lord" despite the judge's admission that Harrison had probably done so unconsciously.⁶⁰ Along with the broader caselaw on musical plagiarism, the court proceedings and decisions in such cases raise key questions about the role of memory and recollection in the supposedly independent process of musical composition as well as in the legal process of proving ownership in authorial disputes. In other words, copyright law regulates the reproduction of music but in cases of musical plagiarism it is clear that copyright is also a system that enacts and models musical memory.

I have found Susannah Radstone and Katharine Hodgkin's (2006) notions of *figurations* and *regimes of memory* helpful in amending the theory of translation to the analysis of the human as an historically-specific subject position. A regime of memory is a system that produces particular conceptualizations or figurations of memory that people perform through various practices, institutions and mechanisms (p. 1). Copyright law functions as a regime of memory by producing truth-claims about memory which

⁶⁰ *ABKCO Music Inc. v. Harrisongs Music Ltd.*, 722 F.2d 988 (2d Cir. 1983) (hereinafter *Harrisongs*).

reinforce the author-as-owner, which in turn figures the human subject as a bounded entity. The 50-year term (plus the life of the author) of copyright regulates cultural memory by creating an incentive to own and exploit rights to existing works through “restored” and “remastered originals,” distribution through new media formats, and so on. In order to have access to the “props” of remembrance, one must go through the institutions and mechanisms of copyright; the operation of the public domain as a system of cultural remembrance is continually deferred through perpetual extensions of copyright’s term.

The role of copyright in the mediation of the musical experience and cultural memory can be elucidated by focusing on the manner in which the legal system expects memory to perform in the courtroom and in the process of musical composition. What is striking about cryptomnesia cases is the manner in which juridical modes of remembrance are disconnected and reconnected with notions of “objective” time and space. At the most general level, musical plagiarism cases demonstrate how memories of musical composition are made to conform to material traces of events inscribed in musical scores, audio recordings and other systems of representation in order to be used in infringement lawsuits. This is accomplished by differentiating accounts as “good” or “bad” remembrances depending on the number and type of mediators with which they are aligned. Copyright law’s assumptions about musical memory are most evident in cases of cryptomnesia, wherein jurists use figurations of leaky, contaminated or overly-active musical memory to explain unintentional plagiarism. While courts in Canada and the US have used the concept of cryptomnesia to explain certain instances of plagiarism, they do not recognize unconscious copying as a full or partial defence. The legal system’s

cautious use of the concept of cryptomnesia suggests that figurations of musical memory are potentially disruptive of copyright's "parable" of aesthetic creation as well as the rationales according to which it distributes ownership titles and settles authorial disputes. Contemporary notions of memory as "ever-present" in the musician's mind, as well as the involvement of electronic media in musical production, troubles the figuration of subjectivity as bounded and generates anxiety about the increasing autonomy of inscriptions in memory and media.

Canadian copyright law has deployed the Jungian concept of cryptomnesia on numerous occasions to preserve a system of authorship based on the image of the autonomous creator when it is faced with the problem of material overlaps between recording, memory and composition. Legal criticism of this tendency in Canadian and American caselaw generally suggests that jurists are too selective in their use of Jung's theory and do not consider the implications of the phenomenon of cryptomnesia for legal defences. Indeed, if jurists read Jung more thoroughly, they would find that cryptomnesia or inadvertent copying is part of the ordinary process of creativity in which memories are recombined unconsciously to produce new works. Since this figuration of the artist as a "remixer of memories" troubles the distribution of copyrights to individual authors on the basis of their "originality," it comes as no surprise that jurists are highly selective in their use of Jung.⁶¹

⁶¹ The *Copyright Act* only associates originality with distinctiveness, leaving the precise qualities of originality to be determined through case law. Harold Fox's *Canadian Law of Copyright and Industrial Designs*, which is frequently cited by Canadian jurists, it is noted "A musical piece to be original need not be an absolutely new production; a new arrangement of an old piece may be copyrighted provided it is more than a mere copy with variations" (as cited in *Alain vs. Rouselle*, para. 20). The concept of cryptomnesia suggests that all creative work is in fact rearrangement of remembered material, which suggests that the original/copy dualism in copyright is actually a division of works based on the extent to which their rearrangements are perceptible as such. For an analysis of the influence of Jung's concept of "cryptomnesia" or "hidden memories" on copyright decisions, see Green (1998).

The figuration of the creative subject as an author in copyright law has been extensively explored from a wide range of disciplinary perspectives.⁶² Many scholars have critically examined the possessiveness, rationality, creativity, individualism and independence of authorial subjectivity, but relatively little attention has been given to the subject's memory.⁶³ This gap in the literature is surprising since it would be difficult to conceptualize authors as the owners of discourse without construing memory as a type of intellectual "container technology," enabling the subject to store and possess objects apprehended through experience before expressing them in "works of authorship." In this particular figuration, memory contains musical experiences along with other experiences of the social world. However, as I will demonstrate in my analysis of the caselaw on musical plagiarism, copyright also presumes that memory organizes these experiences and facilitates the monitoring of their sources during the creative process. Copyright law's figuration of memory also maintains sharp boundaries between self/other, experience/expression, and recollection/composition, which prevent the misrecognition of musical experiences as one's own inventions.

The ideal subject of copyright law is bounded in the sense that his or her creativity is uncontaminated by unintentional recollections of the works of others. However, figurations of memory articulated in the courtroom rarely conform to this ideal. Following Radstone and Hodgkin, the tensions and contradictions that emerge in the

⁶² The history of copyright has been mapped onto histories of subjectivity through a variety of approaches: political economic and neo-Marxist histories of copyright (Edelman, 1979); histories of the Romantic author, or what Saunders (1992) calls "subject-centered histories" (Rose, 1988; Woodmansee & Jaszi, 1994), which draw to a large extent from post-structuralist analyses of authorship (Barthes, 1986; Foucault, 1984); histories of writing, printing and literature (Eisenstein, 1983; Feather, 1983, Loewenstein, 2002).

⁶³ An important exception in this area of study is Celia Lury's (1998) discussion of the role of memory prosthetics (especially photography) in the construction of contemporary notions of personhood. Lisa Gitelman's (2004) study of the "material meanings" of an extremely controversial technology of musical memory (piano rolls) in the late 19th and early 20th centuries traces out the relationship between conceptions of authorship and the anxiety surrounding the shift in musical skill and memory to perforated paper.

legal system's figurations of memory can be used to reveal "the difficulties inherent in attempts to conceptualise the bounded self's relation to the social" (p. 3). These tensions can be found in many cases of musical plagiarism, but they are particularly pronounced in cases of cryptomnesia or unconscious plagiarism. In these relatively rare cases, the court deems the plaintiff's work to be the *causa sine qua non* of the infringing work and yet accepts the defendant's claim to have no *conscious* memory of the plaintiff's work. When humanly embodied memories do not conform to material evidence of plagiarism, the composer's memory is figured as disorganized, leaky, blurry, and unreliable. As Radstone and Hodgkin argue, since the notion of memory as a container is so central to the bounded subject, figurations of memory that suggest a close connection between recollection and composition can problematize that form of subjectivity. "Memory is associated with coherent, bounded and sovereign subjectivity. Yet memory emerges, at points, as that which *undermines* that very conceptualisation of the subject" (p. 3).

To explain unintentional or unremembered plagiarism, jurists present the plagiarist's memory as accumulative and autonomous, containing permanent records of *all* experiences and operating independently of the subject's conscious mind. The figuration of the plagiarist's memory helps to diffuse anxiety about striking similarities by attributing unwilled reproductions to one of the composers' memories, the leaky boundaries of which allow recollections of the works of others to seep into the creative process. But the introduction of unconscious recollection and plagiarism leads to a series of conceptual problems and displacements. First, memory as a container for experiences is displaced by the more disturbing notion of "being possessed" by an active, unconscious memory. Second, the demand for originality, which is an evidentiary requirement for a

successful copyright infringement lawsuit, in some cases compounds authorial anxieties and even generates a paranoid sense that everything that resembles one's own work is *strikingly* similar and is therefore an illegitimate copy.

The figuration of memory as unruly or “acting up” can be found in Freudian psychoanalysis, wherein the subject “balances only precariously upon its own ‘primitive’ and/or infantile substratum – a substratum that could rise up and ‘possess’ its possessor” (Radstone & Hodgkin, p. 4). Cryptomnesia was imported into the caselaw on musical plagiarism in a 1924 decision in *Fred Fisher v. Dillingham*, a musical copyright infringement lawsuit filed in a US court.⁶⁴ In his decision, Judge Hand found no reason for Jerome Kern, a well-known Broadway composer, to risk his reputation by copying someone else's work. To explain how Kern unwittingly plagiarized someone else's work, Judge Hand developed a model of memory strikingly similar to Jung's conceptualization of it. Memory accumulates objects without forgetting, and acts independently of conscious thought. As Judge Hand explained in his decision,

Whether he unconsciously copied the figure, he cannot say, and does not try to. Everything registers somewhere in our memories, and no one can tell what may evoke it. On the whole, my belief is that, in composing the accompaniment to the refrain of ‘Kalua,’ Mr. Kern must have followed, probably unconsciously, what he had certainly often heard only a short time before. I cannot really see how else to account for a similarity, which amounts to identity. So to hold I need not reject his testimony that he was unaware of such a borrowing. (p. 147)

Since the court found that Kern was exposed to the plaintiff's work, the “identical” elements in their compositions could not be coincidental, or what is now called “independent creation.” In order to reconcile the material evidence of plagiarism with the assumption that Kern's interest in maintaining his reputation would outweigh the

⁶⁴ *Fred Fisher Inc. v. Dillingham*, 298 F.2d 145 (S.D.N.Y. 1924) at 145 (hereinafter *Dillingham*).

temptation to plagiarize, Judge Hand offered a version of the accumulative subject who possesses, but is also in some sense possessed by, a memory that contains a *register* of everything, including those experiences which the subject thinks that he or she has forgotten. Judge Hand carries out some rather complex discursive maneuvers in order to consider the overlap between reproduction and music-making while respecting and reinforcing the impossible difference that copyright's notion of originality seems to demand. The anxiety surrounding these unwilled reproductions is highly suggestive of copyright's exclusion and devaluing of culture that is based on repetition, imitation and borrowing.

References to this figuration of memory as a kind of incessant recording system that sends memories of musical experience to consciousness in the guise of original musical expressions have become increasingly common in legal commentary and in contemporary legal decisions. I will discuss the problems that this figuration of memory poses for the agency of the creative subject in my analysis of recent cases of unconscious musical plagiarism in subsequent sections. But first I will discuss the broader caselaw on musical plagiarism, which raises key questions about the relationship between figurations of memory and the regulation of copying: (1) How do the institutional practices of copyright law and musicological expertise affect the manner in which "private" memory is translated into "public" forms of testimony, recollection and interpretation? (2) Does copyright law need a concept of memory to regulate copying or does memory tend to disrupt copyright's ideal of creative subjectivity and its sharp distinction between recollection and composition? (3) If memory is potentially disruptive of the model of signification on which juridical ideals of subjectivity are based, how does copyright

“domesticate” it or make it less threatening to its regulatory configuration and its key conceptual personage – the author-as-owner?

The cases discussed below highlight the problem of translating memories about the process of musical composition into the evidentiary requirements of copyright infringement, and the difficulty of aligning these memories with the sequence of events and the set of relationships reconstructed by expert witnesses and judges through technologies of representation such as musical scores and audio recordings. By focusing on cases of musical plagiarism, both conscious and unconscious, the analysis demonstrates the crucial role of figurations of memory in the renewal of the meaning of the key figuration/mediator in copyright, the author-as-owner. In controversies about musical plagiarism, juridical figurations/mediators are contested, reinforced and transformed.⁶⁵

The plagiarism contagion

In order to successfully sue for copyright infringement under Canadian law, the plaintiff must first meet three basic evidentiary requirements. Judge Denault summarized these requirements in his decision in *Grignon v. Roussel*, a musical copyright infringement case wherein the plaintiff successfully convinced the court that his work had been plagiarized by the defendant.⁶⁶

To succeed in such an action a plaintiff must show the following: (1) that he has a copyright in the musical work, (2) that it is an original work, and (3) that the defendant unfairly copied it, that is, he had access to the plaintiff's work before composing his own, and that a substantial part of both works is very similar. (para. 9)

⁶⁵ On theories of communication embedded in copyright law, see Geller (1994) wherein he discusses copyright in terms of communication between creative subjects.

⁶⁶ *Grignon v. Roussel* (1991), 38 C.P.R. (3d) 4, 44 F.T.R. 121, F.C.J. No. 557 (QL) (hereinafter *Grignon*).

René Grignon successfully sued Jean-Alain Roussel for infringing upon his copyright in “Chanson numéro 7,” which Grignon initially claimed he composed in August 1987 and later distributed it, in Judge Denault’s words, “to certain librettists and people in the artistic world in Montréal, hoping that a song would be eventually made from it” (para. 2). A song was eventually made from it, but the composition was attributed to someone else. “Tous les Juke-Box,” sung by Martine St-Clair, was released in March 1988 and the cover indicated that Jean-Alain Roussel was its composer. Given that Grignon was successful in his action against Roussel, it is worth noting that at each of the three steps – proving ownership, originality, and misappropriation – memory and technologies of representation drift apart, although not to the point that the whole case falls apart.

To prove ownership of the work, Grignon opened a sealed envelop in court, which he had mailed to himself in February 1987. The envelope contained a cassette recording of a song along with a letter bearing Grignon’s signature asserting that he had written the song, entitled “Luc,” in November 1986. In Judge Denault’s words, Grignon was “Clearly surprised by the unexpected title given to his work and its date of composition” (para. 12). This gap between memory and material evidence was quickly smoothed over by Grignon’s explanation that he had originally intended the song for Céline Dion but after sending the song to Dion’s producer, who never replied, Grignon changed the song’s title to “Luc” since he had a new singer for the song in mind, Luc Plamondon, who confirmed that he had received a cassette copy from Grignon. Since Grignon had mentioned all of these copies and persons to whom he had sent them in his prior testimony, the court did not doubt the validity of his explanation.

In an attempt to undermine the originality of “Chanson Numéro 7/Luc,” counsel for Roussel called upon expert witnesses who compared it with fourteen other songs to show that Grignon’s composition was “not new.” However, Judge Denault criticized counsel for the defendant for ignoring the question of whether or not Grignon had access to, or remembered hearing, any of these apparently similar compositions: “It is important to note that apart from ‘Born to run’, no effort was made to have René Grignon identify any of these melodies or to determine whether he knew of them or had already heard them” (para. 19).

However, in their assessments of the degree of similarity between Grignon and Roussel’s songs, the expert witnesses provided the sort of analysis that Judge Denault was looking for. Judge Denault was most impressed by Jacques Faubert, a musicologist who concluded his “painstaking analysis” with an “overall assessment of 24.5 out of 29, or 84.5%, representing the degree of similarity between the two refrains which he had analysed” (para. 36-7). Nevertheless, following Fox’s (1967) rule set out in *The Canadian Law of Copyright and Industrial Designs* that similarities be determined “by the ear as well as by the eye,” Judge Denault asserted that “In the final analysis, it is for the judge - so much the better if he has a musical ear and knowledge - to decide whether according to his own assessment, experience and judgment an impression of similarity is created by the disputed musical works” (para. 37).

Although Judge Denault claimed that “tests of hearing” are “subjective,” he was confident that he would be able to discern “objective” aural similarities through repeated auditions of the sound recordings during the court proceedings. Judge Denault’s remarks about “tests of hearing” are surprising, since they suggest that copyright law in Canada

may occasionally privilege listening over seeing in the reconstruction of the “objective” sequence of events that resulted in “striking similarities.”

Writing imposes natural limits on the reproduction of what is perceived on hearing a musical work; it is not possible to accurately reproduce by words the impression made on the ear by hearing alternately the first measures of the refrain of these two works: it is striking. In the case at bar, I have no hesitation in concluding that in melodic, harmonic and rhythmic terms, the first eight measures of ‘Chanson Numéro 7’ and ‘Tous les juke-box’ have such a striking resemblance that one can only be a copy of the other, with minor differences resulting from arrangements or substitution chords. I also consider that this resemblance applies to a significant part of the work, not in quantitative but in qualitative terms, in that it concerns the first measures of the refrain which are the ‘hook’ that the ear retains for the purpose of identifying a piece. (para. 39)

Although Roussel claimed that he wrote “Tous les juke-box” independently, Judge Denault found that the similarities were so striking that they could only be the result of either a very strange coincidence or plagiarism. Since Grignon was able to show that Roussel was “exposed” to “Chanson numéro 7/Luc,” Roussel and his witnesses’ “vague” testimonies, based on their recollection of events, were supplanted by material traces of striking similarity between the two songs which the court interpreted as the cause-and-effect relationship of plagiarism.

The concept of plagiarism, even in an apparently straightforward (or “flagrant”) case like that of *Grignon*, is based on certain presumptions about the process of communication. As Ron Scollon describes this model (1995),

the more or less standard contemporary view of communication is based on the assumption that at any particular moment ‘one will be speaking his own thoughts on a matter and expressing his own feelings.’ Definitions of plagiarism that are commonly given are also based on the idea that a person, the rightful owner, has expressed his/her own thoughts or feelings, and that another has wrongly appropriated them for some other use. Underlying both of these views is a concept of knowledge and communication which takes ideas, as well as their wordings, as capable of being originally crafted by individuals. (pp. 19-20)

Scollon suggests that the seemingly simple concept of plagiarism is shorthand for a bundle of “hefty concepts” including the “the nature of the person who undertakes to communicate, the concepts of the ownership of discourse as individual or personal property” (p. 4).

Scollon insightfully points out that charges of plagiarism often reproduce a particular view of the subject of communication as the owner of his or her discourse. However, this type of possessive subjectivity is also based on a figuration of human memory as fallible. Juxtaposed with the legal system’s “objective” reconstructions of a person’s actions and social history, memories articulated in discourse can be made to seem unreliable, distorted or selective. In plagiarism cases, humanly embodied memory is often characterized as vulnerable to the plagiarist’s ambition and to his or her misplaced sense of entitlement. Indeed, as the cases of cryptomnesia suggest, the desire to be an author-owner in accordance with evidentiary requirements of copyright law may actually *encourage* plagiarism so as to transform similar works into works that courts will recognize as “objectively” or “strikingly” similar.

In the spring of 1973, a commercial for Salada tea featuring a catchy piano jingle called “The Homecoming” aired on Canadian television (Crowe, 1984, p. 33). In response to the many letters that Salada’s advertising agency received from the public about the song, the composer of “The Homecoming,” Hagood Hardy, extended the sixteen bar jingle into a 45 rpm single (*Ibid.*). The record reached the Top 10 across Canada in 1975 and sold over a million copies (“Hagood Hardy: A Tribute,” para. 4; “Hardy,” para. 4). In June 1981, Hardy was sued by Ivan Gondos, a piano teacher, composer and performer, who alleged that Hardy had plagiarized parts of “The

Homecoming” from Gondos’s “Variations on a Theme in A Minor” (“Variations”).⁶⁷ Over the course of three days, Gondos submitted evidence against Hardy and another composer, Rudy Toth, whose “Moment of Love” was also, according to Gondos, copied from “Variations.” Although Gondos and his supporters seemed to genuinely believe that Hardy and Toth had plagiarized Gondos’ composition, the defendants insisted they had never heard Gondos’s “Variations” and therefore could not have plagiarized it. Desperate to be recognized as the legitimate author and rightful owner of the musical works in question, Gondos resorted to the concept of unconscious plagiarism, or cryptomnesia, to explain the striking similarities between the three works.

Copyright law’s demand for originality generates an excessive desire to be recognized as the point of origin of the work. The legal system manages this excess in some cases by presenting the person’s memory as contaminated or distorted by ambition, and by exposing those distorted memories to the harsh “objective” reality inscribed in material traces of action. Caught in an untenable position between authorship and plagiarism, the composer may attempt to make material traces conform to his or her memory. *Gondos* is perhaps the best example of this process at work in Canadian caselaw.

The actions filed by Gondos against Hardy and Toth began to backfire as suspicions were raised that Gondos had tampered with the evidence. Although the decision does not explicitly state this, it began to look as though Gondos had modified “Variations” in order to transform it from a similar work into a *strikingly* similar work. Gondos fell into what Beverly Haviland (1997) calls “a relation between subject and object - the ‘unliveable’ other of adequately developed subjectivity” (p. 297). Having

⁶⁷ *Gondos v. Hardy* (1982), 64 C.P.R. (2d) 145, 38 O.R. (2d) 555 (Hereinafter “*Gondos*”).

internalized the rules of copyright law, composers who hear similarities between their work and those of others may become obsessed with proving infringement, since the other subject position – the place in between the author and the plagiarist – is unliveable in the sense that copyright law makes no room for partially plagiarized works or partial plagiarists.

Gondos seems to have moved from paranoia to plagiarism, both of which, in Haviland's words, are characterized by "an instability in the recognition of and respect for boundaries between self and other" (*Ibid.*, p. 296). Gondos and his supporters were convinced that other people were copying him, that his work was original, and that other similar works were derivative or even identical. But the tragedy of the case is that it clearly demonstrates how the evidentiary requirements of originality can "thwart a writer's attempt to negotiate her complex relationship with her origins" (*Ibid.*, p. 297). The valorization of originality in copyright law led to an obsession on Gondos's part with proving plagiarism, and to various attempts to make representational memory conform to his embodied memory of being the composer.

