# AMBIVALENT ANIMAL

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by

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# AMBIVALENT ANIMAL

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## SUMMARY

The Ambivalent Animal project explores the interactions of animals, culture and technology. The project employs both artistic practice and critical theory, each in ways that inspire the other.

My creative practice centers around two projects that focus on domestic pets. These projects highlight the animal's uncertain status as they explore the overlapping ontologies of animal, human and machine. They provide concrete artifacts that engage with theoretical issues of anthropocentrism, animality and alterity.

My theoretical work navigates between the fields of animal studies, art and design, media and culture studies, and philosophy. My dissertation explores animality through four real and imagined animal roles: cyborg, clone, chimera and shapeshifter. Each animal role is considered in relation to three dialectics: irreducibility and procedurality, autonomy and integration, aura and abjection. These dialectics do not seek full synthesis but instead embrace the oscillations of irresolvable debates and desires. The dialectics bring into focus issues of epistemology, ontology, corporeality and subjectivity. When the four animal roles engage the three dialectics, connected yet varied themes emerge. The cyborgian animal is simultaneously liberated and regulated, assisted and restricted, integrated and isolated. The cloned animal is an emblem of renewal and loss; she is both idealized code and material flesh and finds herself caught in the battles of nature and nurture. The chimera is both rebel and conformist; his unusual juxtapositions pioneer radical corporeal transgressions but also conform to the mechanisms of global capital. And the shapeshifter explores the thrill and anxiety of an altered phenomenology; she gains new perceptions though unstable subjectivity. These roles

reveal corporeal adjustments and unfamiliar subjectivities that inspire the creative practice.

Both my writing and making employ an ambivalent aesthetic—an aesthetic approach that evokes two or more incompatible sensibilities. The animal's uncertain status contributes to this aesthetic: some animals enjoy remarkable care and attention, while others are routinely exploited, abused and discarded. Ambivalence acknowledges the complexity of lived experience, philosophical and political debate, and academic inquiry. My approach recognizes the light and dark of these complex ambivalences—it privileges paradox and embraces the confusion and wonder of creative research. Rather than erase, conceal or resolve ambiguity, an ambivalent aesthetic foregrounds the limits of language and representation and highlights contradiction and irresolution.

# CHAPTER 1

# INTRODUCTION

## 1.1 Human, Animal and Machine Interactions

Contemporary cybernetic systems mingle hardware and software in complex digital ecologies. These responsive systems were once inspired by biological mechanisms.[1] After developing into sophisticated hardware-software configurations, cybernetic systems have returned to their biological roots. The methods and tools of information technology now underpin the fields of molecular biology and biotechnology. The most idealized biotech projects perceive biological materials as something similar to digital media. Organic matter becomes plastic and replicable[2] and flesh is programmable. Donna Haraway notes:

> …communication sciences and modern biologies are constructed by a common move—*the translation of the world into a problem of coding,* a search for a common language in which all resistance to instrumental control disappears and all heterogeneity can be submitted to disassembly, reassembly, investment, and exchange.[3]

For the body to become a medium, its internal mechanisms need to be defined as fundamentally informational. When we perceive the body as information, it becomes available to replication and inscription. Informational bodies solicit programming techniques—genetic codes become available for algorithmic modification. Animal bodies are at the forefront of these material changes. The biotech animal, born in the traditions of domestication and breeding, is re-imagined as a transgenic creature—a cross-species mix of plant, animal and human genes. Research labs house pigs with baboon-gene hearts, mice with human-esque immune systems and rabbits with jellyfish phosphorescence. The best informational bodies can be broken apart, modified and reassembled. Researchers are developing in-vitro organs that can be transplanted into patients. These body parts are sometimes produced using the familiar processes of media production. A mouse heart, for example, is carefully “printed” by spraying one thin layer of tissue after another.[4] Flesh becomes media that is enlivened by bio-techniques.

Idealized biotechnology perceives all bodies as plastic, both animal and human bodies. This biological equivalency challenges human and animal divisions. Bio-techniques transfer animal parts into humans. Cow and pig tissue are used in human heart valve replacements.[5] Animals also incorporate human genes—human stem cells are injected into the brains of embryonic mice.[6] As genetic and biological material flow back and forth between humans and animals, critical species barriers are broken. The flesh of many becomes one.

Human-nonhuman interactions challenge traditional hierarchies. Power relations that favor the human appear outmoded. As human, animal, and machine act in concert, the question of who leads and who follows comes to the fore. Our integrated actions make autonomy and agency less certain. We are witnessing a rapid expansion of interfaces and codes that make possible the tight affiliations of humans and nonhumans. As we stitch together diverse phenomenologies, we reflect on our peculiar and particular perspectives. This reflection opens us up to the unfamiliar perceptions and capabilities in the nonhuman “other.”