As the court tried to establish the facts of the case, Gondos's memory seemed to be increasingly inconsistent with the actual sequence of events as reconstructed by expert witnesses and technologies of representation. Gondos was not able to convince the court that a photocopy of the "Variations" score represented *his* work. Whereas Gondos claimed he gave this photocopy to one of his students "years ago, 1965 or so, I don't know," expert witnesses pointed out that the "signs of reproduction," including track marks on the paper as well as the size of the paper, matched Xerox machines available in 1974-5, but not in 1965 (*Gondos*, para. 8 and 13). Gondos also claimed that he made his

recording of “Variations” in August 1974, before he heard “The Homecoming” in a version of the Salada commercial that featured a church. This version of the commercial, however, was not aired after July of that year. Gondos’s memory did not seem to match his history as represented by the material evidence, that is, the photocopy given to his piano student, the audio recording of “Variations” that was missing the variation from which Hardy and Toth had allegedly copied, the dates that particular Salada commercials were broadcasted on television, Gondos’s submission to BMI of an array of works in 1965 which also omitted “Variations”, and the musicological opinion that his four page folio of “Variations” contained “the work of another person” (*Gondos*, para 23).

Counsel for the two defendants asked the judge to dismiss the case due to these inconsistencies. As Judge Carruthers wrote in his decision: “In their final analyses of why all claims and contentions of the plaintiff in this action should be rejected, counsel for all the defendants submit that little, if any, credibility be attached to the evidence of the plaintiff as it bears on the issues raised in this action” (para. 28). Judge Carruthers agreed, pointing to Gondos himself as the “worst offender” among all the witnesses “who were caught up in the promotion of the plaintiff’s case to such an extent that they lost much of any objectivity they might otherwise have about the matters in issue” (para. 29). The decision portrays Gondos and his supporters as blinded by their desire to help Gondos prove that his work had been plagiarized. Crucially, the offence to which Carruthers refers is the broader disarray between signifiers and their referents caused by rearrangement of words and inscriptions to simulate plagiarism.

At the same time, however, it is clear that something motivated Gondos and his supporters which, in my view, cannot be reduced to monetary gain. The similarities

between Gondos, Hardy and Toth's work were perhaps "striking" to Gondos and his supporters, who had heard Gondos's work first, and it did not seem possible to them that this resemblance was coincidental. Counsel for Gondos later attempted to convince the court that there was a causal relationship between the works resulting from unconscious plagiarism on the part of Hardy and Toth. After hearing several experts on this matter, and after referring to several cases where the possibility of unconscious plagiarism had been raised, Judge Carruthers maintained that the similarities were coincidental and did not stem from the same source.

Jurists admit that coincidental similarities are much more likely in popular music production, where originality "lies within a very narrow scope" (*Alain vs. Rouselle*, para. 20). Coincidental similarities are enabled by the same conditions as unconscious copying, namely the shift in memory, creativity and originality, understood as the capacity to operate as the origin for a series of works, to hybrid actors. The threat posed to the purely human subjectivity and sociality posed by autonomous inscriptions is much more visible in cases of cryptomnesia than in "flagrant" cases of plagiarism. The figure of the cryptomnesiac underlines the manner in which copyright confronts the disruptive notion that artistic production regularly occurs by "copying from memory" and that memory is not composed of the unique thoughts or ideas but rather of "registered" experiences. Thus, the caselaw on cryptomnesia is a particularly useful domain in which copyright's domestication of potentially disruptive interrelationships between memory, technology and consciousness can be explored.

Restoring the damaged subject

All mediators in copyright infringement lawsuits refer back to the story of independent creation, which is another mediation, and the figure of the cryptomnesiac is occasionally imported to make that story seem reasonable in light of the intertwined memories and knowledges of people and things. Viewed as a positivistic institution, law imports the concept of cryptomnesia to identify, classify and control people and things. Yet, cases of unconscious plagiarism or cryptomnesia are highly suggestive of the extent to which copyright law also acts as a quasi-therapeutic regime of memory by acknowledging the loss of integrity or personality that arguably follows from the misrecognition of memory as invention.

The court plays the role of a recognizing authority by acknowledging that in such cases both the defendant and plaintiff have lost something integral to the self, or will lose something that is integral to the self (albeit, through misrecognition) as a result of the decision. The most sympathetic statement recognizing this dual loss was put forward by Judge Owen in his decision in *Harrisongs* after finding “My Sweet Lord” (including a particular grace note) by George Harrison was indeed “strikingly similar” to The Chiffon’s “He’s So Fine”:

What happened? I conclude that the composer, in seeking musical materials to clothe his thoughts, was working with various possibilities. As he tried this possibility and that, there came to the surface of his mind a particular combination that pleased him as being one he felt would be appealing to a prospective listener; in other words, that this combination of sounds would work. Why? Because his subconscious knew it already had worked in a song his conscious mind did not remember. Having arrived at this pleasing combination of sounds, the recording was made, the lead sheet prepared for copyright and the song became an enormous success. Did Harrison deliberately use the music of He’s So Fine? I do not believe he did so deliberately. Nevertheless, it is clear that My Sweet Lord is the very same song as He’s So Fine with different words, and Harrison had access

to He's So Fine. This is, under the law, infringement of copyright, and is no less so even though subconsciously accomplished. (as cited in *Gondos*, para. 35)

Lawyers for musicians facing charges of plagiarism frequently refer judges to *Harrisongs*, and in particular, to Judge Owen's admission that cryptomnesia was not only possible but that it was the most plausible explanation for striking similarity in that case. Judge Owen's decision has forced judges in Canada and the US to at least form an opinion about the notion of cryptomnesia and has spawned a substantial body of literature in legal studies and psychology about cryptomnesia and its implications for copyright.

Periodically, judges demonstrate that they have developed increasingly nuanced ways of assessing whether copying in fact occurred and, if so, whether it is unlawful (Théberge, 2004, pp. 150-152). This expansion of the evidentiary requirements in some cases opens up the possibility for a "copying-from-memory" defense. Crowe (1984), for example, includes "subconscious copying (copying from memory)" in a list of possible defenses which, in her view as a legal scholar, should accompany the more nuanced approach developed in caselaw for assessments of access and copying. "Subconscious plagiarism results when a prior work so impresses itself on the mind of a subsequent author that, quite unwittingly and forgetting where he had seen or heard the prior work, he produces his work under the submerged influence of that work" (p. 57). Pointing to Jung's figuration of the creative subject as a cryptomnesiac, as well as to more recent studies in experimental psychology, Barbara Green (1998) writes, "Physiological evidence explains how it is that one is able to tap into the resource of 'forgotten' memories. The brain never forgets any impression, no matter how slight. The physiology

of the brain makes the reproduction of old memory possible, even after many years of total oblivion” (p. 64).

While there are conflicting views regarding the time that may elapse between “access” and the unconscious “reproduction of old memory,” legal opinions seem to increasingly agree with the general principle outlined by Judge Hand in 1924, that “Everything registers somewhere in our memories, and no one can tell what may evoke it.” Moreover, the caselaw suggests that this figuration of memory as a container for everything that has been experienced leads to uncertainty about the independence of the compositional process: no one can tell *when* an object of memory will be evoked in the creative process.

While Judge Hand found the time period between “access” and “copying” to be relatively short, Judge Owen’s decision suggested that there had been a much longer period time between Harrison’s supposed exposure to The Chiffons’ song and his subsequent unconscious plagiarism of it. In an infringement lawsuit filed against Michael Bolton by the Isley Brothers over the song, “Love is a Wonderful Thing,” the court devoted considerable attention to Bolton’s teenage exposure to a song that he was found to have subconsciously copied in his professional career as an adult.⁶⁸ Bolton appealed, pointing out that if in fact he and his co-author, Andrew Goldmark, had subconsciously plagiarized the Isley Brothers’ song, this amounted to a “twenty-five-years-after-the-fact-subconscious copying claim” (*Bolton*, p. 484). In her decision for the appellate court, Judge Nelson responded by supporting the Isley Brothers’ claim. “It is entirely plausible that two Connecticut teenagers [Bolton and Goldmark] obsessed with rhythm and blues music could remember an Isley Brothers’ song that was played on the radio and

⁶⁸ *Three Boys Music Corp v. Michael Bolton*, 212 F. 3d 477 (U.S. App. 2000) (Hereinafter Bolton).

television for a few weeks, and subconsciously copy it twenty years later” (p. 484). The problem of heterogeneity, or the growing recognition of nonhumans as constitutive rather than supplementary to action, manifests itself here in entanglement of memories and suggests that creative subjectivity, far from being bounded, extends beyond the human body into an assemblage of transmission and recording technologies.

Canadian courts have been more reluctant to introduce this figuration of unconscious memory as actively disguising “pleasing combinations of sounds” as inventions, although it is at least cited, as it was in *Gondos*, when either the plaintiff or the defendant refers the judge to cases like *Harrisongs*. In cases of unconscious plagiarism, the core conceptual binaries of copyright - self/other, private/public, original/copy, idea/expression - become blurry. When the defendant or the plaintiff in a case of musical copyright infringement admits that he or she may have plagiarized the plaintiff’s work, but has done so unconsciously, the court is confronted with the possibility that memories may be misrecognized as one’s own creations. However, American and Canadian courts stop short of admitting that the blurry relations between self/other, memory/invention, and embodied versus representational memory may be a part of the “normal” process of musical production. These unruly and unpredictable hybrids can potentially undermine the author-as-owner, a mediation of the creative subject as a bounded and cognizant of the difference between his/her expressions and his/her memories of the expressions of others.

On the surface, it seems that, as far as copyright is concerned, there is no need to prove whether something was copied from memory or from a work “in front” of the defendant. Memory in this sense is forgotten; copying from memory, whether conscious

or not, has no impact on the outcome of such cases. However, this reluctance to permit cryptomnesia as a defense points towards a potentially disruptive aspect of memory in copyright law. A few legal scholars have suggested that a partial defense be granted for cases of cryptomnesia, and in making their arguments, they demonstrate the extent to which the recognition of this figuration of memory would alter the story of independent creation. The legal system, for its part, acknowledges the possibility of cryptomnesia without granting it the status of full or partial defense. The figure of the cryptomnesiac is incorporated into legal discourse in such a way as to neutralize its threat to copyright's model of communication, signification and musical production.

Legal scholars who have prompted judges to consider cryptomnesia as a defense against copyright infringement dramatize the mind as a communication system in which memory plays a crucial part in generating “new” compositions. *Harrisongs* sparked interest in the study of cryptomnesia in experimental psychology, which has offered evidence that cryptomnesia is a “normal” part of “generative tasks” such as musical composition. As Richard Landau and Joshua Marsh (1997) state in their commentary following their experimental assessment of cryptomnesia,

Writing an article or creating new technological devices is akin to the generate-new task, in which [research subjects were told] the primary goal is the production of novel work. The primary goal is not to continuously monitor sources. In fact, source monitoring at the early stages of a project might obstruct progress because it might inhibit the generation of ideas that are similar (but sufficiently different) from older ideas. (p. 270)

Legal scholars have developed various rationales for using cryptomnesia as a partial defence against copyright infringement in US and Canada (e.g. Crowe, 1984; Green, 1999; Keyt, 1988; Litman, 1991). Many of these assertions are based on the view that

copyright law's model of the creative process is outdated and does not recognize the role of memory, technology, standardization, and the different contexts in which music is made meaningful. Under these conditions, the production of strange, striking or, as Adorno (2004 [1945]) once called them, "haunting" similarities, is the rule rather than the exception (p. 212).

In seeking a more nuanced assessment of similarity, copying, damages and remedies, legal scholars suggest that copyright infringement cases should be informed by the examination, in as much detail as possible, of the contexts of production. The implication is that the court should pay closer attention to changes in context in order to determine whether a work is plagiarized or not, rather than inferring causal relations from note-by-note comparison. As Aaron Keyt (1988) argues,

a composer creates something more than a string of acoustical events. Rather, the thing created is best viewed as a structure of relationships. Because the sounds in a composition are dependent on one another for their meaning, musical meaning is solely a function of context. *Thus, preservation of context must be a crucial element of copying.* (original emphasis, p. 347)

In order to determine whether there has been a change in context and thus in the meaning of a work, Keyt suggests that courts should examine similarities in the context of production recalled through testimony, expert opinion and so forth. Copyright infringement lawsuits would therefore need to modify their interpretive techniques and carry out an analysis of the works with an ear towards a broader range of musical elements. The truth, Keyt argues, lies not in the comparison of texts but in the degree to which the context of the original has been folded into the allegedly plagiarized work.

Alongside this proposition for a new test of similarity, Keyt provides a figuration of the creative mind based on an analogy to technological reproduction:

Imagine a malfunctioning photocopy machine. The act of putting the original on the glass and pressing a button is analogous to the question of copying as historical fact. What goes on inside the machine, and what comes out the other end as a result, is analogous to what can go on inside the creative mind. (p. 430)

In Keyt's figuration, the mind is black-boxed as a malfunctioning photocopier. The mechanical (but unseen) processes are equated with "copying as historical fact." The black-box of the creative mind, construed as a photocopying machine, displaces the fluid and unruly associations of memory that periodically confront courts in cases of unconscious plagiarism.

Despite the disruptive potential of cryptomnesia, several musical copyright infringement decisions have acknowledged that unconscious copying can be the cause of "striking similarities." As Judge Carruthers wrote in *Gondos*:

The word 'copying', in its ordinary usage, connotes a conscious, intended, or deliberate act. Unconscious copying occurs, then, in the absence of any of these elements, but, of necessity, with the required evidence of de facto familiarity with the work alleged to be copied. (para. 34)

Green (1998) goes further and argues that, "all artistic works subconsciously plagiarize previous artistic works" (p. 65). Courts often assume that it is possible to make a sharp division between (shared and vague) ideas from (individualized and fixed) expressions while, in practice, courts shift this line in a case-by-case way to validate this conceptual dichotomy. Green's analogy between cryptomnesiacs and children, persons in a state of sleep, and the insane, linked by the notion of automatism and the incapacity to choose, make decisions or act voluntarily. Memory becomes autonomous in this figuration of the creative subject, sparking the process of musical production independently of the psyche or the volition of the person. The creative subject is reconfigured with subconscious

memory as the driving force. But this figuration of musical memory leaves out the nonhuman delegates which listen and remember for the subject, transforming the embodiment of the subject who consumes, composes, remembers and describes music and musical experience. Judge Nelson's description of Bolton's immersion in a network of representational and tele-technologies more adequately accounts for the dispersal of subjectivity across heterogeneous materials than any of the legal commentary that I have found on cryptomnesia.

Although subconscious plagiarism is not yet an acceptable defense for infringement, there is an underlying therapeutic role that the court assumes in recognizing loss of one's self or expression thereof, usually in the language of economic losses and damages. Although copyright is in an important sense an economic regime, not all doctrines, principles, rules and tests in copyright law can be reduced to the goal of efficiency and other utilitarian justifications for copyright protection. The doctrine of unconscious plagiarism attempts to renew the meaning of the story of independent creation in the presence of composers who know very well that much of their musical experience and memory is dispersed across extrasomatic resources. The concept helps to reinforce a system of music production characterized by standardization, and to protect the abstract personage of the author while simultaneously parceling out his/her/its rights to various entities. The unruliness of memory and, in particular, its disregard for propriety boundaries, can potentially undermine the sharp division between ideas and expressions. But copyright law continues to model and enact musical memory not only by constraining the manner in which people access the musical past, but also by requiring

human memory to be as precise, fixed, and “objective” as representational technologies and expert reconstructions musical events.

The US Federal Court of Appeal left Michael Bolton puzzled about how he and his co-author could have unconsciously copied music twenty-five years after they had heard the original work. As discussed in the next chapter, Saskatchewan farmer Percy Schmeiser was equally baffled by the Supreme Court of Canada’s decision that he had infringed upon Monsanto Canada’s transgenic patent by doing what he does every year: saving, processing and replanting seed from his canola crop. “Things” in both cases are neither natural objects nor are they social constructions. Machinic memory and transgenic organisms are hybridizations that perform connections in laboratories, studios, communication systems and law. Instead of behaving like passive objects or materializations of social needs, interests and values, they become overly-active agents of reproduction. Institutions deploy specialized discourses to mop up the mess that hybrids make of the Great Divide. However, by focusing on the aporias, the glitches, and places where things fall apart, I have demonstrated that by socializing things humans grant them the capacity to resist or at least withdraw from the identities, roles and scripts for action that have been delegated to them.

The work of authorship, which is traditionally defined as an expression in fixed form, is a modular virtualization of sense-perception. It is decomposable into distinctive sensory experiences which can be recomposed in the unconscious mind with other elements, and the resulting work may be deemed identical to the original. In this sense, the work of authorship becomes virtual in copyright law (it is only one of many sequences and combinations). What was virtual (the entire signifying system and stock of

cultural knowledge from which the author chose certain combinations and sequences) becomes real.

Transgenic patents are also inversions of reality/virtuality. As I will discuss in the next chapter, what is real for some actors (namely, farmers) such as seed, plants, crops, etc., are now “merely” virtual. Like Bolton’s composition, they may be combined with other material, but for the purposes of intellectual property law, they are identical. In semiotic terms, seeds, plants and crops are the material signifiers for a conceptual (genetic) referent. The combinations and sequences of genes, which may be actualized in laboratories or in fields, circulating and recombining with other sequences and combinations, are real. Or, at least, that is what the court decided in *Schmeiser*.

5. Genetic chimera: Culture in the age of its biological reproduction

Problematizing the “who” and “what” of self-replication

At first glance, genetic science seems to offer new ways of transforming reproductivity mechanisms into mechanisms for controlling the nonhuman in the form of crops, disease, medicine, and so on. According to *Scientific American*, American juries frequently expect DNA analysis for criminal cases such as murder even when the accused has admitted to committing the crime (Houck, 2006). If genetic science encourages a perspective of the objective world as encoded in DNA, where is subjectivity? One clue can be found in *CSI: Crime Scene Investigation*, which, through a mixture of clever lighting, computer animation and slick soundtracks, manages to make the process of DNA analysis, not just the revelation of whodunit, seem exciting. Notwithstanding the theme song, “Who are you?” by The Who, *CSI* typically focuses on individual identity rather than subjectivity or selfhood. One exception is a scene in a 2005 episode in which the forensic supervisor, Gil Grissom (William Petersen) and detective Sofia Curtis (Louise Lombard) engage in philosophic ruminations about identity and selfhood as they collect evidence from a woman’s corpse.

GRISSOM: A brown hair with a follicular tag. A person’s entire identity balled up in a few nanograms of matter.

SOFIA CURTIS: Assuming one’s identity can be wholly quantified by our DNA.

GRISSOM: Well, genetically, it can. We’re completely programmed as soon as the sperm hits the egg.

SOFIA CURTIS: So we’re defined at a cellular level?

GRISSOM: More or less.

SOFIA CURTIS: No. Identity is the totality of our life experiences and our brain neurons process our relationship to the world and each other.

GRISSOM: I stand corrected. DNA is what we are, not who we are.

SOFIA CURTIS: What we are never changes. Who we are never stops changing.

GRISSOM: Yeah. Whether we like it or not.

Grissom gets the final word, but not until his genetically-deterministic equation of identity and subjectivity has been qualified by Curtis's neuroscientific view of subjectivity. Identity, or the "what" is a thing, a constant against which the processual and relational subject can be discerned. What stands out here in light of the discussion of the aural unconscious in the previous chapter is that the subject's agency is shifted out of the conscious mind into neurological processes. Despite its intentions, desires, likes and dislikes, the subject cannot prevent or control its mutations and it cannot change the composition of its individual or species identity.

The figuration of the subject as a neurological process firmly located in the human body works as an anti-anxiety mechanism against the biotechnology's disruption of bodily boundaries and the growing intimacy of humans and nonhuman in law, especially in jurisdictions where animals and plants have reproductive rights. Writing for *The New York Times*, Clay Risen (2008) notes that the Ecuadorian government granted "nature" the "right to the maintenance and regeneration of its vital cycles, structure, functions and evolutionary processes" while the Spanish government has given similar rights to apes and the Swiss to plants in order to protect their "reproductive ability."⁶⁹ As N. Katherine Hayles (1999) demonstrates, the redefinition of life in terms of self-generation, self-organization and other capacities derived from reproductivity provokes anxieties about the disruption of body boundaries. What were once mere "parts" become autonomous "wholes." Similar incorporation anxieties emerge out of biotechnical

⁶⁹ Clay Risen (2008), *The year in ideas 2008 – Interactive feature; Plant rights*. Accessed March 16, 2009 from http://www.nytimes.com/interactive/2008/12/14/magazine/2008_IDEAS.html#p-ideas-2.

interventions in the metabolism of cells. The treatment of people and things as reconfigurable bio-informational systems raises troubling questions about the programmability of the human and about the material and social life of nonhuman programs. Biotechnical reproductivity also generates inscription anxieties about the contamination and subordination of humans to the processing of nonhuman inscriptions and the capacity of inscriptions to become embodied entities that rival and overtake their human counterparts. While Hayles suggests that incorporation is the richer ground for the development of new forms of subjectivity, both types of anxieties can encourage the production of alternative definitions and enactments of the human which depend less on closure to nonhuman others.

One way into the expanded human-nonhuman collectivity of biotechnology is through the entanglement of Percy Schmeiser, a Saskatchewan farmer, with a transgenic organism marketed by Monsanto as Roundup Ready canola. As discussed by Lawrence Busch and Keiko Tanaka (1996), modern canola derives from rapeseed, the oil of which was, for many years, considered unsuitable for human consumption due to its association with high cholesterol. After the Second World War, the Canadian government embarked on a program to construct a more secure domestic food production system. This involved the development of sources of edible oils that could withstand Canadian winters. During the 1950s and 1960s, government agencies bred a strand of rapeseed with less acid in its oil, lower saturated fat content and an enhanced moisture level which made it suitable for deep frying, processing into margarine, mayonnaise and salad dressing. To reflect this transformation, rapeseed was renamed canola and Canada became its largest exporter. Over the last fifty years, the Canadian government has worked with various industrial

actors in Canada and internationally to transform a heterogeneous and unruly crop into a commodity through the development of tests, classificatory schemes and standards of “goodness” for both human and nonhuman entities involved in the canola commodity chain (Busch and Tanaka, pp. 6-7).