My research examines the discourse of animal, human and machine interaction. This discourse includes texts and artifacts from the fields of art and design, animal studies, media and cultural studies, and philosophy. My analysis is framed by three dialectics: irreducibility and procedurality, autonomy and integration, aura and abjection. These dialectics are associated with issues of epistemology, subjectivity and corporeality. The dialectics do not seek synthesis but instead remain actively engaged. They fluctuate between two opposing ideas, unable or unwilling to come to a final resolution. These oscillating dialectics bring new interpretive insights—they question the boundaries between human and nonhuman and challenge our anthropocentric assumptions.

These dialectics are specific to particular context (a humanities-based digital media program in an engineering school) and identity (an art-trained graduate student drawn to media culture and technology). Someone reading the same texts and reviewing the same artifacts may likely imagine an alternative framework. It is not my intent to create a totalizing interpretive matrix. Instead, I'm following my unique interests and tendencies, developing a particular perspective designed to highlight the ambiguities of creative work. My framework is always partial—it does not aim to provide a comprehensive picture of creative research.

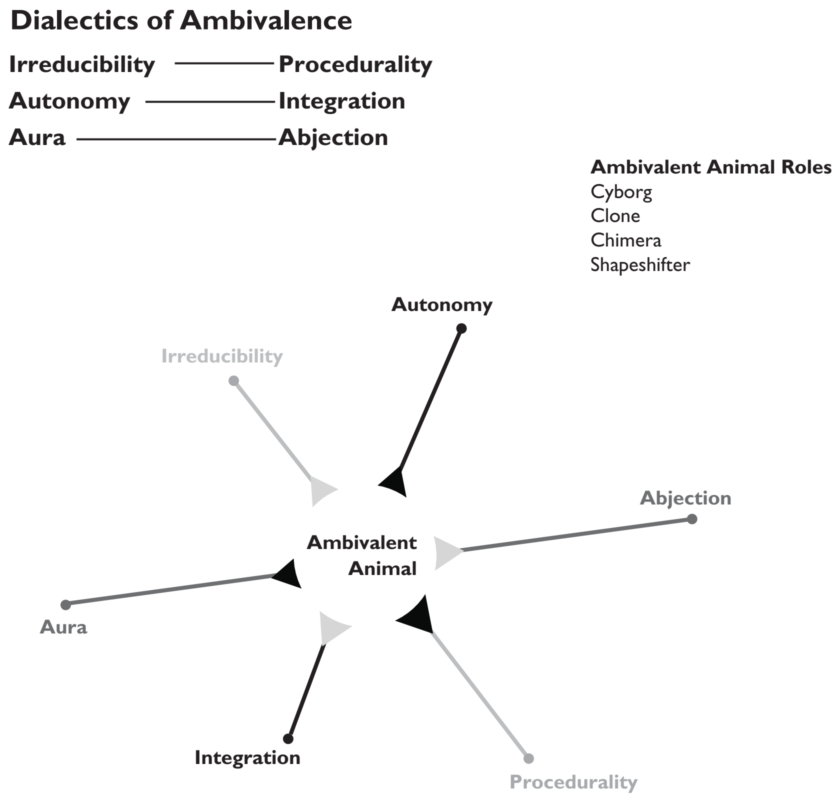
## 1.2 The Ambivalent Animal

In the mix of human, animal and machine, the focal point of my thesis is an ambivalent animal. The animal is often the least resolved participant of the triad. The animal's uncertain status makes him a rich source of inquiry for a framework of ambivalence. An ambivalent animal oscillates between divine and degraded, subject and object, detached and integrated, flesh and machine. In my exploration of the animal, I'm examining four roles that highlight the interactions of human, animal and machine. These roles are: cyborg, clone, chimera and shapeshifter. Examining animal roles emphasizes the exchanges of culture and technology and encourages a holistic research approach.

The first four chapters of this dissertation explore these animal roles—each animal role has its own chapter. The roles are framed by the three dialectics and reveal different aspects of animality and alterity. The cyborgian animal is simultaneously empowered and regulated, assisted and restricted, integrated and isolated. The cloned animal is an emblem of renewal and loss; she is both idealized code and irreducible flesh and finds herself caught in the battles of nature and nurture. The chimera explores ontological confusion as he fuses unrelated elements; his unusual juxtapositions suggest radical corporeal transgressions but also conform to the mechanisms of global capital. And the shapeshifter explores the thrill and anxiety of a radically altered phenomenology; she gains new perceptions though unstable subjectivity.