In February 1993, Monsanto Canada Inc. obtained a Canadian patent for “glyphosate-resistant plants.”⁷⁰ As disclosed in the patent, Monsanto’s invention consists of genes and cells containing the genes which can be inserted into canola DNA to generate canola plants that can withstand glyphosate. Glyphosate destroys plant life by deactivating a gene which is involved in the production of an enzyme essential for growth and survival. This unusual resistance to chemicals designed to destroy plants is conferred by inserting a bacteria gene into plant DNA. Canola grown from seed containing the gene will survive glyphosphate herbicide while other weeds and plants will die.⁷¹ There are two ways to determine whether or not a plant is “Roundup Ready”: (1) laboratory analysis of the plant’s DNA; and, (2) a “grow out test” in which Roundup is sprayed on the plants so that only Roundup Ready plants survive. Although the Roundup Ready system is a set of tightly bound scripts for human and nonhuman action, canola’s “on/off” switch for resistance and the herbicide’s capacity to target the actions of specific genes are open to multiple configurations, one of which facilitates unauthorized plant reproduction.

Monsanto began marketing genetically-modified seeds as Roundup Ready canola in 1996 to farmers who use it because instead of spraying for weeds first and then

⁷⁰ *Monsanto Canada Inc. v. Schmeiser*, [2004] 1 S.C.R. 902, 2004 SCC 34, para. 8.

⁷¹ Health Canada (1999, October), Food & nutrition; Genetically modified (GM) foods & other novel foods; Glyphosate Tolerant Canola, GT73, para. Accessed June 9, 2009 from <http://www.hc-sc.gc.ca/fn-an/gmf-agm/appro/ofb-094-325-a-eng.php>.

planting seeds, the entire crop can be sprayed and it will kill everything but the canola. Since Roundup Ready canola contains the patented gene, Monsanto can restrict its use by requiring farmers to sign a Technology Use Agreement (TUA) and thereby agreeing to Monsanto's rules for growing the plants. The farmer is then bound by the agreement to buy seed only from dealers authorized by Monsanto and to sell the crop to only to authorized Monsanto dealers. The farmer cannot sell, give away or save seed and must allow Monsanto to inspect the fields and take samples if it wishes to do so. The licensing fee for Roundup Ready canola is \$15 per acre.

Percy Schmeiser began growing canola in the 1950s, saving seeds to replant the next year, avoiding tilling diseased plants, spraying for weeds before planting and using Roundup only for areas around power poles and in ditches. Schmeiser believes that he has developed his own strain of canola that is uniquely suited for the conditions in Bruno, Saskatchewan, where his farm is located. Schmeiser purchased canola seed in 1993 but he never purchased Roundup Ready canola and had not signed a TUA for Roundup Ready Canola.

Five farmers in the Bruno area grew Roundup Ready canola. In 1996, one of these farmers grew Roundup Ready canola in a field next to Schmeiser's canola crop from which he saved seed and replanted in 1997. In the summer of 1997, Schmeiser and his farm hand, Carlyle Moritz, used Roundup to kill off weeds around power poles and in the ditches between his fields and the main road into the town of Bruno. A few days later, Schmeiser found that many canola plants had somehow survived the spraying. To figure out why, he performed a grow out test, spraying a three acre swath of his crop near the road with Roundup. After a few days, approximately 60% were found alive, with high

concentrations near the road and thinning inwards to his field. When the canola was ready to be harvested, Schmeiser had Moritz combine the fields as well as the areas near the road. In the spring of 1998, Schmeiser had the seeds processed and planted them in over 1,000 acres of his farm. He sold the crop for \$142,000.

Monsanto tested Schmeiser's 1997 crop and accused him of obtaining Roundup Ready Canola without authorization, but quickly withdrew its allegation of patent infringement. In 1998, Monsanto did more extensive testing on Schmeiser's fields. Monsanto found a high percentage of Roundup Ready canola plants and sued Schmeiser for using its invention without authorization. What was initially a test case for Monsanto's ability to enforce its monopoly rights to patented seeds opened up a number of more fundamental questions. Schmeiser forced the trial judge, the appeal judge and then the Supreme Court of Canada to reconsider the validity of the patent claims, the meaning of "use" in regards to a gene patent, and the line between patentable and unpatentable subject matter. In this way, the trajectory of Roundup Ready canola reopened the question of whether gene patents effectively confer intellectual property ownership over life generated by those genes. The Supreme Court of Canada had already been divided on this issue. In an earlier case, the Court upheld the Patent Commission's decision not to grant patent rights to the genes and cells that render mice susceptible to cancer (and would thus be useful in cancer research) because such a patent would grant rights to the mice themselves.⁷² In partnership with Schmeiser, Roundup Ready plants renewed the debate among jurists, environmental advocacy groups, government agencies, biotechnology industry representatives, bioethicists, and agricultural and legal scholars.

⁷² *Harvard College v. Canada (Commissioner of Patents)*, 2002 SCC 76 (CanLII), [2002] 4 S.C.R. 45, 2002 SCC 76.

The controversy surrounding Roundup Ready canola (“RR Canola”) is useful for highlighting the manner in which reproductive anxieties emerge out of, and contribute to, the problematization of incorporation (reconfiguration of body boundaries) and inscription (mediators become actors and vice versa) in the emerging bio-informational regime. In legal and journalistic texts, incorporation anxieties emerged around the boundaries between the plants, cells and genes; very different results for the identity of a plant in law, science and farming practice were possible depending on how the manner in which these boundaries were redrawn. The properties of DNA-based “things” do not fit very well into legal definitions of “thingness” because of the difficulty of drawing boundaries around a “thing” that is a part of what it produces and organizes. In the Supreme Court’s decision, inscription anxieties were more pronounced, as the minority worried that the granting control over code would effectively grant Monsanto control of reproductive processes of the plant. The conventional definition of “use” in patent law thus became problematic, since it was unclear how genetic “things” can be used by human actors. If Schmeiser used Monsanto’s invention by growing it, does this mean that any farmer who happens to have canola growing on his or her farm is a user of the invention? Should the farmer’s intentions be considered in deciding cases like this, thus breaking away from the traditional exclusion of intentions in cases of patent infringement? If the farmer’s intentions do not matter, then how much weight should be given to those of the self-replicating plant?

There is a striking parallel between unconscious musical plagiarism and unintentional genetic replication. This parallel emerges as a category of actions that cannot be entirely attributed to human will and choice. Just as cryptomnesia shifts

attention from originality to the actors' various accounts of the socio-technical origin and life of copies, proving infringement of a gene patent leads to a rather embarrassing affirmation that gene patents are much more promiscuous, unruly and malleable than patent claims suggest. But the problems of identity and identification are much more pronounced in the case of gene patents. Monsanto needs the technologies of law (e.g., its manner of producing subjects) to stabilize its genetic inventions and define the proper courses of action for those who come in contact with those inventions. The problem, however, is that genetic science, far from settling the matter of who owns what, shifts agency out of subjectivity into the realm of mechanistic biology. As Pottage (2002) argues,

the turn to mechanism in biology has proved problematic for law and ethics. In one sense, genetic explanations promise to make biology – as the basic referent of legal rights – determinate, but in becoming determinate 'biology' shrinks to leave a thematic or normative 'vacuum' in law. The question of 'body' defines the horizon within which these anxieties are negotiated by bio-ethics committees. (p. 285)

Genetic materials and processes threaten to overstep the proper role of the biological entity (to act as a stable anchor for its rights and a reference point for its legal and ethical treatment) and become determinant of the entity's body and behaviors. Biotechnology challenges the division of biology from the codes used to describe and regulate it in what Mitchell (2003) calls bio-cybernetic reproduction. Instead of a pre-personal, non-human, brutishly material, biological referent as the "what" on which a cultural "who" is performed, biotechnology places both in the realm of inscription.

The question of body is also key to exploring the public interest in, and anxieties about, RR canola and its patentability. In contrast to other gene patents and transgenic organisms, RR canola received wide and sustained media coverage due to the decade-

long legal dispute between Monsanto (and its supporters) and Schmeiser (and his many supporters) between August 1998, when the Monsanto filed its complaint against Schmeiser for patent infringement, and 2008 when Schmeiser “won” an out of court settlement with Monsanto for the removal of “volunteers” (stray plants) which Schmeiser claimed had contaminated his farm and compromised his status as a “non-GM” farmer. I suggest that more than any other legal case or regulatory controversy, *Schmeiser* mediated, continually renewed and shaped anxieties in Canada and around the world stemming from general knowledge about DNA and how it is and could be used to reconfigure the “who” and the “what” of the legal subject.

Enrolling anxieties

In principle, the possibility of infringement could have been programmed out of the RR system by engineering RR canola to produce sterile offspring. But given the strong public, scholarly and activist response against GURTS (genetic use restriction technologies) and other “hard coded” restrictions on agricultural resources, it is not surprising that Monsanto shifted those restrictions into legal rather than genetic code. Anticipating the potential for “piracy,” Monsanto demanded “more law” for RR canola, seeking propriety rights for DNA under the *Patent Act* (1985) in order to trump farmer’s rights rather than applying for the more restricted rights conferred to owners of novel plant varieties under the *Plant Breeders’ Rights Act* (1990). However, the control mechanisms were vulnerable not only to “agrarian plagiarism,” as one newspaper put it, but also “programming bugs” such as gene flow or contamination which require

continuous de-bugging, including the time-consuming process of removing volunteer crops.

Unlike other farmers who were being sued around the same time by Monsanto, Schmeiser had not signed the technology use agreement, he did not try to sell the seed, and he maintained that his infringement was a consequence of the irresponsible release of the gene, seed drift, and the nature of the patent.⁷³ Schmeiser frequently told reporters that he was genuinely fearful of the effects of GM technology and was not attempting to hijack it for financial gain. Establishing his identity as a victim of a genetic contagion rather than as an opportunistic infringer helped to interest others around the world in his story. With *Schmeiser*, courts were given the opportunity to define what RR canola is and what its meaning and value is for farmers like Schmeiser as well as the consumers, advocacy groups, and governments he came to represent.

However, in my analysis of the legal decisions, I found was that the meaning of the code-based reproduction was not entirely stabilized through the court decisions. The transgenic object appeared to resist the identities imposed on it by all parties, reproducing itself in a way that transgressed “good” and “bad” reproduction in law, environmentalism, and industry. While Monsanto enlisted thousands of farmers, certain consumer groups, parts of the media system, and even federal ministries to make its patent claims seem indisputable, necessary and beneficial, a “counter-network” took shape around the errant organisms.

⁷³ *Monsanto Co. v. McFarling*, 363 F.3d 1336 (Fed. Cir. 2004), wherein it was found that McFarling had signed Monsanto’s TUA. *Pioneer Hi-Bred International, Inc. v. Ottawa Plant Food, Inc.*, 283 F. Supp. 2d 1018 (N.D. Iowa 2003), wherein defendant tried to resell patented product. *Monsanto Co. v. Trantham*, 156 F.Supp, wherein court rejected defendant’s claim that Monsanto’s patents were anti-competitive.

Just as Latour (1998) analyzed how actor-networks are formed by retracing the steps of Pasteur in his attempt to convince farmers and eventually all of France that milk was contaminated with microbes, I use *Schmeiser* as a way in to the counter-network built upon the folding of anxieties into each other. In contrast to much of the news discourse (and some scholarly literature) which likens *Schmeiser* to the parable of David and Goliath, Schmeiser's canola counter-network is as diverse and as vast as Monsanto's RR canola network.

The diversity of groups that were granted intervener status for Schmeiser's appeal is indicative of the extent to which a broad spectrum of concerns, interests and anxieties were enrolled, mobilized and materialized in legal action. These groups include the Attorney General of Ontario, the Council of Canadians, the Sierra Club of Canada, the International Centre for Technology Assessment (US), the Research Foundation for Science, Technology and Ecology (Delhi) and the Action Group on Erosion, Technology and Concentration. As I argue below, the counter-network also enrolled and mobilized Supreme Court justices such as Arbour J. who wrote the dissenting opinion in which she argued that the majority had misinterpreted the meaning of "use" in the context of gene patents. "With respect, in my view, the case law does not support my colleagues' interpretation of use" (para. 154). Indeed, Arbour J. suggests that much of the jurisprudence on "use" is not relevant to "use" in *Schmeiser* "because of the unique properties of biological materials, especially higher life forms that can self-replicate and spread" (*Ibid.*).

Reproductive anxiety in cases of bio-informational inventions is provoked to a large extent by a general knowledge of genetics and its possible implications (Roof,

1996). In an age where DNA displaces blood and murder weapons as stand-ins for the culprit in popular culture, no specialized knowledge is required to contemplate the possible implications of DNA in processes of social ordering. Moreover, as Richard Ericson, Patricia Baranek and Janet Chan (1991) argue, “As a social discourse, law is recognized as valid more through the ways it is ‘mediated’ in popular culture than through its formal procedures or substantive content as construed in legal culture” (p. 244). Since many areas of intellectual property are largely ignored by popular culture, the force of intellectual property derives more from their use in habituated action as well as institutional discourses. But these routine actions were disrupted by the news coverage surrounding *Schmeiser*, which translated the legal dispute into an ongoing set of cultural anxieties about biotechnical hybridization.

While the suspected capabilities of transgenic technologies and bio-informational reproductivity more generally are implied at times in court decisions, they are more legible in news reports. Thus, without losing sight of the different kinds of authority that these documents have, I suggest that reproductive anxiety in *Schmeiser* is as much about the imagined capacities of new networks of humans and nonhumans to transform one another as it is about the specific patent claims and alleged breaches of patent law that Canadian courts were asked to evaluate. Although reproductive anxiety cannot be reduced to an effect of journalistic discourse within an ANTian framework, such discourses can be enrolled into the problematizations that give reproductive anxiety its historically- and culturally-specific forms. Martina McGloughlin (2001) lists public concerns about GM, many of which were incorporated into the problematization

established by Schmeiser and his supporters (from grassroots organizations to the dissenting justices of the Supreme Court):

- “Ethics of genetic modification (interfering with nature)
- Safety of food and of introducing genetically engineered organisms into the environment
- The alleged radical novelty, unpredictability, or irreversibility of biotechnology
- Possible negative impacts on employment or small farms
- Trust or lack of trust of government regulatory agencies
- Enhancement of corporate power and ownership of intellectual property
- Possible exploitation of developing countries
- Possible mistreatment of animals.” (p. 36)⁷⁴

Through the mechanisms of translation, this diverse array of concerns, worries and anxieties were eventually condensed into “contamination.” The “possible” consequences and imagined capabilities of biotechnical inventions were just as important for the durability of the counter-network as the actual and imminent concerns in McGloughlin’s list.⁷⁵ The contaminant rather than commodification or mistreatment was the key discursive “prop” in the counter-network that formed around *Schmeiser*.

The particular anxieties of law regarding gene patents stem from the DNA’s multiple roles in knowledge production and social ordering. DNA simultaneously acts as the object of regulation and the means by which to identifying objects, owners and

⁷⁴ Other studies of regulatory controversies suggest that there is also a sequence in the concerns raised in regulatory controversies, from feelings of empowerment and control to anxiety and uncertainty. But there is also a stepped pattern in the different sources of anxiety throughout the lifespan of a regulatory controversy about food technology. In their study of three food controversies – pasteurization, irradiation and biotechnology – Ten Eyck and Williment (2004) note that in all cases innovations in food technology were initially mobilized as part of a broader programme of “progressive farming.” Approximately ten years into the news coverage, however, anxieties emerge about the regulatory, economic, taste, and consumer rights implications of the technologies. After fifteen years, taste-based and economic anxieties are displaced by anxieties about the health of people and environments.

⁷⁵ Consistent with McGloughlin’s study of the Swiss public, Heller (2001) found that in 1999 the discourse of GM in France widened to include what she calls “the political.” More specifically, the notion that GMOs commodify life (borrowed from Shiva’s 1977 book) began to circulate in the public debate. The commodification of life discourse is wider in the sense that it links a wide range of technologies, events, and entities – such as Dolly and Frankenfoods – as part of the same problem. Moreover, a wider range of actors from various strata of society are encouraged to make the same connections.

culprits. Moreover, RR canola challenges legal conceptions of “thingness.” Does this challenge lead, as Roof (1996) found in her analysis of popular culture, to the recuperation of the bounded subject? Or does it lead to a mutation of embodiment and subjectivity?

As discussed in subsequent sections, *Schmeiser* emerged at a time when the legal system, along with other institutions, confronted the problems of heterogeneity, epistemology and distribution posed by various forms of virtualization. Coming to terms with “thingness” became a persistent problem in legal theory and practice. As Michael Madison (2005) argues, “Property theorists have recently raised the problem of things in the law, recognizing the paradox that in an era of increasing dephysicalization of the artifacts of our lives, thingness may matter more than ever” (p. 382). Madison highlights the problematic status of informationalized things, but “dephysicalization” suggests virtualization-as-disembodiment whereas the information in virtual culture is understood to be extractable but embodied. The circumstances might be better described in terms of anxiety, that is, an embodied experience which in this case stems from uncertainty about identity and continuity in code-based reproduction. As Roof argues,

the incipient alteration of the order of identification/identity enabled by DNA produces an anxiety about a loss of identity that takes the form of the fear of multiples that DNA also potentially represents. This anxiety isn’t necessary produced by a knowledge of DNA’s capacities, but by a generalized suspicion about the capabilities of genetic engineering. (p. 181)

In other words, DNA’s imagined capabilities in processes of identification outstrip the actual capabilities of DNA in identifying individual persons or things. Two or more individuals may share the same DNA (e.g., identical twins; non-GM crops that have been

cross-pollinated with RR canola), frustrating the modes of identification, differentiation and attribution in law.

None of the news stories about *Schmeiser* that I analyzed linked the concerns, worries and conflicts surrounding RR canola and other genetically modified organisms and gene patents with identity. However, identification was the primary concern in the controversy about the labelling of products containing GMOs, which emerged around the same time that *Schmeiser* was moving through the various levels of the legal system and involved many of the same individual and institutional actors.

The regulatory controversy about GM labelling became a major news story on October 16, 2001, when Liberal MP Charles Caccia's private members' bill C-287 for the institution of a mandatory labelling regime in Canada was narrowly defeated in Parliament. Headlines in major Canadian dailies between 1999 and 2001 such as "Lines are fuzzy on GM foods," "Food fight" and "Local action brewing against GM giants" indicate the growing anxiety about industry and government efforts to frustrate an already-difficult process of identifying GM DNA or proteins resulting from such DNA in food products.⁷⁶

The demise of Bill C-287 compounded anxieties about identification that had been provoked by the "biotech sponsorship scandal," in which a Greenpeace-funded researcher found evidence that governmental regulators were funding pro-GM public relations campaigns, first reported by the *Montreal Gazette* in March 2000.⁷⁷ At this

⁷⁶ Lyle Stewart (2002, April 5), "Lines are fuzzy on GM foods," *Montreal Gazette*; Thomas Walkom (1999, August 22), "Food fight," *Toronto Star*, p. 1; Joanne Paulson, (2001, October 12), "Local action brewing," *Star-Phoenix*, p. A1.

⁷⁷ Mark Abley, (2000, February 28), "Biotech lobby got millions from Ottawa: Public cash used to alter image," *The Montreal Gazette*, p. A1.

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point, news stories merged anxieties about genetic contamination in grain cars, mills and processing plants with worries about the lack of independent testing and the willingness of regulators to implement a mandatory labelling regime.⁷⁸ “Contamination” represented collusion, corruption as well as the circulation of (mis)information and informationalized things. Anxieties about problem of identifying GM DNA in the crops and the broader food system led to a shift the formation of the Guelph-based Food Biotechnology Communication Network. The Network consisted of government officials, researchers, public relations experts and industry representatives who believed that mobilizing “science-based groups” would diffuse anxieties by circulating reassuring claims that food biotechnology is safe for humans and environment.⁷⁹

Following Roof’s analysis of DNA in popular culture, demand for identification-by-DNA in a mandatory labelling regime can be understood as a symptom of the loss of a regime of reproduction based on paternity, individualization and singularity. While DNA is being mobilized in processes of commodification and surveillance, some of them seemingly designed in the public interest, new technologies of reproduction such as genetics and digitalization threaten individualist subjectivity and the regime of reproduction which supported it. In Kember’s (1998) terms, identification-by-DNA provokes “virtual anxiety” because the informational means of knowledge-production become contaminated or synonymous with the unruliness and uncertainty which the regulatory mechanisms were meant to reign in.

Engineers attempt to make humans more predictable by enrolling their anxieties into technical design. While public unease about genetic use restriction technology

⁷⁸ Thomas Walkom (1999, August 22), “Food fight,” *Toronto Star*, p. 1.

⁷⁹ The growing public concern about the safety of food biotechnology was noted by Rick Walter of the Canadian Institute for Biotechnology as early as 1995.

(GURTS, or “Terminator” technology) in seeds might suggest that socio-cultural values limit the amount and type of regulation programmed into reproductive technology, a combination of legal and genetic codes as exemplified by the RR canola system has been successfully mobilized in Canada and many other countries by “shifting out” regulatory scripts from code (plant genes) to contract (technology use agreements). Monsanto’s decision not to pursue GURTS and to instead enforce its largely successful gene patent system suggests that reproductive anxieties shape technological innovation, but not necessarily in ways that counter-networks would want. Engineers enrol anxiety about farmers’ agency and environmental contamination along with the probability of a certain rate of infringement into new problematizations which are leading towards the development of GM traits that can only be “turned on” with proprietary spray, and, as a way of staving off antiprograms built on anxieties about contamination, the so-called “Exorcist” technology eliminates any “foreign” DNA in seeds, rendering them “GM-free” (Forge, 2006).

Unlike Pasteur in Latour’s famous case study, Schmeiser and his supporters do not have the advantage of being able to point to infections, sick people or dead bodies as effects of the dangerous but invisible contagion. But in *Schmeiser*, a different catastrophe becomes possible. The scene is filled with “out of control” GM canola, farmers enslaved to biotechnology corporations, consumers who unwittingly ingest GM food and courts that “indirectly” extend (via courts rather than Parliament) patent protection to “higher lifeforms.” In Schmeiser’s terms, farms and farmers become contaminated by the

astonishingly rapid self-reproduction of the “invention,” and Canadian farming reverts to a feudal-like system.⁸⁰

As a narrative, *Schmeiser* is a health crisis without sickness, accomplished by adding other moral, ideological, political and economic agents to the drama: the contamination of his farm by GM canola becomes inextricably bound up with the reduction of farmers’ discretion by the authority of biotechnological objects – a bio-juridical “infection.” The nonhuman-as-contagion in Latour’s study of Pasteur can be invoked in controversies that are not actually about microbes, disease or sickness to generate anxiety and organize action.

Schmeiser had the unintended effect of opening up an opportunity for Schmeiser to associate RR canola with a wide range of concerns about genetically-modified organisms (GMOs) bound together by a broader anxiety about the multiplicity of transgenic inventions, that is, their mobilization by Monsanto as commodities, intellectual property and regulatory mechanisms. While Monsanto was able to stave off Schmeiser’s anti-program and the whole counter-network of advocacy groups, farmers and jurists, it was unable to manage uncertainty about the reproductive actions and effects of its living inventions. The growth and endurance of Schmeiser’s counter-network depended upon strategies for provoking, channelling, perpetuating and merging a range of anxieties and giving them a common anxiety-object.

⁸⁰ A recent Montreal Gazette article quotes Guy Debailleul suggesting a similar regression in property law. “It’s a feudal relationship. It’s a takeover of the agricultural profession by these companies.” Scott, Marian. (2008, May 28). Sowing seeds of Discontent. *The Gazette*, p. B.1; Kinver, Mark. (2008, January 31).

Mutable mobiles

Though *Schmeiser* did not receive as much attention from bioethicists as similar cases involving animals, RR canola mobilized new inter-definitions of human and nonhuman life in bio-informational terms. Schmeiser's counter-network depended on the channelling of anxieties that such drastic revisions in the "correct" way of classifying and seeing the world tend to provoke. As much as courts attempted to dodge the question, *Schmeiser* called upon those who heard the story to think about the implications of the relationship between information and materiality in genetic redefinitions of life.

The caselaw on transgenic patent infringement suggests that jurists are or should be involved in the policing of boundaries around "thingness" in order to protect humans from the types of control that are regarded as harmless when they are applied to nonhumans. Patent law has come to represent a kind guardian of human purity when, in practice, it is engaged in the authorization of human-nonhuman hybrids. The public appearance of humans entangled with nonhumans does not seem to provoke anxiety insofar as they enhance the agency of the human individual to act according to his or her own volition. Hybridization requires public purification, which may be accomplished through the imposition of the categories of invention, patent-holder and user in patent law. Following Latour (1993), patent law operates as a kind of way-station for careful consideration of the "public release" of hybrids on their way into "society" and as a mode of purifying the human from the nonhuman.

If anxiety tends to increase with the publicity of hybrids, then how news reports, which recuperate the Great Divide, increase rather than decrease anxiety? I suggest that when the process of purification is perceived to be incomplete or unmanageable, the

complexity and tremendous heterogeneity of hybrids generates anxiety. It was not hybridity and publicity which provoked anxiety but rather the manner in which the mechanisms of control (law, transgenic replication, and “conventional” farming practices) became “contaminated” with the very things they were meant to control.

Transgenic organisms in *Schmeiser* are particularly good at disrupting categories of thingness because, depending on the setting and stage of reproduction, they appear as genes, cells, plants, crops, pollen, oil, and food. In Paul Street’s (2003) view, corporate and technoscientific actors draw power from the humble seed form of the plant. “While it might at first appear odd to ascribe agency to non-humans such as seeds, it is these seeds’ existence as active presences that provides a means of enrolling others into particular topologically extended social networks” (p. 9). While Street is attentive to the crucial role of patent law in altering farming practices such that a market for RR canola can be created and sustained, he implies that the seeds exert force upon their environments and that, like speed bumps, they are not as negotiable as other kinds of entities or texts. Seeds reduce the discretion of farmers to choose between courses of action.

Marianne de Laet (2000) attributes agency to patents rather than the patented invention, since patents, in her view, are “events that perform connections – and that bring about changes as they go along” (p. 150). Patent claims are designed to function as immutable mobiles, transferring information about the world beyond the actual text in which the invention is described and prescribing roles to human and nonhuman entities in, for example, the role of the “user” of the invention or the “public” to whom the patent discloses the invention’s inner workings. However, to extend claims about reality outside

the laboratory, immutable mobiles must withstand litigation and other tests of their validity, strength and value.

In *Schmeiser*, patent claims end up being extremely mobile but not quite as immutable as Latour and Street suggest. This is in part because of the mediation of the claims through the news media, but it is also due, I argue, to the manner in which agency is ascribed to different things such as the genetic code of RR canola and the plant it supposedly generates. The slow construction of domination through inscription and mobilization can, according to Latour, be “corroded, interrupted, or destroyed if the records, files, and figures are immobilized, made more mutable, less readable, less combinable, or unclear when displayed” (p. 56). This insight enables me to explore the discourses, narrative and practices through which farmers, advocacy groups, judges and reporters undermined the meanings of bio-information materials which Monsanto’s patent claims were designed to stabilize.

Schmeiser managed to muster up the legal resources to drag the case out for four years. With an extremely divided SCC ruling in which the minority and majority accused each other of misinterpreting or transforming the meaning of “use” or “invention” in the *Patent Act*, and of misconstruing Monsanto’s patent claims, the case was not as clear cut as Monsanto had hoped.⁸¹ Nevertheless, the majority concluded that Monsanto’s patents

⁸¹ Schmeiser argued that he had not “used” the invention for its intended purpose because he did not spray Roundup on his canola crop in 1998. He further argued that the common law on farmer’s property rights – whereby farmer’s are considered to be the owner of the progeny of entities such as stray bulls that arrive on their property – entitles him to use the seeds and plants that blow in from other fields or from passing trucks. These arguments were rejected by the trial judge, the Federal court of appeal as well as the SCC. Although the majority concluded that Schmeiser had violated Monsanto’s patents by “using” the invention’s “insurance value” – that is, its “readiness” or resistance to Roundup should the need for spraying arise – he did not actually spray Roundup on the Roundup Ready crop and therefore did not profit from the invention. Key questions remained unresolved: Was Schmeiser breaking the law by “facilitating” the reproduction of volunteer plants? If the patent claims do not extend to plants, then how exactly does the use of biological materials on the farm constitute “use”? The SCC’s decision regarding damages and legal

were valid and that Schmeiser infringed those patent rights because he knew or should have known that what he was cultivating was in fact RR canola.

Arguably, what the case does is modify farmers' relations to seeds and plants; it sets up boundaries on the practice of seed saving, a crucial element of farming based on the local reproduction of plant life. According to Lakshman Yapa (1993), a development theorist who has studied the use of hybrid seeds in the so-called Green Revolution in developing countries,

The characteristics of seeds are not only technical, social, and ecological, but also, at once, cultural. To say that improved seed is a technique for increasing food production is only part of the story. It has also been a bearer of the hegemonic culture of science, capital, and authority that subjugates tradition and the keepers of that knowledge. The diffusion of improved seeds is also the diffusion of a new culture, one that devalues the production of subsistence and erodes the principle of local reproduction by creating a need for external inputs (p. 267).

Through patent law, technology user agreements, financing packages, and so on, Monsanto is attempting to step in between farmers and their usual practices, setting itself up as an obligatory point of passage for canola farming. Farmers become markets for seeds produced through expertise and knowledge monopolized by biotechnology firms. Tinkering – a form of making that enables humans and nonhumans to modify each other in everyday life – is marked as out of bounds for another, more specialized and institutionalized form of making and modifying identities and relations.

The ongoing contestation of the meaning of transgenic seeds seems to be due – at least in part – to the interaction of legal and non-legal modes of ordering. In contrast to the problematizations set up by jurists, news reports suggested that the central question

costs indicates this ambivalence. Schmeiser was not required to turn over profits from 1998 to Monsanto, but he had to bear his own legal expenses which according to Schmeiser's calculations, amounted to some \$400,000.

was how Monsanto's seeds got into Schmeiser's crop, that is, whether he played a determinative role in this presence, or whether the presence of RR canola was due to its own reproductive processes.⁸² The case takes the form of a simplistic either/or scenario regarding the relationship between Schmeiser and the canola: either he is an "innocent infringer" or an "active cultivator".⁸³

Even in those stories which suggest that no matter how the seeds got there, Schmeiser's conduct still constitutes infringement,⁸⁴ it is suggested that the case was complicated due to the special properties of higher lifeforms, and specifically, their capacity to reproduce.⁸⁵ Schmeiser is identified by, and reduced to, his claim that the seeds were "accidentally blown" into his field.⁸⁶

"Contamination" aptly describes the scenario constructed by the news. In news stories, the Ontario government appears to side with Schmeiser because of its concerns about the health costs that this "public nuisance" would eventually cause, and the Council of Canadians similarly suggested that the ruling has a terrible impact not only on agriculture but on public health.⁸⁷ The idea of out of control GM reproduction was also conveyed in the notion that environmental "contamination" would lead to a loss of markets for Canadian canola.⁸⁸ Silvia Ribeiro of the non-governmental organization ETC

⁸² "Canadian Supreme Court rules against farmer in biotech dispute." (2004, May 21), *Associated Press Worldstream*; *CTV National News*, May 21, 2004, 21:43; *Global National News*, May 21, 2004, 18:12.

⁸³ "Farmer loses final court battle." (2004, May 21). CanWest News [Janice Tibbetts].

⁸⁴ "Canada's top court backs Monsanto against farmer." (2004, May 21), *Inter Press Service*.

⁸⁵ "Schmeiser decision causes uproar around the world." (2004, May 21). *Canada Newswire*

⁸⁶ "Canadian Supreme Court rules against farmer in biotech dispute." (2004, May 21). *Associated Press Newswires*; "Canada's top court backs Monsanto against farmer." (2004, May 21), *Inter Press Service*; "Canadian Supreme Court rules against farmer in biotech dispute." (2004, May 21). *Associated Press Worldstream*; *CTV National News*, May 21, 2004, 21:43; *Global National News*, May 21, 2004, 18:12.

⁸⁷ "Farmer loses final court battle." (2004, May 21). CanWest News [Janice Tibbetts]

⁸⁸ "Canadian Supreme Court rules against farmer in biotech dispute." (2004, May 21). *Associated Press Newswires*; "Island farmers divided over GMO decision in favour of Monsanto." *The Guardian* (Charlottetown), *The Province*, May 22, 2004, p. A3 [Wayne Thibodeau]

Group suggested for example that farmers simply do not like GM organisms contaminating their crops.⁸⁹

Closely related to this view of the canola as promiscuously reproducing throughout the countryside is the notion, expressed by representatives of the National Farmers' Union and the Centre for Food Safety (Washington), that biotechnology corporations may be held responsible for genetic pollution if future cases determine that "liability is a two-way street".⁹⁰ Thus, even if canola "moves" across space through multiplication, the corporate "polluters" should bear the responsibility for contamination, not farmers.⁹¹ Many news stories represented both law and the environment as sites of disorder. Richard Gold, a patent law scholar at McGill, for example, suggested in news stories that patent law is now a "confusing mess" and that Parliament will probably take its time to clean it up.⁹² The minority in *Schmeiser* used Gold's (2001) analysis, co-authored with Wendy Adams, of the "disturbing" actions of courts in *Schmeiser* to draw attention to the broader problems at stake in the case.

These aspects of the news stories trace out much more fluid relationships between farmer's fields and genetically modified plants. Indeed, canola is presented as much less immutable, predictable and containable than Monsanto's genetic engineers believed. The classificatory schemes and the classified seem to interact, producing a new kind of legal and ecological disorder.

⁸⁹ "Canada's top court backs Monsanto against farmer." (2004, May 21), *Inter Press Service*.

⁹⁰ "Canada's top court backs Monsanto against farmer." (2004, May 21), *Inter Press Service*; "Canadian Supreme Court rules against farmer in biotech dispute." (2004, May 21). *Associated Press State & Local Wire, BC cycle*.

⁹¹ "Schmeiser decision causes uproar around the world." (2004, May 21). *Canada Newswire*.

⁹² "Monsanto wins landmark case; Pressure shifting to politicians; Supreme Court rules against farmer; He infringed on biotech giant's patent." (2004, May 22). *The Toronto Star*, p. D01; "Review of patent law up to Ottawa, again," (2004, May 26), *The Vancouver Sun*, p. A16 [Editorial].

The stories also suggest that genetic engineering is heterogeneous engineering, as described in actor-network literature, since Monsanto is attempting to draw power from an array of social, technical, natural, etc. entities. It attempted to construct a natural world in which RR canola behaves itself unless provoked by a farmer; a world of technologists, scientists and biotechnology firms that will simply vanish if the scope of patent law isn't extended to genes and plants;⁹³ a world in which a ruling in favour of Schmeiser "would have made Canada a Third World country"; a world where a decision to uphold the validity of Monsanto's patents can be understood as an indication that "the system works"; a world in which GM crops are good for the environment,⁹⁴ developing countries,⁹⁵ and farmers⁹⁶ and are novel enough to be patented but not novel enough to warrant different kinds of regulation.

Not all of the entities performed the role they were assigned. In the news stories, seeds fall out of trucks on the way to processing plants, cross-pollinate and contaminate fields, and, in complicity with the wind, insects, animals and vehicles, the seeds move between property boundaries and perhaps geopolitical borders. Indeed, the patent and the genes, rather than carrying instructions for the proper reproduction of RR canola, drew attention to the hybridity of the invention and the implications for human "use" of plants.

One of the key differences between the trial judge's decision and that of the Federal Court of Appeal is that the latter accepted at least one of Schmeiser's seventeen

⁹³ "Supreme Court rules for Monsanto in key battle over genetic seed patent." Canada Press NewsWire, May 21, 2004. [Julian Branch]; "Canadian Supreme Court rules against farmer in biotech dispute." (2004, May 21). *Associated Press Newswires*; "Supreme Court rules for Monsanto in key battle over genetic seed patent." (2004, May 21). *Whitehorse Daily Star*, p. 20; "Supreme Court of Canada finds in favor of Monsanto in Schmeiser vs. Monsanto patent infringement case." (2004, May 21), *PR Newswire*; "Canada's top court backs Monsanto against farmer." (2004, May 21), *Inter Press Service*; "Canadian Supreme Court rules against farmer in biotech dispute." (2004, May 21). *Associated Press Worldstream*.

⁹⁴ "Biotech jobs hinge on court ruling" (2004, May 21), *Star-Phoenix*, p. C1. [Murray Lyons]

⁹⁵ "Biotech jobs hinge on court ruling" (2004, May 21), *Star-Phoenix*, p. C1. [Murray Lyons]

⁹⁶ "Canola ruling 'abominable,' says Sturgeon County farmer." (2004, May 22). *Edmonton Journal*, p. A5.

grounds of appeal regarding the relationship between the actions and intentions of the alleged infringer. While Schmeiser's conduct suggests that he knowingly exploited Monsanto's invention, in other cases, the court suggests, farmers might not be aware of the presence of the gene in their plants, or might be aware of it without attempting to cultivate it. The Court hinted that in such cases, intentionality might be a factor in the determination of infringement. It thus points to a scenario in patent law in which intentions would matter, even though they are normally considered to be irrelevant in cases of patent infringement.

These new associations between human intentions and awareness of the genetic identity of plants in the crop, and the movement of genes between plants, crops, fields and perhaps even legal jurisdictions, persists through to the Supreme Court decision in which the majority stated that the defendant's conduct can be used as evidence of intentions or will and that, had Schmeiser tried to get rid of the Roundup Ready Canola rather than "actively cultivate" it, then these actions could then be signs that he did not in fact "use" the canola's "stand-by" or insurance value (para. 86-7). The decision had the effect of making Monsanto's patent much more mutable than Monsanto desired. This is one example of how fluid and heterogeneous relations mingle with legal classifications to produce new distributions of actions and new ways of attributing their consequences to things and people. Incorporated entities like farming operations attempt to negotiate the terms of their incorporation, and do so in a way that can potentially transform the regime in which they are being incorporated.

In the wake of the Federal Court decision in *Monsanto v. Schmeiser*, the Canadian Press, among other news agencies, highlighted Schmeiser's concern about contaminated

property, which the court did not consider a relevant issue. “[Schmeiser] says his fields are now contaminated with the genetically engineered seeds”.⁹⁷ After a decade of legal actions and decisions, Schmeiser surprisingly declared victory after Monsanto agreed to settle the matter of “contamination” out of court for \$660, even though the Supreme Court of Canada determined that Schmeiser had indeed infringed upon Monsanto’s patent. Schmeiser now describes himself rather than his farm as contaminated.⁹⁸

The link between contaminated crops and contaminated persons was initially made by a Reuters’ story, parts of which were published in many Canadian newspapers. The Reuters article quoted without qualification Schmeiser’s notion of his legacy was “poisoned” due to the “spreading noxious plant by natural means,” which reinforced Schmeiser’s image as an “international folk hero ... standing up for farmers’ rights”.⁹⁹ Although the concept of the “innocent bystander” had not yet entered into academic, legal or journalistic discourse about gene patents, the key ingredients as articulated by Schmeiser and his lawyer were present in nearly every news report about the Federal Court decision: (1) the seeds came from his own field; (2) his field was “contaminated” by pollen; and, (3) this pollen originated in neighbour’s fields, traveling by wind or insects or falling off of trucks.

The contaminated farmer and the innocent infringer respond in similar ways to the reproductive agency of RR canola in the form of pollen, genes and seeds. In news stories, the promiscuity of the GM plant was presented not so much as a way of extending patent

⁹⁷ “Monsanto – Lawsuit” CP Broadcast news, Prairie Audio, Mar 30, 2001, 4:35 AM MST.

⁹⁸ Hartley, Matt. (2008, March 20). Grain farmer claims moral victory in seed battle *The Globe and Mail*, p. A3.

⁹⁹ The Reuters report was used in at least two major dailies. “Saskatchewan farmer loses patent fight against biotech giant; Fears he could lose farm over legal bills in Monsanto case” *Toronto Star*, Mar 30, p. A8 (although it seems to draw from the CP piece as well); “Saskatchewan farmer loses battle over modified canola: He could face huge costs as Monsanto wins lawsuit” *The Vancouver Sun*, Mar 30, 2001, p. A5;

law and the new bio-informational regime of reproduction wherever the plant happened to multiply, but rather as a limit to the reach of Monsanto's monopoly control over the plants via the gene patent. "Schmeiser ... claimed Monsanto lost the right to control its patented genes when the seed arrived uninvited on his land".¹⁰⁰

Tampering with canola DNA is particularly worrying because of the plant's reproductive properties. In an interview with *World Watch*, Schmeiser suggested that the trial judge lacked the necessary agricultural knowledge to make an informed decision.¹⁰¹

I guess the judge maybe didn't understand the situation fully: canola is an open pollinate crop variety. It's very different from corn or soybeans and can spread quite easily. Canola requires cutting, like hay. And then it has to be put in rows to dry. Dried canola can act like tumbleweed and can blow for miles ... It's not uncommon for seeds to go five, ten miles. So, this is why canola can spread so easily. There is no stopping it. (pp. 8-9)

In 2008, after Monsanto formally agreed to compensate Schmeiser for the removal of uninvited GM crops ("volunteers") on his farm, Schmeiser told reporters, "I really feel that if a farmer is now contaminated, he has a right to go after Monsanto for liability and to clean up the contamination".¹⁰² Schmeiser is not speaking metaphorically. Like his many of his supporters, he believes that genetically-modified seeds and plants like RR canola contaminate the crops of "non-GM," "conventional" and "organic" farms which contaminate the food supply as well as the bodies of those who consume the contaminated food. "One little seed blowing in the wind," Schmeiser says, "can

¹⁰⁰ "Farmer fined in fight with biotech giant (Toronto edition headline.); Farmer reaps fines in fight over canola (All but Toronto edition headline.). National Post, Mar 30, 2001, p. A4

¹⁰¹ "Seeds of discontent." (2002). *World Watch*, Jan/Feb, pp. 8-10.

¹⁰² Hartley, Matt. (2008, March 20). Grain farmer claims moral victory in seed battle *The Globe and Mail*, p. A3.

contaminate a field in two years. We will never get rid of genetically altered canola in Canada now” (p. 10).¹⁰³

As Busch and Tanaka (1996) argue in their analysis of the construction of “quality” in Canadian canola economy, processing plants and certification organizations evaluate and classify farmers according to the qualities of their seeds and crops. When seeds are deemed to be “contaminated,” the farm and farmer that produced them are also “contaminated.” Although “contamination” is typically used in scientific language to describe microbial infection, its circulation in the language of a wide array of actors in the RR canola controversy underlines the manner in which the reproductive actions of transgenic organisms exert force on the manner in which they are represented.¹⁰⁴

The role of virtual “thingness” in reproductive controversies

One of law’s key roles in virtual culture is to operate as a recognizing authority for the new quasi-objects and quasi-subjects produced by technoscientific, governmental and industrial processes. Courts spend a considerable amount of time in cases like *Schmeiser* deciphering what constitutes the “thing” at stake and whether quasi-objects like unconsciously plagiarized texts or transgenic organisms meet the conditions of legal “thingness.” If Monsanto is the owner of a virtual life form, who is responsible for the actions of its materialized “expressions”? Ann Clark, a plant physiologist who submitted an affidavit on Schmeiser’s behalf, suggests that “reproductive isolation” in the case of

¹⁰³ “Seeds of discontent.” (2002). *World Watch*, Jan/Feb, pp. 8-10.

¹⁰⁴ Even Trish Jordan, Monsanto’s key spokesperson throughout the Schmeiser case, stated that approximately 46 per cent of the canola grown in Western Canada in 2007 was Roundup Ready, and, more importantly, admits that 85 to 90 per cent of all canola in the region would be classified as genetically-modified since it would have herbicide-resistant traits (Lyons, March 20, 2008).

GM canola is impossible. The suggestion that transgenic agricultural objects cannot be contained challenges the manner in which *Schmeiser* distilled the humans responsible for the actions of the hybrid collective: “how can farmers be held accountable for something which the seed trade itself cannot do?”¹⁰⁵

At the most basic level, *Schmeiser* draws attention to new kinds of technoscientific boundary blurring between categories of life (i.e., species) that were considered to be relatively stable and crucial to human identity. But the case also underscores the interplay between scientific uncertainty about reproductive life forms and disagreements among jurists about “thingness.” For example, the majority in the Supreme Court decision used the term “higher life forms” two times while the minority used it twenty times. These differences in terminology reflect disagreements about fundamental areas of reality, which in turn affect the authority of RR canola and other bio-informational entities in law. While the majority took the minority to task for using a distinction that does not have any basis in the *Patent Act*, the latter insisted on using the terms “higher” and “lower” life because without this distinction, what seems to be a mere application of the *Act* ends up transforming and extending rights beyond those granted by the *Act*. The ontology of DNA complicates rather than reinforces the boundaries between self-replication and use.

In *Schmeiser*, the kind of autotelic experience that Mihály Csíkszentmihályi (2007) associates with “flow” is disrupted in the court by mediators that no longer point clearly to an objective reality but point back to patent law as a collaborator in the authorization of commodified, virtual life. The court relies on DNA samples, testimony,

¹⁰⁵ Steed, Judy. (2003, Nov 10). “Seeds of conflict; Percy Schmeiser vs. Monsanto reaches Canada’s Supreme Court early next year. It’s a 21st century case study of technology versus tradition. Who will win?” *The Toronto Star*, p. D1.

photographs, maps of Schmeiser's fields, and so forth to produce knowledge since the various scales at which the patent operates can only be seen through atomic resolution microscopes (the court didn't have any of these on hand). Reading through the decisions against the background of news stories and public relations campaigns, it is clear that jurists were not in a state of "flow" but were nevertheless attempting to give the impression that they were in control, that is, that their knowledge of the caselaw and of the *Patent Act* was more than adequate to deal with the challenge at hand. The trial judge, the appeal judge and the majority in the SCC all coolly addressed points of contention as if there was nothing particularly challenging about the case from the point of view of patent law. However, the minority in the SCC decision asserted that analogies to other technologies, other patents, and other cases of infringement were not sufficient to make sense of RR canola and Schmeiser's alleged infringement, and more generally, that patent law does not provide the right tools to enable jurists to perform the task of evaluating claims about genetic inventions. Indeed, the classificatory schemes provided by patent law deform the things they classify, the minority argues, which is why it suggested that a new set of classifications (and the knowledge and skills required to apply them) should be imported in order to have, at the very least, a sense of control that is not artificially created by treating the matter as just another infringement case, or just another invention like zippers or Lego blocks.

The minority was legitimately anxious about how its decision in this particular case might transform the patent law more generally. In C.B. Macpherson's (1978) formulation, a system of property can be transformed by changes in social relations as well as "by its own momentum, bringing about effects other than were intended" (p.

13).¹⁰⁶ Thus, in Macpherson's view, extensions of patents to new subject matter have the potential to transform patent law and perhaps notions of property more generally. In the evaluation of ontological claims about code-based reproduction, the challenge of legitimating the bio-information regime with a set of patent infringement decisions appears to have disrupted their ordinary course of action and led both sides to accuse each other of policy-making.

The 5-4 SCC decision reveals a tension about the difficulty of conceptualizing the relations between the parts of the patented thing so that rights to them do not extend into non-patentable subject matter. Schmeiser and Monsanto agreed that the patent claims referred the biological components of the plant: genes, processes, cells derived from those processes, and plants. But Schmeiser likened the parts of the "thing" to Russian dolls, proceeding from small (DNA) to large (the plant). In Schmeiser's view, granting patent rights in DNA, replication processes and cells derived from them amounts to control over the use of the "higher life form." The court (both majority and minority decisions) considered Monsanto's model of the parts to be valid but not Schmeiser's. The Russian doll model conflicts with the decision of the Patent Commissioner to grant the patent. In order to accept the model, Schmeiser would need to refute the Commissioner's decision whereas Monsanto need only demonstrate that use constitutes infringement and does not require any prior decision to be overturned (para. 32). Without a successful refutation of the Patent Commissioner's decision to allow the claims, the court assumes the claims are valid. For the majority, the main issue is whether Schmeiser's conduct interfered with Monsanto's monopoly rights. The minority accepts this, but draws a boundary around the plant. "The issue at this stage is whether the appellants used the

¹⁰⁶ Macpherson (1978), *Property: Mainstream and critical positions*, Toronto: University of Toronto Press.

invention so as to interfere with the exclusive rights of the patentee, keeping in mind that the scope of Monsanto's patent does not extend to plants" (para. 141). Since plants are non-patentable, valid claims cannot extend to them.

The debate about how to construe the patent claims in such a way that the patents do not include the plant can be understood as part of a broader division in the Supreme Court about how to differentiate the informational and material elements of the invention. The majority decision smoothes over problems in Monsanto's argument that even though the plants are non-patentable, reproducing the plant without authorization is an infringing use of the patented gene. In the minority decision, Arbour J. argues that if the patent was approved by the Patent Commissioner, then they must be narrow claims, that is, they must not extend to plant reproduction even though the patented gene and cells determine the identity of the plant. Sexual or asexual reproduction, as well as the resulting offspring, cannot fall under the scope of a patent. Otherwise it would be invalid. "In order to avoid the claim extending to the whole plant, the plant cell claim cannot extend past the point where the genetically modified cell begins to multiply and differentiate into plant tissues ..." (para. 139). The minority decision thus defines things by their mode of reproduction, suggesting that the plant's self-replication cannot be "use" whereas genetic replication in "isolated laboratory form" can be. Legal thingness under patent law must be narrowed, the minority argues, to forms of reproduction which the plant does not carry out itself. While the minority may be attempting to establish limits on gene patenting, it should be noted that the minority does not challenge the hierarchization of different kinds of technical innovation in patent law. Those performed as creation *ex nihilo* in laboratory

settings attain protection as inventions while those that appear to be made through mixtures of human and nonhuman action do not.

The informational and the fleshy materialization are also distinguished in the minority decision using the terms “founder plants” and “offspring.” Use of the invention to produce the former – again, “in a laboratory culture” – would be infringement but not in the production of offspring (para. 161). If the “invention” is capable of, and inclined to, reproduce without human intervention, the patent must be interpreted very narrowly and precisely to survive challenges to its validity. In this way, the court is urged to interpret the patent claims in a way that recognizes the specific capacities of human and nonhuman actors involved in different types of reproduction.

The subtext against which both opinions are written is that gene patents – whether in mice, canola or human beings – have the potential to disrupt the self-sameness of identity on which law depends in processes of identification. The minority addresses this matter more directly than the majority when it argues that DNA in replicated laboratory form is not the same thing as the plant reproduced in fields. As Roof writes,

DNA is true, witnessed by atomic resolution images. The fullness of truth lies in the visible identity of discrete parts; the lie of continuity is revealed ... As the very molecules of the code become visible, that code becomes a law in itself, wieldable and manipulable like digital images whose make up can be untraceably altered by changing its code. (p. 176)

Unlike the literal and figurative photocopiers invoked in the caselaw on cryptomnesia, code-based reproduction leaves no trace of itself in mechanical marks or generational degradation. Transgenic innovations challenge both the notion of a purely human subject as well as the conception of subjectivity as bounded since bio-informational entities cross the boundaries between species and between individuals. Transgenic organisms are an

extreme case of a general trend in technoscientific practices which make the boundaries between individuals and between species more pliable and, as James Boyle (1996) notes in his analysis of proprietary information gleaned from a human organs, the biological becomes an unreliable anchor for the possessive individual's subjectivity.

Conclusion: The identification crisis

Of the key sources of anxiety discussed in previous chapters, such as origin, identity, continuity and epistemology, heterogeneity and distribution, identity seems to be the most important in this case. The means of identification compound rather than contain the problem of the production of identical multiples. Knowledge about the reproductive components of plants, which has long been a key part of agricultural farming, becomes dangerous knowledge within the new regime of reproduction. A plaintiff such as Monsanto may now argue that a farmer "knew or ought to have known" that his or her crop contained a patented invention and therefore infringed upon the patent by cultivating and processing the crop.

Like cryptomnesia cases, transgenic organisms in agriculture problematize the value of knowledge developed in professional practices, in this case, farming. Patent claims have a function in processes of identification since they are supposed to mark out where a person may go within a field of practice without infringing upon another person's intellectual property. When inventions are bio-informational such as a glyphosphate-resistant canola gene that carries instructions for the replication of cellular tissue, the patent does not describe the invention in a way that a farmer may use to practically navigate the field, discern varieties of patented and unpatented canola, whether or not to harvest, process, save seeds and other routine farming processes. For

farmers and consumers interested in maintaining an “organic” food supply, the scale at which these inventions are said to exist presents a problem for ascertaining the identity of a crop since transgenic DNA has been found in both organic and industrial food systems.

In *Schmeiser*, DNA is the slippery subject matter of patent claims as well as the means of identifying unauthorized copies. Like the caselaw on cryptomnesia, uncertainty is held at bay through the development of new conceptual categories. Instead of the unconscious versus conscious plagiarism, the Federal Court of Appeal suggested that intentional infringement should be differentiated from unintentional infringement in the context of gene patents, even though intentions are traditionally considered to be irrelevant in patent law. New classifications of thingness were introduced by the minority in the SCC decision, such as DNA in isolated laboratory form and DNA in a crop as well as the equally controversial distinction between higher and lower life forms. These new distinctions, however, only underline contamination of the instruments of control and knowledge production with the instruments that are meant to be controlled and known. Reproductive anxiety was channelled by Schmeiser and his supporters into a problematization in the ANTian sense of a zone of uncertainty and disorder bordered by stabilized entities such as facts and laws. Like the other two case studies in this project, a new type of human subject is composed that cannot be isolated from the performance of a particular version of bio-informational reality. The contaminated farmer is a transformative figuration of embodied subjectivity at the edge of the bio-informational regime of reproduction.

6. Enhancing the original: Human agency in virtual music-making

Extreme dematerialization

Since the closure of the highly publicized Napster case in 2001, copyright owners have used the rhetoric of “piracy” to equate unauthorized copying on the Internet with theft. Although the rhetoric of piracy contradicts legal principles and economic evidence, it has been adopted by policy-makers and jurists around the world to generate a media panic about unruly and unlawful reproduction (Rice, 2002; Yar, 2005). An army of lawyers, lobbyists, industry consultants, and public relations personnel reinforced the “illegality” of online “piracy” and thus cleared the path for the commercial distribution of music online (McCourt & Burkart, 2003). However, the rhetoric of piracy has not eliminated the use of unsanctioned file-sharing networks or “pirated” MP3s in the everyday activities of music fans and amateur musicians. In some cases, the illegality of piracy contributes to the appeal of unauthorized copies online. As Alistair Riddell (2001) observed, MP3 audio files rapidly gained a new “cult following based on a sense of freedom” (p. 338). The rhetoric of piracy surrounding MP3s transformed a rather mundane process of “accessing data” into an “enticingly risqué” activity (p. 341). Given that MP3 became “a ‘teen spirit’ thing,” Riddell foresaw the possibility a new musical development: “We might anticipate a new music based on reworking MP3 recordings pulled from the Internet... In this respect, the Internet is more than just a means of distribution, it becomes a *raison d’être* for a culture based on audio data” (p. 341).

At precisely the moment Riddell's article was being published, a deluge of unauthorized remixes called "creative bootlegs" or "mash-ups" flooded the web. Using MP3s and audio-editing software, "bedroom disc jockeys" spliced together two or more pop songs to create unlikely combinations which they distributed through peer-to-peer file-sharing services or posted on websites like Boom Selection. By 2002, mash-up culture furnished its own set of "star remixers." Popular unauthorized mash-ups like Freelance Hellraiser's "A Stroke of Genius" (Christina Aguilera's vocals from "Genie in a Bottle" layered on top of The Stokes' guitars in "Hard to Explain") gained the attention of *Newsweek*, *The New York Times* and other major news publications. A few of these mash-up stars, such as Freelance Hellraiser, Danger Mouse, and Go Home Productions, have assumed positions within the official music industry, working as DJs, musicians and producers. In addition to the many podcasts and webstreams that play mash-ups online, conventional radio and television stations like London's XFM, Re:Mixology on New York City's WFMU, as well as MTV Europe have given mash-up remixes considerable airplay (Haughey, 2004). Club nights devoted exclusively to mash-up remixes have also emerged, first in Berlin and London, and more recently in Boston, San Francisco and Los Angeles.

News stories often present mash-up culture as a form of resistance against the official music industry, as a *Newsweek* article illustrates:

The London DJs spinning this stuff delight in coming up with goofy combinations – Missy Elliott with Nirvana, say – but their work is borne out of a serious discomfort with today's pop pap. Record conglomerates "force this music on us, so let's play with it," says Osymyso, whose "Intro-Inspection" melds the intros of 101 songs. "Take something cheesy, and see if you can do something that's listenable." (Consider asking first. Warner/Chappell, which owns the rights to the 'Genius' building blocks, told a London radio station to cease-and-desist after it aired the song.). (Begun, p.12)

In *Newsweek's* dramatization of mash-up culture, remixers transform the “cheesy music” forced upon them into “something that’s listenable.”

Rather than using mash-up culture as a window into debates about the corporate and legal control of musical innovation and exchange, I focus on three major socio-technical shifts that shape the sensibilities, techniques and cultural logic of mash-up remixing: (1) the development of MP3 codecs which enact an inter-definition of sound recording and human hearing; (2) the extension via sound-editing software of what Sterne (2003a) calls *audile technique*, or a set of listening practices that transform sound into a useable “thing,” which in this case shifts the locus of creativity and musical skill to a virtualized assemblage of programs, machines and bodies; and (3) the detachment of “piracy” from its function in regulatory institutions into a new patterns of signification, consumption, embodiment and representation that enable the distinction and valuation of works, personalities and scenes within the broader field of popular music culture. These three shifts in socio-technical relations underlie the primary characteristics of the mash-up community, including its intense concern with tactics of materialization; pluralistic listening and sympathetic audition as the basis for membership and ethical sociality; and the redefinition of creativity in terms of the making of links between names, styles and works.

Mash-up culture is a useful site for exploring the sources and functions of reproductive anxiety in virtual culture because it translates bio-informational reproductivity into a musical and discursive performance and constantly opens itself up to problems of discerning human uniqueness. Like early theories of virtuality discussed in

Chapter Three, much of the news discourse and a surprising amount of mash-up culture's own promoters present disembodiment and the transformation of embodiment in virtual mediation as solutions to the limitations on movement and action imposed by the human body and one's location in space and time. Yet, underneath the mash-up scene's promotional culture, I have found that virtualization, or what Don Slater (2002) calls the "conditions of extreme dematerialization," is frequently problematized and turned into an anxiety-object. Conditions of extreme dematerialization generate anxiety about the frameworks for valorization, the manner in which to reserve certain creative roles for humans and the basis of social order. If artifacts can be infinitely reproduced and manipulated, why bother treating them as if they have some kind of unique existence? On what grounds should the use of certain technologies be deemed to be "cheating" if remixers are already bypassing the need to learn how to remix records or CDs? What use is there for producing and maintaining associations in the form of "scenes" or "communities" if artifacts can be posted and grabbed? Following Callon, Slater argues that the specific kind of normative orders or types of ethical sociality that operate in virtual spaces require and generate materialities.

[P]articipants' interest in sustaining an ethical social order is primary. It is *not* (as in much economic sociology and anthropology) that an ethical framework is necessary in order to maintain orderly exchange but that orderly exchange is necessary in order to sustain normative frameworks, and that such exchange requires materialities. (p. 229)

Mash-up culture may be understood in terms of a two-fold problem of virtualization (of people, things, inscriptions, actions, etc.) and materialization. Materialization emerges from the process of valorization and it can take many forms depending on the kind of ethical sociality that the actors attempt to institute between

themselves. They can produce commodities and anonymous strangers in order to regulate distrust and enable non-biased evaluations of work as in market exchange or they may operate like a Maussian gift-economy, exchanging things in a way that facilitates the blurring of boundaries between self and other, people and things. Just as Latour (1998) urges scholars not to think of all mediation in terms of scientific mediation and to examine how different types of material mediations are designed to produce very different subjects and objects, Slater asserts that types of mechanisms of materialization deployed in virtual culture “need to be interpreted in the light of the precise ethical sociality they sought to sustain” (p. 227). Social orders are not just effects but are the goals of particular materialization strategies. The materialities of mash-up culture include bodies and machines oriented toward certain types of listening as well as the materials that are commonly used in attempts to give fleeting youth cultures and music scenes durability, such as flags, t-shirts, cars and clubs.

In order to explore the specificities of mash-up culture’s reproductive anxiety, I consider Slater’s “mechanisms of materialization” as part of virtual reproductivity. Contrary to the utopian rhetoric of disembodiment, virtuality reopens the question of what sort of material forms and arrangements are needed to generate and maintain particular kinds of ethical sociality. As I demonstrate below, the development and choice of mechanisms of materialization are shaped by the institutionalized transactions that preceded them (e.g., copyright, software development, standardization of digital audio formats), and the actors tend to choose forms that generate or lead to different kinds of ethical sociality.

Both the constraints and the conflicts in materializations of mash-up culture generate an anxiety. But anxiety in this case is extremely productive. Anxieties about losing control over the manner in which mash-up culture is materialized through the institutionalized transactions of the popular music industry, the news media, and the legal system have led to new problematizations of bio-informational reality, in particular, the localized destabilizations of DJ culture and copyright. These problematizations of definitions of ethical sociality and the materializations that enact them in turn contribute to the development and mobilization of technical, aesthetic and legal innovations. These innovations include the Creative Commons licensing system, modes of valorization that stress the enhancement of the original rather than fidelity to or disregard of it, and a mode of listening that enacts the human through virtuality in the sense of being open to otherness and being in excess of one's current state.

The ontological politics of MP3

For Slater (2002), ethics takes precedence over ontology. Ethical sociality depends on strategies of materialization which perform reality. This suggests that reproductive anxiety in virtual culture derives not only from intimacies of humans and nonhumans and the dispersal, implosion and splitting of subjectivities, but from the need for materialities to generate ethical orders, and, more importantly, the kinds of ethical sociality that are being instituted through material reconstructions and arrangements. "It is not simply the necessity of materiality for normativity that is at stake but also the *precedence* of the normative over the material, of the 'ought' over the 'is' (p. 127). Actors translate definitions of social reality into more durable forms that reduce the discretion of the individual to choose different interpretations so as to regulate the actions

of diverse others. But this translation also leads to a shift in the claim or message and to a drift in goals. The normative fixity achieved in one series of translations can become an anxiety-object enrolled into subsequent problematizations.

While ethical sociality takes precedence over, but requires, materiality, it is important to highlight the manner in which the “ought” is not always successfully materialized. Virtual culture shifts the normative fixity into the invisible processes of bio-informational reproductivity. This reinforces the technocratic dream of “programming” reality with precision and at an unprecedented scale below human perception, but it also multiplies the actors involved in the materialization of the “ought” as well as the possibilities for human and nonhuman defections from the performance of social-technical reality.

The “ought” in mash-up culture derives from a file-sharing sensibility that one should copy without asking because music ought to be “free,” not in cost but in the capacity of users to copy, circulate and modify works. This ethical order is materialized in a variety of forms, most notably the Creative Commons licensing system, whereby “some rights” rather than “all rights” are reserved as set out by the author in the licence obtained through the non-profit Creative Commons organization. This is a way of institutionalizing a particular form ethical sociality based on a notion that human creativity is enhanced when individuals and corporations are not worried about the consequences of using pre-existing works. As stated in a Creative Commons pamphlet,

CC’s legal infrastructure gives you flexibility (for example, you can choose to only pre-clear non-commercial uses) and protects the people who use your work (so that they don’t have to worry about copyright infringement, as long as they abide by the terms you have specified). (CreativeCommons.org, 2008, p. 1)

Creative Commons licensing was spurred by anxiety about the increased control that corporate copyright owners were able to exert over larger tracts of cultural works and practices through code, which eroded the public domain, an argument developed by Lawrence Lessig (1999; 2002) who later became a founder of Creative Commons.

The human subject in this view is aesthetic. Institutions – including technological, legal and economic systems – should facilitate the development of aesthetic subjectivity. A recent *Wired* issue was bundled with a CD containing music by the Beastie Boys, David Byrne, and Chuck D published under the Creative Commons license. The captions around the CD are highly suggestive of the kind of ethical sociality that the CD and the licensing system are supposed to materialize. “These musicians are saying that true creativity needs to be open, fluid, and alive. When it comes to copyright, they are pro-choice. Here are 16 songs that encourage people to play with their tunes, not just play them ... Rip. Sample. Mash. Share” (*Wired*, 2004, November). Anxiety, Hayles (1999) notes, is never far from enthusiasms like this.

Slater’s claim that the ethical takes precedence over, but requires, the material suggests that the politics of technologies that extends into the definition, inscription and performance of actions by a human-nonhuman collectivity and attempts by a few actors to speak on behalf of the whole collectivity. MP3, which provoked the development of file-sharing networks and the subsequent anxieties and anti-anxiety mechanisms, is a political materialization in the sense that it enacts a particular figuration of listening subject and operates as an immutable mobile, making certain claims about human hearing durable and increasingly indisputable. If, as Andreas Reckwitz (2002) claims, the concept of translation, immutable mobility and nonhuman agency were attempts to redeploy

materiality in cultural theory and to rethink materiality in terms of artifacts, the design of MP3 can be understood as the political materialization of actions, goals and capacities across the human and the nonhuman.

Digital artifacts, like all technical innovations, leave long paper trails behind them as they emerge. In the case of MP3, the paper trail is enormous, spanning across the news media, law journals, computer science articles, patent claims, and legal decisions. Much of this literature construes the politics of MP3 in terms of legal controversies about ownership and public access. But one does not need to concentrate on corporate or legal influences on copyright legislation or legal decisions to discern the power relations of MP3. “The social” does not intrude upon “the technical” periodically. Translation suggests instead that attempts to order the world, including the most specialized technical and scientific papers, are not disinterested activities but rather are highly strategic attempts to bind humans and nonhumans together and make them accept particular definitions of their capacities, roles and identities as well as their associations with others.

Without the proliferation of unsanctioned MP3 sites, anti-piracy campaigns, and efforts to build security features and copy protection features into music files, would MP3 have politics? Using the framework of translation, one can answer “yes.” MP3 is political not only because it has led to juridical and technical reordering of human interaction but also because it requires a redistribution of capacities across the human/nonhuman divide in order to enact and enforce the ethical sociality of a hybrid collective. To trace out the politics of MP3, I revisit the scientific problematizations that established alliances and possibilities of interaction between entities. The effect of these problematizations, according to Callon (1980), “is not to create stability and order. It is to create local

instability. With the creation of such instability the possibility of autonomy arises” (p. 217).

In 1988, the International Standards Organization established a committee (ISO/IEC JTC1/SC29 WG11), which was called the Motion Picture Experts Group or MPEG (Brandenburg, 1995). Chaired by Hans Musmann, MPEG developed a series of audiovisual encoding standards. While Charles Creusere (2003) notes that digital audio compression has been a persistent problem for the telecommunications industry since the 1970s, MPEG interested a wide variety of firms and engineers by developing a new problematization. As Musmann (1990) argued, “A coding technique which allows to reduce the bit rate of a stereo sound signal down to 2 x 128 kbit/s or even to 2 x 64 kbit/s preserving a sound quality comparable to that of CD would be very attractive to save transmission and storage capacity and would facilitate the introduction of new services” (p. 511). Musmann sets up a problem (How can sound be digitally represented using less data than CD encoding but with the same sound quality?) and a grid of certainties (particular input and output sampling rates, lower bit rates, and so forth are *necessary*) to outline the “hunting grounds” or areas to be analyzed by groups of engineers. Musmann then associates these problematized areas of the cognitive field with particular coding concepts that were developed and tested by groups composed of engineers employed by different electronics firms.

MP3 – the audio layer of the MPEG-1 compression standard – emerged within this socio-cognitive network of problematization. MPEG-1 was the first ISO standard for audio compression, published in 1992 (Creusere, 2003). This standard was accepted not so much because it was more efficient than other proposals, but because its proponents

persuaded their colleagues to change the definition of efficiency. Until the emergence of MPEG, efficient compression was defined by the maximum reduction of “quantization noise,” noise that results from the conversion of a continuous signal (analogue) into discrete bits (digital). The MPEG group adopted an entirely different way of compressing data by allowing or injecting as much quantization noise as possible, that is, by associating the coding scheme with a perceptual model imported from psychoacoustics. By 1995, Jean Bernard Rault, Yves-Francois Deherly and Michel Lever confidently asserted that “it is world-wide accepted that the more efficient audio compression algorithm is the one that introduces the maximum noise provided that it remains perceptually inaudible” (3/1). The bit-reduction techniques developed by MPEG were based upon the psychoacoustic principle that a sound can be “masked” by a louder sound. The representation of human hearing in the psychoacoustic model was then shifted or inscribed into the codec (decoder/encoder) in order to “exploit the fallibility of the human ear” (Carey & Wall, 2001, p. 36).

The politics of MP3 are not reducible to the legal controversy surrounding some of its uses on the Internet. Scientific controversies about coding techniques, bit-rates, definitions of efficiency and so forth destabilize local areas of knowledge to interest and enlist others in the performance of a particular definition of reality. This does not mean that the politics of science are reducible to the standardization or rationalization of hearing. Long before the legal controversy erupted, Musmann’s (1990) report on the ISO plan to develop a compression standard clearly stated that the act of hearing could be divided into scripts (codes, models, algorithms) which would then be distributed to various human and nonhuman entities.

The redistribution of hearing in the development of MPEG codecs is an exercise of power. First, it establishes a grid of certainties about a phenomenon of vibration (i.e. sound) to develop an obligatory point of passage (i.e. maintaining tonal relations despite compression). Accepting the problematization means accepting a framework for interaction with the other MPEG working groups. MPEG thereby sets itself up as an obligatory passage for Phillips, Matsushita, and other firms to solve their problems regarding data storage, data transmission and the development of new services. Second, each coding concept is a claim about the acceptable amount of data that can be lost in the encoding stage and the amount of noise that can be “injected” into digital recording without affecting its “subjective quality.” To bolster these claims, the working groups embedded them in a collective (or network) of private and public institutions, mathematical theories of data compression, acoustic facts, and artifacts such the filtersbanks, integrated circuits and chips that encode and decode digital representations of sound (Rault, Dehery & Lever, 1995). The engineers enrolled a psychoacoustic model of human hearing which they associated with their various coding and bit-allocation techniques. The fact that sounds can be masked by other sounds was translated into an encoding technique called psychoacoustic masking. Since no one contested the validity of psychoacoustic masking, it acted as a black-box. Inside this black box, there were many previous translations including a model of sound based on certain components of the human ear, the summarization of “subjective quality” in perceptual audio codes, and the notion of efficient compression as the maximization of imperceptible noise. This model was crucial to the distribution of the capacity to hear within the hybrid collective.

Compression algorithms are not only political because they are inscribed with the normative values of a corporate engineering community. MP3 embodies representations of the (vibrating) world and definitions of efficiency which render the “lossy” compression format acceptable, desirable and unavoidable. MPEG also enrolled a number of previous translations such as the psychoacoustic model of hearing which abstract the senses, detach the ear from the body, and treat sound as an object that can be controlled, chopped up, reassembled, and injected with noise. Finally, MP3, like all sound reproduction technologies, do not merely depend on the *extension* of human hearing but rather, as Sterne (2003a) puts it, “on us delegating to machines that hear for us” (p. 41).

The question that remains is whether or not artifacts delegate capacities or tasks back to humans. The development of digital rights management is predicated on the notion that MP3 lacks the capacity to shape the way people reproduce music, and that additional coding and monitoring systems are needed to make it an effective regulatory agent. What file-sharing networks demonstrated so well was the need to *materialize* copyright’s version of ethical sociality not only in fine print but immutable mobiles or “protective envelopes.” Traveling in MP3 form on the Internet, copyrighted artifacts perform new functions, working, for example, as the currency of peer-to-peer music exchange. MP3 operates as “sound objects” that can be altered or simplified to make the file smaller and more easily copied and sent between computers. MP3 maintains the tonal relations of the sound through compression (MPEG’s obligatory point of passage), but in order to maintain the links between the subjects and objects of copyright law, ownership relations need to be translated into more durable and mobile forms. For example, when

the media conglomerate Bertelsmann bought the Napster file-sharing system in 2002, it also installed rights management systems in the network architecture to maintain the ownership relations of copyright. When copyright “expands” or is materialized in a new environment, it transforms the place in which it moves, turning them into supportive environments or protective envelopes that maintain the integrity of the representational and proprietary functions of the copyright.

Immutable mobility suggests that the medium of materialization matters in the definition and enactment of ethical sociality. In MP3 form, sound recordings are used differently and towards different ends than they are in the form of CDs or in broadcasting. Similarly, copyrights change and are changed by their movement through different computer networks. The enrolment of MP3s, file-sharing networks and computer users into copyright law also alters the way in which ownership relations are maintained. In Canada, the music industry lobby group, CRIA, has attempted to sue the end-users of file-sharing networks, whereas a few years earlier, commercial pirates were the main targets of such litigation. CRIA has also developed an anti-piracy public relations campaign over the last three years targeting Canadian youth, a necessary measure, CRIA claims because “Consumers have to know that if they want a wide choice and variety of music, that if they want their favourite artists to succeed, they must support them by buying their music.”¹⁰⁷ Until recently, copyright “notices” were inscribed in fine print on CDs in legal jargon. Now they are now transformed into multimillion-dollar anti-piracy campaigns designed to capture the interest of the news media, educators and youth.

¹⁰⁷ CRIA. (2005). <http://www.cria.ca/freemusicmyth.php#mythsanswers>. Accessed February 23, 2005.

File-sharing continues to be a popular cultural practice in Canada despite the high-profile lawsuits, copyright reforms, and quasi-education anti-piracy programs. CRIA is faced with two choices since files continue to be swapped long after the message “do not copy unless authorized” has been amplified and translated into various moral and economic discourses: (1) either ensure that everyone reads the orders/rules in the same way and responds in the same way, or; (2) “load” the statement by anticipating and incorporating “anti-programmes” (Latour, 1991). CRIA can then make a second translation of the file-sharers’ interests (they do not like transferring music from their computer to a CD and back again – a simple but annoying anti-circumvention technique), which leads to a minor technological innovation (copies that regulate their own replication) and a shift in the materials used to enrol file-sharers into the music industry’s program of action (digital rights management)

Recent technical papers on MP3 compression have set up new problematizations that are designed to interest copyright owners (rather than just electronic firms and telecommunications companies) by translating their definitions of ethical sociality into the language of compression codecs and metadata (e.g. Egidi *et al.*, 2005; Thorwirth *et al.*, 2000). However, MP3 plus DRM does not simply transmit the meaning of the order, “do not copy,” in a different form to the same entities. The sequence of translations into new material arrangements leads to a gradual shift in the distribution of roles, skills and competences assigned to the various entities. Rather than pointing towards an already-powerful actor (a class, a corporation, etc.) whose quantitative difference from other actors (having more power, money, prestige, influence, etc.) explains the alignments in the uses of artifacts and thus the stability in the artifact’s identity, the emphasis should be

placed on the local practices through which power is produced by enrolling others into particular definitions of what is ethical, practical, unavoidable or real.¹⁰⁸

Two important points about virtual music can be drawn from the attempt to make MP3s more resistant to copying. First, the translation of the statement “do not copy” in anti-piracy campaigns, compression algorithms and other security devices *transforms* the various definitions of reality enrolled by the principle actor and distributes competences and actions to a new configuration of materials, bodies and machines. The metadata in digital audio files, which controls the number of copies that can be made from the file, internalizes the subject of copyright law who accesses music via his or her computer connected to the Internet. Second, many of the prescribed actions on the web are not read by humans. Like a speed bump, instructions are translated into a form that makes the action of the hybrid person-machine more predictable. The various scenes or settings that one encounters on the web (identity checks, verification tests, blank search fields, etc.) are arranged as seriated actions: “The result of such an alignment of set-ups,” Latour (1988) suggests, “is to decrease the number of occasions in which words are used; most of the actions become silent, familiar, incorporated (in human and nonhuman bodies) – making the analyst’s job so much harder” (308).

Auditioning for the role of human in virtual culture

Following the methodological principles of free association and agnosticism, humanness in the engineering of MP3 is a set of associations that can be kept in place by delegating skills and actions across human and nonhuman materials. But the apparent

¹⁰⁸ Latour (1986): “Those who are powerful are not those who ‘hold’ power in principle, but those who practically define or redefine what ‘holds’ everyone together. This shift from principle to practice allows us to treat the vague notion of power not as a cause of people’s behavior but as the consequence of an intense activity of enrolling, convincing and enlisting” (273).

dispersal of subjectivity and growing intimacy of the biological and informational processes of reproducing sound involves the reduction of humanness for the purposes of engineering an “efficient” codec to the fallibility of the human ear.

Humanness in mash-up culture, in contrast, is defined by the capacity to discern affinities between seemingly disparate musical works to be open to unlikely combinations. At the same time, like participants in other subcultures, mash-up remixers sometimes dramatize unauthorized copying as resistance against the regime of reproduction, as demonstrated by the self-promotional imagery and rhetoric of the San Francisco-based duo Adrian and The Mysterious D (A&D) who present themselves as “rebel DJs” surrounded by pirate flags on their website (*60-Second Bio*, para. 1). The abundance of news stories about the illegality of unauthorized copying in the US, the UK, Australia, and many other countries provides a backdrop against which unauthorized remixing may be framed as a form of resistance. For example, the *Grey Album* – an album-length unauthorized mash-up that fuses hip-hop producer Jay-Z’s *Black Album* with the Beatles’ *White Album* – became an icon for copyright reform and free speech advocacy groups like the Electronic Freedom Frontier. The producer of the *Grey Album*, Brian Burton (a.k.a. DJ Danger Mouse), along with various websites, record stores and eBay, received cease-and-desist orders after EMI claimed that the *Grey Album* infringed upon its copyright to the *White Album*. Copyright reform and free speech advocacy groups then staged a web-based protest called Grey Tuesday on February 24, 2004. According to Downhill Battle, the group that coordinated Grey Tuesday, this “first-of-its-kind protest signals a refusal to let major label lawyers control what musicians can create and what the public can hear” (*Grey Tuesday*, para. 5). Using the *Grey Album* as a case in

point, Holmes Wilson, co-founder of Downhill Battle, argued, “Artists are being forced to break the law to innovate” (illegal-art.org, para. 3).

Based on the promotional discourses of mash-up culture, the litmus test of humanness is the capacity to resist the juridical subjectivity imposed by copyright law. This conforms to Fuller’s view of human agency as the capacity to resist definitions of their interests, goals and realities, a notion which he finds is lacking in ANT literature. “The whole point of social organization is specifically to combine in ways that go against the natural course of things. In that sense, resistance and conflict are what characterize the distinction between the human and the non-human” (as cited in Barron, 2003, p. 83). Fuller thus takes the ANT researchers to task for failing to address the capacity of humans to resist those who attempt to order, engineer or design interactions between humans or between humans and nonhuman entities. Mash-up culture’s apparent resistance to the definition of music as property is, in Fuller’s framework, an enactment of a type of agency that nonhumans lack.

Rather than imputing a rationale to mash-up remixing (i.e. unauthorized copying as a principled rebellion against the inequalities of copyright ownership), the analyst may instead trace out the logic of individual moves for prestige and social status within complex fields of practices, markets and institutional contexts (Straw, 1991, pp. 374-5; Hesmondhalgh, 2002, pp. 15-17). Concentrating on the matrix of embodied preferences and classificatory schemes of remixers’ – which includes but is not limited to the legalistic oppositions between authorized/unauthorized and official/unofficial – also allows me to analyze how definitions of humanness and of ethical sociality are

materialized through the (re)production of artifacts and in the commentary on artifacts and reproductive technologies.

Using my modified ANT framework, agency can be defined not just as the capacity to stay the same, to resist “the flow,” as Fuller puts it, but to multiply associations and keep them in place over time. Collectivities gain this form of agency from artifacts as much as they do from human beings. The strength of the mash-up board, Get Your Bootleg On (GYBO), derives from both the human and nonhuman elements that materialize its ethical sociality and enable it to persist over time. This can be demonstrated by way of a negative example. A poster named m’ashups.com started a thread called “m’ashups.com is finally up and running,” asking GYBO members to help develop it by posting remixes, reviews, and “histories” (m’ashups.com, 2006, July 26). This immediately provoked anxiety and suspicion about the use of GYBO as a bio-informational entity to generate traffic for a site with no real interest in the scene.

Some responses to m’ashups.com used the fact that s/he joined GYBO the same day s/he started this thread as well as his/her discussion of “generating traffic” and the admission that the site was going to use advertising to generate revenue as evidence of a “hidden agenda.” As churchill (2006, July 22) wrote,

Well this just kinda confirms what I think you're doing here ... You've bought a domain that is essentially a cool buzzword on the internet in 2 different ways, thus capturing searches related to two different but popular areas of discussion, and then you're asking us to help you populate the site with more content (the reviews) that will increase your search potential by adding further related buzzwords. Yes, it **might** improve OUR traffic, but to me it seems like you don't really care too much about what we're doing on GYBO, and just here to exploit the potential for making some money.

Many GYBO members used the opportunity to point out the distinctiveness of GYBO, pointing to the knowledge that is built up around techniques, new artists, and mechanisms

of materialization such as regular compilation of Top 10 lists and reviews, as well as the care that is articulated through the careful management of the site's look (which, as several members pointed out, was lacking in m'ashups.com). But following the ethic of virtuality (openness to the other and being in excess of one's current state), other members found this pride in GYBO disturbing since this suggested that GYBO was "the center of the universe" and, as Mixomatosis (2006, July 22) put it, "some of the best and most innovative bastard-pop around comes from everywhere but GYBO." The anxiety here derives from the susceptibility of virtual culture's materializations (its boards, blogs, websites, etc.) of ethical sociality to be carelessly reduced to keywords in the hopes of generating "click throughs" and thus advertising revenue. Other members were so confident in GYBO's richness in knowledge, discussion and so forth that they provoked another anxiety about being closed-minded, which conflicts with the ethic of virtuality. Generally, the thread suggests two conflicting notions of humanness: the virtual dimension of being in excess of one's current state and thus accepting the possibility that GYBO might itself be "mashed" into other trends in virtual culture, and the ability to care about, devote time to, and commit oneself to a specific mode of materialization as represented by GYBO's community-style board.

In the mash-up community, copying is inextricably tied to listening; "save target as ..." is a necessary step to hear unauthorized mash-ups posted on message boards. The isolation of voices in pop songs to produce acapellas ("pellas") and their erasure in the production of instrumental versions ("mentals") involves the production of copies as well as specialized listening techniques and technologies. The incorporation of sound-engineering and musicological expertise into Sony's Acid, Ableton's Live, Image-Line's

Fruity Loops, and other software studios, which are themselves available through file-sharing networks, is frequently cited by journalists as the key factor in the emergence of mash-up remixing. According to Neil McCormick (2002), writing for *The Daily Telegraph* (London),

In this digital era, no expensive studio hardware is required by would-be bootleggers. Tracks are manipulated by easily accessible software programmes, such as Acid, which enable pitch and speed to be adjusted and new beats to be added, the results then being distributed across the same internet from which original samples are gleaned. (p. 22)

Since audio-editing software enable amateurs to produce remixes, and since the Internet facilitates the circulation of such remixes outside the control of the organized music industry, these technologies have become emblems of democratization for many journalists.¹⁰⁹ While music critics hold up the mash-up as a challenge to individual authorship, they tend to focus on tracks rather than the more open-ended form of live sets. The overriding theme in these news stories is that the ease of making and distributing remixes through this new technological assemblage opens up cultural expression to those excluded from the formalized institutions that dominate musical production.

Another interpretation of the ethical sociality materialized by virtual studios can be derived from the emergence of these technologies from a 150-year project in medicine, acoustics and engineering to objectify sound and transform listening into an

¹⁰⁹ Katigbak, R. (2002, October 24). Boot camp. *Montreal Mirror*. Retrieved March 15, 2006 from, <http://www.montrealmirror.com/ARCHIVES/2002/102402/nightlife2.html>; Lomax, J. (2002, May 2). Pop goes the bastard. *Houston Press*, Music columns; McCormick, N. (2002, April 25). Pop eats itself: 'Bastard pop' yokes together songs by odd – and unwitting – musical bedfellows. *The Daily Telegraph* (London), p. 22; Norris, C. (2002, December 15). The year in ideas: Mash-ups. *The New York Times*, pp. 102; Strauss, N. (2002, May 9). Spreading by the web: Pop's bootleg remix. *The New York Times*, p. A1; Woods, S. (2002, May 30). These boots are made for downloading. *Eye*. Retrieved November 5, 2003 from, http://www.eyenet.net/eye/issue/issue_05.30.02/thebeat/bootlegs.html.

expert knowledge practice (Sterne, 2003a; Théberge, 1989; Thompson, 2004). Sterne's (2003a) concept of *audile technique* or "virtuoso listening" encapsulates this enduring cultural interface with sound in Western culture. His analysis of training manuals, diagrams, instruments, instructions and advertisements demonstrates that professional *and* consumer sound reproduction technologies are extensions of audile technique, that is, "a set of practices of listening that were articulated to science, reason, and instrumentality and that encouraged the coding and rationalization of what was heard" (p. 23). With the marketing of sound reproduction technologies to consumers, audile technique was sold as agency. It was extended through the notion of "high fidelity," "live" recording, broadcasting, etc. In each instance, audile technique promised listeners more control over their auditory field by linking sound reproduction to sound creation. Yet, as I highlight below, these technologies can also become anxiety-objects when they appear to shift human control into nonhuman forms.

Most technical debates among mash-up DJs regarding sound quality are not about achieving perfect transparency, but about the minimal requirements to make mashed-up MP3s sound "good enough" at a party or club. One GYBO poster underlined the tension between the sound engineer's disposition towards sonic fidelity and the mash-up remixer's concern with recordings that sound "decent" in particular contexts: "Although the cd sent to the studio was a .wav [an uncompressed audio file], the sound engineer had a good laugh when he heard the source used was mp3 192kb. Several pros told me the same thing, you can't do anything pro with mp3's" (Zamali, 2006). Zamali had the mash-up transferred to vinyl anyway, which s/he found was "decent enough to play in a party." Another GYBO member, Jools, added: "Plenty of slick club tunes... are just polished

turds.” While mash-up remixers use terms like “high quality” and “pro” (or professional sound), they are reluctant to accept these standards at the expense of other production values. Moreover, the acceptance of the relatively low-fidelity (and highly compressed) audio format of MP3 suggests that, for mash-up remixers, one may do something “pro” without adopting the audiophilic taste for transparent recording characteristic of professional sound-engineering.

Demonstrating one’s willingness to listen and comment on remixes made by others is as important as the capacity to produce “listenable” works in mash-up culture. Mash-up culture is a culture based on *audition*, in Peters’ (2005) sense of the term, which he elaborates in his discussion of the listening subject of liberal society: “Audition, ever since the Athenian *ekklesia*, has been the primordial civic act. Those who listen must be ready for assaults on everything they hold dear” (p. 133). Although mash-up remixers disregard the authority of sound-engineers in determining the quality of a sound recording, the listening disposition of mash-up culture is an extension of an older mode of listening derived from liberalism; it is a form of listening that is directed towards the construction and maintenance of mash-up message boards like GYBO as a community of listeners-remixers rather than as an online storage facility for software, acapellas and other resources. Status and reputations within the mash-up community hinge upon the capacity to hear affinities between seemingly disparate songs, artists and genres, which requires pluralistic openness to music that has little or no value for professional DJs, music critics and other individuals who act as intellectuals in popular music cultures. To borrow Peters’ (2005) terms, the listening techniques of mash-up culture are extensions of the liberal regime of “sympathetic” or “cool listening,” which is part of a struggle for

prestige, but which is also a mode of listening directed towards a certain model of civility (pp. 135, 162).

The importance of “cool listening” in the online mash-up community can be demonstrated by way of negative example. Strategy, a GYBO member, started a thread entitled: “Do Ya’ll Battle Up In Here?” in which he wrote, “Or should I just be nice and post links to stuff? ... Should I call out this dude mcsleazy who seems to be top dog around here... I got some stuff that seems to qualify as what I’ve gathered is now called mashups/bootlegs... One of them is so great, I’d rather save it for a contest” (2005). While self-promotion constitutes a considerable amount of GYBO’s content, sudden boastful remarks about one’s mash-up virtuosity or incitements to “battle it out” with other members of the mash-up community are regarded as suspect; this form of exchange does not conform to the “regime of cool listening” in mash-up culture, as dozens of other GYBO members made clear: “there’s no battles by the way... maybe a challenge every so often, but definitely no battling... if you’re bootleg’s are ‘so great’ as you say, then put ‘em up on the boots board!” Similarly, another member wrote: “reading the title [of the thread] made me think i was in the wrong place for a minute ... battle indeed? this isn’t 8 mile dear.” Strategy replied a few hours later: “yeah, I went and saw 8 Mile and said, ‘wow, this whole battle thing is cool, I bet DJ’s could do it too!’ Excuse me from coming from a hip-hop DJ background, where friendly competition is usualy [*sic*] welcome and part of the game.” While mash-up culture borrows many techniques, styles and recordings from hip-hop culture, the two musical cultures, as this thread makes clear, are organized by very different types of exchange that sustain different norms of ethical sociality. “Battling” is out of place in GYBO; the call for such a battle marks Strategy as

an outsider. Communication in mash-up culture is instead directed towards serialized posting, listening and commenting.

While a few mash-ups have been officially released by record companies, the vast majority are posted online in order to acquire feedback, recognition and prestige within the mash-up community. Mash-ups that are posted on message boards are also opportunities for other members to reassemble the mash-up from its components or display their listening skills through commentary about a particular mash-up. A member of another mash-up message board, acapellas4u.co.uk, posted a mash-up which he claimed received radio airplay, and asked for feedback (johnnybaby, 2006). The feedback suggests that the validation of remixes/remixers does not necessarily lead to a sense of the “work” as the remixer’s private acoustic space or property. RobertP wrote: “this is a really tight, fun mix - excellent work - it is the only version of eminem that I think I have wanted to play again. In fact I think I’ll burn it to CD to play in the car - thank you!!!” The producer of the mash-up, johnnybaby, replied: “Cheers Robert! ... Have fun when you’re driving around with it blastin’ out of your motor!” Another member asked for permission to air the mash-up on his/her homemade radio station, which johnnybaby gave without hesitation.

This thread suggests that listening in mash-up culture is guided by a file-sharing sensibility, a disposition towards sound as infinitely replicable. The conventions of validation and techniques of listening do not translate directly into commodifiable works, but they open the possibility of developing a “trademark” style of listening, remixing, and commenting, or a “brand name” that links different artifacts. As Lury (2006) observes, the emergence of the artist as a brand name is part of broader shift in the author-function

of the art-culture system: “[I]ncreasingly the brand name is not the mark of an originary relationship between producer and products but is rather the mark of the organization of a set of relations between products in time” (p. 95). However, the attempt to promote oneself as a stylized link between multiple works produced by other people exists in tension with the broader corporate and legal scrutiny of unauthorized copying on the web. Pseudonymous identities have thus become the norm in mash-up culture, which makes it difficult to pinpoint legal persons responsible for copyright infringement while at the same time enabling subcultural capital to be accumulated through a name that persists over time in the filenames of mash-ups and in the comments posted on message boards.

Lury’s (2006) discussion of the displacement of origins by organized relations points to the problems underlying the notion that new technical objects generate entirely new modes of cultural reproduction; the making of links between materials is not a new phenomenon but is perhaps better understood as a suppressed part of music-making, which also emerges in cases of cryptomnesia. The displacement of origins by relations also raises the question of technique: *how* are the relations between parts of songs reorganized? Certainly, a mash-up, like any other remix, may be defined as a reorganization of a set of musical relations. But how do musicological or engineering languages, as well as software languages, visual interfaces and metaphors, affect modes of reorganization in mash-up culture? According to Sterne, the audile technique of sound-engineers and audiophiles tends to emphasize practical listening and technical representations rather than abstract descriptions of sound because sounds lack a metalanguage (p. 94). In this context, music and voices become meaningful insofar as their sonic characteristics are useful in the project of developing perfect transparency.

The metalanguage of sound in mash-up culture is a vernacular form of musicological and sound engineering languages embedded in software like Ableton Live and Sony's Acid. In this branch of software development, an increasing number of listening practices are automated or delegated to digital processing. Early remix software could "time-stretch" or "time-compress," that is, change the tempo of a music clip without affecting its pitch. This language varies from program to program, but the process of developing linguistic descriptors parallels the transformation of listening by computerized analysis.

For years, software studios required users to listen closely to audio clips in order to determine tempo and key. Recent software studios "map" these musical properties, which is to say that the software not only assumes the role of the musically-trained listener but translates sound into the topographical language of height, length, depth, waves, grids, textures, contours and so forth. The most recent development in this regard is Acid's "groove mapping" and "groove cloning" processes:

If one of your tracks has a rhythmic feel (a groove) that you want to use on a different track, right-click the first track's track header and choose Add to the Groove Pool from the pop-up menu... Use the methods outlined above to add this new groove to any other track in your project. The tracks now share the same groove. (Sony, 2006)

Acid, and countless programs like it, presume that the aural environment consists of a set of *useful* things ("tracks") within a "project." Two tracks gleaned from the aural environment and set side by side in the virtual space of a remix project may already share the same tempo or key, but different "rhythmic feels" may thwart the reorganization (or mashing together) of these otherwise compatible tracks. Sony problematizes sound via these differences to sell a form of audile technique which transforms rhythmic feel into a feature or property that can be described, represented and altered like any other feature of

music (key, tempo, etc.); the program extracts “groove” as a set of sonic characteristics that define a particular “region” of the aural landscape, which can then be “mapped” and “cloned.” Finally, these rhythmic relations that constitute “groove” can be transferred to another track such that, according to Sony, one track may be used to reorganize the rhythmic feel of another track.

Mash-up culture has developed its own tools that extend these processes of delegating listening and visualizing/mapping sound, but uses them to transfer sonic properties between whole songs. One of the major preoccupations of mash-up remixers is the search for songs that are in the same key or songs that have “compatible” keys in order to avoid “key clashes.” DJ! wrote a rather enthusiastic message about Mixed In Key, a program that analyzes, extracts and saves the key of songs in MP3 files.

According to DJ!,

Suprisingly [*sic*] it is pretty accurate and does an amazing job keying any collection of tunes. The program also allows users to save the key information in the name of the song title field or before the name of the artist, this way if you are using a program like Traktor DJ 3 you can have all of the information you need right in front of you. (DJ!, 2006a)

As I have argued, mash-up culture is an auditive culture, which is to say that it emphasizes the importance of listening for ethical sociality but also valorizes the ability to listen and know what songs sound “right” together. Not surprisingly, then, another remixer wrote,

[U]sually i love all the new softwares and gadgets... but i find this very sad and scary. If you have a list of [f]iles organized by different parameters and only with few clicks you can pair them it kills the fun of mixing, mashing. Kills your motivation and the joy of making and creating. Maybe the 2.0 version will do the mash instead of the user???

Software developers make sound meaningful “in itself” by extracting its sonic characteristics. This may facilitate mash-up remixing, but the ongoing delegation of listening techniques to machines raises the spectre of total automation and thus seems to put human agency and uniqueness in question. Mash-up practitioners thus reserve certain kinds of audition and listening for humans since the production of links is part of the author-function discussed above. The challenge of listening closely to avoid key clashes, as this remixer makes clear, is also part of the pleasure of mash-up remixing.

Despite the panoply of effects at the disposal of Acid users, using them in mash-up culture involves a surprising degree of restraint. The desired effect is not to reveal to audiences the fact that recordings are representations, the conventional interpretations of which can be deconstructed with intensive sound-processing to the point of unrecognizability. Rather, as Neminem put it on the GYBO board in a thread about “all time favourite mash-ups,” creativity in this technological setting is defined as the capacity to recognize shared properties between different songs or the capacity to reorganize the musical and aural relations of recordings so that they sound like they are components of the same song: “I differentiate between three classes of mashups that show particular talent - the ‘wow, those two songs *do* sound exactly the same’, the ‘entirely new song made out of little pieces of a bunch of other songs’, and the ‘you put *what* together and made it sound good?!’” (Neminem, 2006).

While discussions about what constitutes a “listenable” mash-up suggest that “tracks” are traces of acoustic events, spatial and temporal mediation are also problematized in mash-up culture’s remix aesthetic. Mixing up the current Top 40 with past categorizations of “mainstream” and “underground” recordings disrupts what Straw

(1995) calls the historical rationality of connoisseurship and of professional DJ culture. Similarly, Sterne (2003a) notes that new forms of audile technique can challenge existing sound cultures, that is, to “ask in concrete ways what the long-established fact of sound reproduction can tell people about who they are, where they come from, and where they are going” (p. 351).

Mash-up culture’s reproductive anxiety stems from the manner in which professional and amateur programmers shift those actions which, according to mash-up culture’s model of ethical sociality, *ought* to be performed by humans, into software. Thus, even in a culture of virtual remixing, programming the unpredictability of sound *out* of cultural experience generates anxiety. This issue frequently comes up in relation to new software which translates the remixer’s interests in a way that upgrades nonhuman competences to the point that the role previously reserved for the human actor appears to have been shifted or delegated to nonhuman agents.

A thread regarding Ableton Live, a program that accomplishes many of the same things as Sony’s Acid but was specifically designed to mix large files (i.e., long recordings or whole songs) rather than samples, asked whether members of DJmixes.net thought using it amounted to “cheating.” Since DJmix.net is a site devoted to the exchange of recordings of “live” and “professional” DJ mixes, it comes as no surprise that the question was largely interpreted in terms of the use of Ableton instead of mixing records or CDs together in front of an audience. The replies are highly suggestive of the extent to which the virtual ethic of openness has to be continually amended or revised in relation to the institutionalized transactions of interests, skills and competences in the software industry. Spastik! (2006, March 28) wrote, “with ableton what’s going to

separate the good from the bad from the great? a vst plug-in?” but then admitted that s/he uses Ableton but not for mixing records together. At the other extreme, some replies suggested that it was “the way forward,” suggesting that human skills and experienced would not only be transformed but enhanced by the software. As danmever (2006, August 21) wrote,

I have been using ableton for a while now, and find it to be truly inspiring. i can bring together unlimited tracks with unlimited [*sic*] effects to create a raucous dance experience that truly is pushing the envelope. All reputable Djs are having to adjust there game to it. Also since its a completely digital workflow it just makes my life that much easier (all on the comp). Not to mention sub bass in stereo or even surround is not something you could ever do on vinyl only through digital formats. Using this digital signal flow for direct control of visualization is unbelievable...making myself a DJ and VJ in one. I believe this is the future, and I'm ready to rock it!!!

As the replies trickled in over a five month period, opinions did not become increasingly polarized but rather seemed to settle on the notion that software DJing is not cheating but that DJs should be able to demonstrate “basic skills” (i.e., mix records together). For my purposes, what is significant about this thread are the tangents. What began as a threat to the hard-earned knowledge and skills of DJs turned into a discussion of various ways of enhancing the human control over the software through exteriorized components (knobs, faders, etc.). Anxiety about the replication of the DJ and his/her interests in moving from mixing to remixing to production is displaced by translating and transforming those interests through new interfaces. These materializations reinforce the ethical sociality of DJ culture, that is, to go through a sequence of steps that is deemed necessary to acquire skills. At the same time, however, those skills are continuously transformed by the institutionalized transactions of human and nonhuman action in the mechanisms of materialization.

Simulating piracy, provoking anxiety

Mash-up culture's apparently fearless move towards "illegal art" is easily construed as part of a larger political movement for the reform of copyright laws. However, like mash-up culture's other moves – its tendency to remix Top 40 music rather than obscure recordings and its preference for MP3s rather than twelve-inch vinyl singles – the attraction to illegality and its significance within mash-up culture is grounded in a set of existing preferences and classifications. These classifications are appropriated from the legal system. Websites, club nights and online personalities indicate their affiliation with mash-up culture using "piracy" imagery, such as skulls and crossbones. "Piracy" has become an integral part of the mash-up community's promotional culture but its fearlessness towards illegality is part of a system of authentication and materialization which is not entirely stable.

An exchange on the GYBO message board about Secret Garden 2006, a dance music festival that included several DJs playing mash-ups but also featuring other kinds of musicians and DJs, indicates the extent to which "piracy" may be detached from its legal meaning and become a source of distinction within the field of contemporary dance music. The problem identified in the Secret Garden thread was how to assemble the "mash-up crowd." Zephyr posted a solution: "I am going quite early tomorrow morning... I'll take some of the pink and black hometapingiskillingmusic pirate flags and put them up - so come and say hello!" (2006). Included in the message was a photo of his flag, featuring a cassette tape above crossbones in pink, which earned Zephyr the praise of several other members. Mixomatosis, for example, replied: "put *that* on a t-shirt and I'll buy it" (2006). The illegality of mash-up remixing in this instance works as a marker

of distinction within a particular cultural space rather than as a gesture of resistance towards the use of copyright law to contain or suppress mash-up remixing. Highlighting and celebrating gestures of resistance comes at the expense of an analysis of the variety of uses and meanings of “piracy” and other quasi-legal categories. In this case, “piracy” icons function to materialize a community whose interactions generally take place in online forums.

Mash-up culture more generally simulates piracy in the sense that the signs of piracy are detached from their juridical and industrial use, which, in any case, have no basis in reality since piracy in the realm of replicable works is already a simulation of the piracy of “real” or “absolute” property that depends on the materialization of pirate from the codified ethics of intellectual property law. The signs of piracy are detached from their industrial use as agents of anxiety and are incorporated into an aesthetic, sensibility or style. The mash-up community often distinguishes itself from other musical communities by invoking the threat of legal sanctions such as cease-and-desist orders; it is a boundary across which participants acquire recognition and prestige. Adrian and the Mysterious D regularly invoke illegality in their self-promotional postings on message boards and websites. To promote the third anniversary of their monthly club night “Bootie” in San Francisco, A&D highlighted the illegal connotations of “bootie”: “Of course, ‘bootie’ also refers to pirate treasure... And that’s exactly what mash-ups are – copyright-infringing, illegally-released MP3s that are found by searching and scouring the internet. Practically everything we spin is technically pirated and illegal. Therefore, a pirate theme for Bootie is only natural” (A plus D = Bootie, 2006). A&D use legal classifications as a theme or motif that distinguishes mash-up remixers, clubs, DJs and

club-goes from outsiders. More importantly, the promotional use of illegality is indicative of the extent to which A&D perceive various copyright-infringing activities as investments in subcultural capital which can be converted or reinvested in the “offline” world of club promotion. Through the pirate dress code, A&D challenge others to adopt their cheerful attitude towards “piracy” or “copyright infringement” as an enactment of the human ability to assemble new semiotic and material associations and make them persist by provoking and playing upon anxiety about musical piracy.

These invocations, performances and embodiments of “piracy” in mash-up culture are grounded in the classifications of copyright law (authorized/unauthorized, infringing/non-infringing, etc.). However, these hierarchical oppositions have been inverted such that an unauthorized remix is preferable and more valuable than an authorized one. Mash-up culture is not the only musical community in which illegality heightens the value musical recordings. However, until the emergence of mash-up culture, the circulation of unauthorized remixes was limited to the exclusive networks of club DJs, specialty record shops and connoisseurs, where they acquired what Nabeel Zuberi (2001) describes as “the near mythical anticommodity status of the white-label twelve-inch single and the dub plate – the one-off acetate or vinyl disc of a track exclusive to certain DJs, unavailable in the marketplace” (p. 123).

The “aura of illegality” and the “anticommodity” status of unauthorized remixes in mash-up culture are suggestive of a shift in the production and authentication of recordings in virtual culture. As Hayles (1999) writes, subtle differences in “identical” should prompt the analyst to consider wider shifts not only in production but also in signification, consumption, embodiment and representation.

A book produced by typesetting may look very similar to one generated by a computerized program, but the technological processes involved in this transformation are not neutral. Different technologies of text production suggest different models of signification; changes in signification are linked with shifts in consumption; shifting patterns of consumption initiate new experiences of embodiment; and embodied experience interacts with codes of representation to generate new kinds of textual worlds. In fact, each category – production, signification, consumption, bodily experience, and representation – is in constant feedback and feedforward loops with the others. (p. 28)

In the case of mash-up culture, the music video, the musical recording, and the remix are simulations since they rely on specific techniques of reconstructing the semblance of a *trace* to bodies through codecs that mimic the analog recording process.¹¹⁰ The simulation of remixing via turntables or video consoles also suggests a shift in consumption, which in this case revolves around the circulation of digital files through computer networks and their reconstruction and reanimation in media players and editors. They signify not just the “original” but the opportunity to enhance the original and to be valorized within the mash-up scene. These consumption practices are in turn based on the popularization of DJ techniques of reanimation and recombination, which have been shifted into programs like Ableton Live and Sony Acid as well as various hardware accessories that enhance the simulation of DJing, which are in fact the real commodities in mash-up culture. Apart from copyright owners, professional DJs have been most anxious about the techniques and aesthetics of reproduction in mash-up culture, which indicates that there is a conflict between mash-up culture modes of materialization, valorization and signification which conflict with those of *some* elements of professional

¹¹⁰ Theorists of digital media generally fall into one of two camps. There are those, such as Gitleman (2004), Manovich (2001), Cubitt (1998), Sterne (2003), and Rosen (2001), who emphasize the manner in which digital media have been shaped by their precursors in media history and argue that digital reproduction is not an altogether new mode of signification. In the other camp, theorists argue that digital media signify things in a radically different way. For Rothenbuhler and Peters (1997), Roof (1998), Binkley (1997), Kahn (1999) and Usai (2001), one of the major implications of digital technology is that there is no longer such a thing as a “reproduction” but only simulations of reproduction.

DJ culture. Star-DJ Pete Tong (1999) criticized them in his column in dance music magazine *Mixmag*. Although Tong admitted that some of these remixes could be “very clever,” he told his *Mixmag* readership that creative bootlegs are little more than “musical fast food” (p. 7). Tong’s ambivalence towards mash-ups is at first puzzling given that he and many other star-DJs played them regularly in their radio and club performances. But mash-up remixers did not comply with the connoisseurist values of DJ culture, nor did they did they align themselves with increasingly narrow subgenres of dance music. Mixing Top 40 songs in MP3 form seemed unrefined and brash (the analogy to fast-food is quite suggestive here) within the classificatory scheme of DJs whose subcultural capital hinged upon the embodiment and display of connoisseurist knowledge about obscure vinyl recordings.

Signification feedsforward and feedback into modes of embodiment and systems of representation. As the struggle to materialize ethical sociality suggests, mash-up’s virtuality is *not* directed towards a celebration of disembodiment, but rather attempts to relocate human action within an assemblage of biological and informational systems. A remix culture on this scale would not be possible without the shifting of skills such as beat-matching into programs and of particular models of hearing and seeing into the compression algorithms that enable files to be quickly exchanged, accumulated and altered. This dispersal of subjectivity and the new intimacy of organic and informational agents in the mash-up mode of embodiment have come to represent virtual reproductivity in both popular and academic discourse.

This mode of embodiment is signified most frequently in mash-up culture through a translation of “piracy” and “illegality” as signs of authenticity and attachment to works,

styles and scenes. The “pirate” is the personification of mash-up culture’s ethical sociality and its valorization of seemingly “simplistic” and modest enhancements of the original rather than autonomous production as the goal of the community. Since illegality cannot be signified by white labels on digital files, other modes of signifying illegality have become increasingly important. One way of doing this is simply to mash-up artists that the audience knows or assumes would not perform or record together. The most effective technique in this regard is to mash up artists that could not perform together because at least one of the musicians is dead. Authenticity is in the “proof” of the recording’s unauthorized existence, which is practically indisputable when a mash-up remixer reanimates the dead alongside the living. Flipboitamidles mash-up music videos of Amy Winehouse with the Four Tops and Green Day with Queen are particularly salient instances of the manner in which the dead signify the inability to give authorization, and the lack of authorization as a sign of authenticity.¹¹¹

On one level, mash-up culture seems to provide a protective envelope that reassures the subject that unauthorized remixing is not only “normal” but can be a laudable achievement if it is done in particular way. In this sense, mash-up culture’s recycling of piracy imagery is reassurance against the juridical and industrial use of piracy as an agent of anxiety. Yet, on a broader level, in the materialization of mash-up’s ethical sociality in news stories, club nights and, increasingly, the music industry itself, mash-up remixers depend upon the generation of reproductive anxiety for publicity, since in some cases they gain mass media exposure when their work is subject to cease-and-desist orders. This was clearly the case for Brian Burton, whose profile as a skilled,

¹¹¹ Flipboitamidles (2008), “Amy Winehouse vs Four Tops - Rehab (I Can’t Help Myself).” Accessible online, <http://www.youtube.com/watch?v=BeHFVZr5HnM>. Flipboitamidles (2008), “Novocaine Rhapsody.” Accessible online, <http://www.youtube.com/watch?v=F-iRNGfcneE>.

knowledgeable, and creative remixer was enhanced by the publicity surrounding the *Grey Album* controversy. Burton has since worked as a producer for the Gorillaz and is one half of Gnarles Barkley, the duo credited with one of 2006's most successful pop music singles, "Crazy."

However, there is rarely consensus about the value of mash-ups that acquire high degrees of exposure in the music press. In 2005, Ben Gill (a.k.a. Party Ben) and Neil Mason (a.k.a. Team9) released *American Edit* on the web under the pseudonym "Dean Grey," the story of which seems to echo the *Grey Album*. The duo mashed up Green Day's *American Idiot* with recordings by The Bangles, The Sex Pistols, Mariah Carey, The Who, U2 and dozens of other pop, rock and hip-hop stars. Like the *Grey Album*, *American Edit* seemed to be intended as a tribute to a band whose record label (Warner) promptly responded with a cease-and-desist order, which was then followed by an online protest (Tossell, 2005). *American Edit* was then covered in music magazines like *New Musical Express (NME)* and *Spin*, completing a sequence of events that is strikingly similar to the development of the *Grey Album*.

The pattern of provocation through illegal remixing followed by legal orders and press coverage suggests that the logic of mash-up culture can be reduced to a series of calculated moves on the part of amateur remixers to incite legal controversies that enable them to showcase their skills in the news media. But unlike the *Grey Album*, *American Edit* did not generate critical consensus in the music press or in the mash-up community. Daft Monkey, writing on the Bootie Blog a few hours before a "rock-opera style" celebration of *American Edit* at the Pirate's Ball, seemed rather ambivalent about the meaning and value of *American Edit*. "At the time of its release, I was quite confident

that *American Edit* had set a new standard for mash-ups and was going to inspire bedroom DJs to produce mind-blowing productions that combined remix and mash-up methodologies together. Quite honestly, it was a foolish expectation” (2006b). It was foolish because mash-up culture is an “always refreshing community of newcomers who use the mash-up platform to begin exploring, experimenting and learning their own remix and production techniques. If new producers and fans didn’t enter the mash-up or bootleg community on a regular basis ... the scene would die.” Nevertheless, Daft Monkey suggested that the year was marked by an increase in the quality of mash-up “productions,” which diverged from the standard “acapella + instrumental = mash-up” formula, and that *American Edit* had something to do with this sense of “raising the bar.” However, Party Ben, co-producer of *American Edit*, disagreed a few days later:

The original idea of an entire *American Idiot* mash-up album struck me as an amusing piss-take on the very concept of the mash-up album; I adore *The Grey Album*, but I also found the whole worshipful attitude it got from critics a little silly, and based on an inherent bias towards the ‘album’ as such as a more ‘legitimate’ artistic medium than the single ... The idea of *American Edit*, in my mind, was partially to poke fun at this attitude: if people take albums more seriously, well then here’s your album right here. (Daft Monkey, 2006b)

The legal/illegal opposition is an important distinction in the habitus of mash-up remixing and functions as a key marker on the boundaries of its cultural space. However, modes of validation and stylistic development in mash-up culture are guided by an increasingly complex set of classifications that cannot be reduced to the legal/illegal opposition. In this instance, Dean Gray used the album as a mechanisms of materialization which reinforced a version of ethical sociality characteristic of rock culture where listening is directed at the careful assembly of songs produced by the same artist, and, moreover, to evaluate music in relation to canonical or “classic” albums. This suggests that the

material forms of virtual culture are not “blank slates” but are durable mediations of prior definitions of ethical sociality that resist renegotiation. Sometime a cease-and-desist order cannot be “upgraded” into a sign of prestige. Sometimes an ironic reuse of an old commodity form ends up being interpreted in “straight” way.

Although the development of mash-up culture as a style of remixing is intertwined with the bravura of legal and stylistic transgression, reputations depend upon the display of subcultural capital through “cool listening” to music such as chart pop which, in other subcultures, epitomizes the “mainstream.” The dispersal of DJ techniques into a wider social and cultural sphere enabled the emergence of the mash-up sensibility, which is not grounded in professional DJ culture’s connoisseurist values or its historical rationality. Mash-up culture is now struggling with the manner in which it has been tolerated and validated by those institutional authorities against which it previously defined itself. The vitality of mash-up culture and its relative autonomy from professional DJ culture depends to a large extent on maintaining a mode of valorization and an infrastructure that gives members a sense that they are developing reputations, skills and roles within a community rather than investing time in a passing scene. The infrastructure of the mash-up community exists primarily online, providing a relatively durable record of artifacts, interactions and events, as well as a source of tools and materials for making mash-ups. However, anxieties shift from the “old” concern with technology as a danger to creative agency towards the demise of a scene through its own ethic of virtuality, to tolerate various forms of duplication of its materializations and skills. And yet, it is through the relatively stable infrastructure of mash-up culture’s message boards that a

new kind of author emerges in the persistence of a name across message boards and the reorganized components of popular music.

The threatening aspect of the reproduction of humanness manifests itself in the previous chapter in two key ways: (1) unexpected, uncontrollable and unconscious reproduction; and (2) unreliable extensions of memory and other elements of embodied subjectivity. Based on the analysis of mash-up culture, a third formation can be added: (3) disruptions of human-centred models of perception and creativity. These disruptions, which are “planned” in the sense that they are designed, engineered and programmed, illuminate the order, regime or paradigm of reproductivity and the type of subjectivity it supports. An action that escapes control can become a reassuring representative of life is not entirely caged within bureaucratic, technoscientific and juridical rationality. While contemporary music-making incorporates reproductive media and reproductive accidents into the aesthetic, intelligent, creative and perceptual machines collapse the distance between aesthetic accidents and the lived experience of the listener.

7. Conclusion: Openness to the nonhuman

Reproductivity in virtual culture is unique in variety of ways; there are new kinds of automation, the greater expectation that “things” should regulate and organize themselves, the authority of code, bodies as interfaces with information and vice versa. There is also a frustration, sometimes deliberate, of the capacity to represent reproductive processes visually and a revalorization of the willingness and capacity to listen in litmus tests of the human. But just as important is the manner in which certain boundaries and relations are kept in place. Although the human subject’s permeability to information is highly suggestive of new forms of hybridization, law, science and popular culture also generate a surprising array of epistemic and material forms of purification. These modes of purifying mixtures of humans and nonhumans do not return the human to some original state but reconfigure the human in various ways in law, science and popular culture. As a response to the unsettling delegations, prescriptions and transformations made possible by the habituated, embodied and unconscious contact between distant people and things, Jung’s unconscious finds an unlikely home in copyright law’s machinic theory of musical memory, intentions acquire significance in the thought experiments of Supreme Court justices in gene patent disputes, and the normally cheerful mash-up remix scene becomes dead serious in its opposition to automated remixing.

What causes reproductive anxiety? Descriptive epithets like the cybernetic, bio-informational and bio-cybernetic suggest that the general trajectory of reproductive innovation, law and culture moves along the lines of control, and that the mutation of reproductive media into seemingly uncontrollable actors is the primary source of anxiety. This formulation has been productive. It emphasizes the manner in which subjectivity

and sociality are problematized and transformed by their technoscientific, legal and cultural extensions to new configurations of people and things. But the hybridization process – the mixing of the social and the technical, the cultural and the biological, people and things – accounts for only some of the anxieties discussed in this study. The actors also rightly worry about purification mechanisms, or the public arrangement, ordering and bifurcation of mixtures into subjects and objects.

Anxieties about the shrinking zone of the human can lead toward repressive forms of purification. In other instances, such anxieties can encourage the redefinition of humanness in relation, rather than in opposition, to the nonhuman. In some of the sites analyzed here, such as the partial defense for musical plagiarism and the inadvertent infringement of gene patents, the concern is that the supposedly pure and autonomous wholes (e.g., humans) are actually parts of other systems, such as the largely unconscious actions performed by machines and people in musical reproduction or the flow of genetic chimera through consenting and non-consenting farmers alike in plant reproduction. Anxieties in the mash-up remix scene, which presents itself as unworried about the current clampdown on unauthorized reproduction, tend to focus on the hybridity of autonomous music-making machines. But the first two sites have given me reason to problematize the purifying discourses and practices of the third. While purifying mechanisms encourage a view of cultural and agricultural production as performed by conscious and social subjects using non-conscious and technical objects, it turns out that the objects are more social and take over for some elements of thinking while the subjects virtually sleepwalk through their alleged transgressions of intellectual property.

The reproductive anxieties that currently circulate through the academy, law, engineering, farming and music-making would not be so productive and historically significant were it not for the difficult recognition that what nonhumans resist most vigorously is their cool dismissal as passive, affectless, nonsocial entities. Enabled by particular technical objects, legal systems and cultural practices, reproductive anxiety in the disparate sites analyzed in this study points to the ongoing debate in contemporary society about the implications of nonhuman delegations for the capacity of the subject to act ethically in specific fields of practice. Reproductive anxiety is in this sense more characteristic of virtual culture than the Frankenstein complex or the experience of the uncanny. Contemporary reproductive technologies and practices pose a series of practical problems not so much about how to draw boundaries around the human but whether or not boundary-drawing is the best way to ethically configure humans and nonhuman. If reproduction begins with concepts (numbers) in virtual culture, then it is not surprising that humanness is currently being redefined in terms of bodies which act as “centres of indetermination,” affective embodiment, or embodied forms of life that modulate codes or resemblances (Hansen, 2006, p. 220). The conviction that humans have certain qualities or capacities that technologies of reproduction cannot mimic or automate frequently resurfaces in virtual culture. I have stressed, however, that this reconstitution of humanness is an ongoing project and that it emerges out of the discursive and practical work of a wide range of cultural spaces. Recognizing the social role of nonhumans is the first step towards a view of the human as a configuration rather than a bounded essence. The second is the recognition of the human in its partly unconscious, partly programmed

and partly technical forms. Anxieties about these two processes displace the objectified it-as-I and the uncanny I-as-it in the cultural spaces analyzed here.

One way of thinking about the human as an historically- and culturally-specific configuration is to follow the actors as they put the human through reproductive litmus tests. Following Peters (1999), I explored the notion that when subjectivity is mediated through technical reproduction, the “core” of the human subject shifts from immutable souls to material remainders or “the fleshy residuum of finitude escapes simulation” (p. 237). But human difference in virtual culture is not always located in the remainder of reproduction but increasingly in the excess of copy, that is, the “artifacts,” “noise,” and other qualities and entities generated by reproductive practices, discourses, technologies and laws. Thus the bio-informational ear encoded in MP3, not just its digitized contents, has been added to the human sensorium thanks to the popularity of psychoacoustic modeling among digital signal engineers and the popularity of MP3 among music fans. The overly-active memory in unconscious plagiarism cases will be a persistent reminder of the consequences of switching the autonomous creator with a cryptomnesic figuration of creative subjectivity. By affirming the validity of Monsanto’s gene patents in Roundup Ready canola, we are encouraged to imagine the genetically configurable bodies of humans and nonhumans as determinative of “what” we are for the purposes of law, leaving the relationship of the body to “who” an open question.

Stepping back from my focus on the specific ways in which different institutional contexts and cultural spaces redefine humanness, it is possible discern four key patterns in the reproductive anxiety of virtual culture: (1) figurations, conceptualizations, stories, representations, theories, practices, regulatory schemes and aesthetics of reproduction are

key sites in the redefinition of humanness in virtual culture, and intellectual property law is mobilized to determine what is “good” and “bad” reproduction; (2) reproductivity is thought to be regulable through intellectual property law, but key concepts like “work,” “invention” and “use” are problematized and transformed by their extension to bio-informational processes and entities; (3) although jurists do not paint detailed portraits of the human subject in legal decisions, legal actors generate a patchwork of claims and assumptions about subjectivity in order to produce a “who” through which the actions of sociotechnical collectivities might be regulated; and (4) the shrinking of the zone of irreproducibility (what cannot or should not be reproduced in nonhuman form) has led to a variety of “hot” affective responses (e.g., public controversies), which should prompt researchers to rethink early characterizations of virtual culture as affectively “cool.”

Anxieties about the emerging regime suggest that, for many actors, virtuality in diverse knowledge cultures is not associated with the disembodiment of identities but rather with shifts in embodied parts of subjectivity, such as intentions, capacities, and perception, to new material arrangements. It is therefore more appropriate to refer to the virtual regime as bio-informational rather than as computational or informational. What is being problematized in debates and controversies about virtuality is the proper figuration and relation of the human to the nonhuman in different material settings. Although biotechnical and digital reproduction might be expected to destabilize the frameworks for experience and forms of subjectivity established by writing, photography and broadcasting and so forth, the novelty of a medium is less important in the generation of anxieties than the manner in which it interrupts the forms of agency ascribed to human beings.

In this work, I have mobilized the subject/object dualism to highlight an overlooked field of problematizations and negotiations of the human. My study focused on the anxieties, some of which became public controversies, about what the new forms of intimacy and hybridity mean for the autonomy of the human subject and the capacity of humans to regulate their relations and actions. I have underlined subtle but significant shifts in the forms of subjectivity developed through reproductive anxiety, in particular, the recognition that human intentions, actions and creativity emerge out of heterogeneous networks. However, this does not mean that the Great Divide has collapsed. From copyright to farming to software, the recognition work tends to be based on a human-centred and, moreover, liberal framework. In this framework, human autonomy depends on the freedom to choose different course of action, glossing over important differences in the material and discursive settings of this choice. Nevertheless, the emphasis should be on the tensions between the liberal notion that reproductive innovation increases choice on the one hand and the kinds of translation or “programming” of action which the liberal framework actually authorizes on the other. Through analysis of reproductive anxieties, the connection between technical reproduction and choice becomes problematic as the material and discursive constituents of reproductive choices become increasingly visible.

The choosing or discretionary subject that emerges in reproductive controversies is distinct from the forms of individualism that one might expect to find in legal dramatizations of the subject. In an age where memory, affect, experience, and other parts of the “bios” are vulnerable to unpredictable forms of replication and modification, human agency is increasingly identified as the capacity to make choices about what

should be reproduced and how they should be reproduced. Some of these choices may be described as “mnemonic” or choices about when to remember, when to forget and how to accomplish both. Others involve choices about the kinds of materialities that should be generated in order to sustain ethical sociality. But the discretionary subject frequently runs up against its own actions anticipated by engineers as well as the anxieties of possessive individualism. Both offer an indirect route into the problems of sociotechnical hybridity and distribution. In order for virtual artifacts to have an impact on bio-cultural emergence, distribution and regulation, various institutions have developed the capacity to transform the qualities of a human subject into codes, programs, or algorithms, which in turn raised questions about the proper way to distribute discretion and authority over the use of code.

These uncertainties, worries and anxieties which animate popular culture as well as the specialized discourses of law, may not be entirely new or surprising. What *is* unexpected is the link between technical reproductivity and embodiment. In the cases of cryptomnesia, transgenic patents, and digital mash-ups, the drama revolves around human-nonhuman incorporations as well as autonomous inscriptions. Given that theorists of digital culture have tended to associate the qualities of reproduction with disembodiment, the shift towards an engagement with embodiment via the unpredictable potential of technical reproduction is surprising and worthy of further exploration.

Bio-informational reproductivity confounds the series of contrasts through which subjectivity in various institutions and cultural spaces has conventionally been constituted: nature/culture, human/nonhuman, subject/object, society/technology, people/things. The depolarization of nature and culture manifests itself not only in the

unfixing of “natural” categories and stratifications, but also the biological reproduction of culture. As Sarah Franklin, Celia Lury and Jackie Stacey (2000) note, this should prompt a reconsideration of how culture will be reproduced. “How will its transmission be regulated? Can its reproduction be made secure? Or do such promiscuous minglings collapse the very terms of reference by which they might be defined, regulated or owned?” (p. 10)

The aural unconscious, the unintentional patent infringer and the copy that enhances its original suggest that the idea of collapse is overly-simplistic. Human/nonhuman, subject/object, nature/culture and other foundational dualisms are recirculated in unexpected ways in law, science and popular culture. The problem for theories of subjectivity and technology is how to reconceptualize the manner in which actors recognize the “constructed-ness” of nature and other foundational categories while in other instances treat them as if they were “natural” and unavoidable enablements and constraints on action. However, the source of reproductive anxiety is not always the exchange of properties between humans and nonhumans; anxiety may also be a response to the institutionalized transaction of those properties. In some cases, such as the patch-up work on the author in the figure of the cryptomnesiac, human-nonhuman entanglement provides an occasion for dramatic purifications of the human, leading to a workable but awkward figuration of the author as not-quite-human. In other instances, as in the case of Roundup Ready canola, the solution to an illegitimate and unethical regime of bio-informational reproduction is imagined to be a counter-network of humans and nonhumans. Looking closely at reproductive controversies in law, science and popular culture, it turns out that even when the actors begin with a bounded figuration, they

loosen the bounds to accommodate the nonhuman interventions in writing, listening and arranging. But who makes these attributions? Who produces the figurations? Who delegates to the network of humans and nonhumans? One could point to certain individuals, groups and institutions. But these actors are inseparable from the materials which they used to pen decisions, set standards or organize legal battles. Without things, the singular and stabilized subjects would fly apart. But with things, actors multiply. The basic principle I found at work in mash-up culture applies to law and engineering equally well: the human actor is recursively produced after too much of what was previously considered to be human has been shifted out into nonhumans.

Attributions of responsibility, accountability, and intentionality do not always reflect the actual processes through which the collective action was composed in the first place. In each of the preceding chapters, I have problematized attribution by highlighting the constitution of action by material settings and the formation and transformation of intentions in relation to nonhuman organisms, materials and artifacts. As technical reproductivity continues to frustrate attempts to discern the difference between humans and their replicas, human subjectivity will likely continue to be redefined as a set of qualities that could, in principle, be performed by nonhumans. Anxieties about body boundaries and autonomous inscriptions ensue, as do worries about the growing dependence of humans and nonhuman on each other to generate social order, and the redistribution of qualities previously considered uniquely human.

The problem that reproductive anxiety highlights is that those things which tend to be opposed to human subjectivity “re-infect” the subject and appear to become inextricably intertwined to it. Audiotape is medium of both recording and erasure of

memory; intentions are formed and modified by the objects at hand; thinking needs things to think with. It is no surprise then, that “conventional” farmers suddenly find their fate is bound up with “nonconventional” genetically-modified plants; that musicians hear “their” work exactly reproduced in recordings of others; that fearless unauthorized remixers shudder at the notion of software that can mix in key. In all of these cases, memory, listening, intentionality and other parts of what it meant to be human seem to have been shifted into the nonhuman. The copy highlights the common field of signification and the material overlaps between the human and the nonhuman that make societies and subjectivities possible.

While this study has focused on articulations of anxiety, it is possible to draw out implications for concepts of affectivity more generally. In the analysis of technologically reproduced music, biotechnologies and music software, anxieties tend to be articulated toward different ends, from the attempt to enrol other actors in a particular program of action (e.g., a partial defence for unauthorized copying) to the maintenance of an ethical framework for social action (e.g., an imperative to respect the limits of the collectivity’s boundaries). Does this mean that affect is the domain of power relations in contemporary regimes of reproduction? My analysis suggests that institutions do attempt to generate and capture anxiety along with other forms of affect to make actions more regulable. But these modes of governance-by-anxiety do not account for the entire range of anxiety’s social functions, all of which depend on mediation and performance for their discursive and material effects.

While the question, “why are we anxious about reproduction?” is arguably a key thread in Western thought, reproductive anxieties have too often been considered replays

of ancient worries. While the reproductive anxieties discussed are provoked by the perception of a shrinking sphere of properly human capacity and authority, my study has also explored the multiple sources and uses of reproductive anxiety. This multiplicity derives in part from the variable roles associated with humans and nonhumans in each field of practice. Moreover, forms of human subjectivity change considerably between institutions and between historical moments. Like the interplay of humans and nonhumans in processes of hybridization, institutional roles can be shifted out and transformed. The historical reconfiguration of the human is shaped by that of institutions. Thus, while virtual culture is often assumed to be a culture enabled by startling advances in technical innovation, it could be argued that the capacity to litigate has become as important (or perhaps more important) to technoscience and the cultural industries as the capacity to innovate. What might be called the inter-institutional translation of the human or the enrolment of legal, scientific, industrial and aesthetic institutions into courses of action for “proper” reproduction is thus a field of considerable interest for research on the reconfiguration of the human.

Questions regarding affect have enabled me to interpret anxieties as articulations of difference (between ideals of subjectivity, between definitions of nature, the social, the technical, etc.). In an encounter with enthusiasms about the potentials of reproductive technologies, it is best to ask, when should anxiety take the place of enthusiasm? In this project, I focused on the “in between” stage, when anxiety recedes to permit new enthusiasms and new, more focused, anxieties to emerge. Thus, transgenic organisms do not lead to the same polarized debates as, for example, the spectre of the human clone. The anxieties are instead about much more mundane aspects of life, in this case, saving

canola seeds and replanting, which enabled me to explore how the broader concern about humanness is mediated in particular fields of practice. As far as for scholarly practice, anxiety should emerge and should be anticipated the moment that the cultures in question become enthusiastic, since those moments, like moments of diffused anxiety, tend to gloss over important details in the messy domain of sociotechnical relations.

Reproductive anxieties are precisely about that messiness wherein collectivities test the limits of subjectivity and sociality.

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