Though I am foregrounding the animal, the human shadow is ever present. By examining the animal, we also inspect the human. Human identity is established through the exclusion of animals. Without a clear divide between human and animal, human subjectivity dissolves. An ambivalent animal challenges this barrier. Caught in the sights of technology and culture, the animal's situation often reflects our own. We see our uncertainties in the experience of the animal. And in the process, we recognize the animal's subjectivity and our own animality. Ambivalence brings to light the unresolved nature of human and animal subjectivity. Its methods emphasize the interdependent dance of humans and nonhumans.

The final chapter of the dissertation examines the interactions of theory and practice. This dissertation combines both writing and making—as I write about the ambivalent animal, I am also making artworks that inform and respond to my writing. In the last chapter I discuss these artworks and their relationship to my theoretical research.




1.1 Diagram of the Dialectics of Ambivalence

## 1.3 The Dialectics of the Ambivalent Animal Project

### 1.3.1 Irreducibility & Procedurality

The three dialectics frame the discourse of the ambivalent animal project. The first dialectic is irreducibility and procedurality. Cultural artifacts and processes are irreducible when they refuse closure, seek out idiosyncratic and unpredictable methods, and emphasize the complexity of each moment. Irreducibility celebrates sensuality and experiments with materials. It foregrounds embodiment and the complexities of phenomenology. Procedural artifacts and processes, on the other hand, categorize and clarify, develop repeatable rules, and create consistent patterns. Procedurality pursues modularity and abstraction. It examines concepts and discovers essential truths. It highlights disembodied codes and discursive signs. The ambivalent animal project oscillates between these poles, embracing ways of knowing that are both concrete and abstract. We see echoes of this dialectic in Aristotle's materialism and Plato's idealism as well as in Cartesian rationalism and Lockean empiricism. But while rationalists emphasize the mind and empiricists the senses, irreducibility argues that neither mind nor body can provide complete knowledge. Instead, it suggests that mind-bodies are perpetually limited in their understanding—there are always unknown phenomenologies and philosophies with the potential to disrupt conventional wisdom.

Prodecurality creates efficiency and greater accessibility, expands our reach, recognizes important patterns, provides focus, and reduces the most tedious elements of human labor. Irreducibility invents new perspectives, seeks out contingent methods and knowledge, celebrates chaos, and embraces the mystery of life. In a digital age, procedurality is on the rise. Its logic sweeps through social, intellectual and commercial endeavors. At this moment, keeping prodecurality and irreducibility in play is perhaps more important than ever. Embracing irreducibility may help temper the totalizing tendencies of procedurality.

### 1.3.2 Autonomy & Integration

The second dialectic is autonomy and integration. An ambivalent animal is autonomous when she seeks new forms of independence, opposes the status quo, and breaks with tradition. She is integrated when she accommodates the needs of culture and context and foregrounds intersubjectivity and interconnectedness. Autonomy frees from repressive customs and controls, but it may suffer from a sense of isolation and self-absorption. Integration acknowledges the wisdom of community and culture but may succumb to the constraints of tradition. The ambivalent animal is simultaneously detached and embedded, rebel and conformist, liberated and restricted.

This dialectic also examines the traditions of subjectivity. Human subjectivity is founded on the division between the human and nonhuman. The ambivalent animal emerges in the gap between human and animal. He oscillates between subject and object and argues for an expansion of subjectivity beyond the human—human privilege is questioned and more fluid hierarchies are promoted. This dialectic also investigates the boundaries between human, animal and machine. These human-nonhuman "assemblages" engender new forms of collaborative agency. These affinities encourage cooperation without erasing difference. They keep in play the connection of community and the liveliness of diversity.

### 1.3.3 Aura & Abjection

The final dialectic is aura and abjection. Materiality and corporeality are key components of this dialectic. The fragile and ephemeral nature of existence helps to generate the tension between aura and abjection. The ambivalent animal experiments with new "becomings" but is also frequently exploited and abused. In the realm of cultural production, auratic art creates rarified, unique, immediate, and enduring artifacts and experiences. Abject art is scatological, entropic, ephemeral, perverse, violent and peripheral.[7] The ambivalent animal shares in these cultural taxonomies. He is both elevated and degraded, simultaneously exceptional and banal.

## 1.4 Ambivalent Aesthetic

The integration of animals, humans and machines sparks utopian and dystopian rhetoric. Optimistic scenarios of more leisure and better health compete with dark tales of coercive regulation, corporeal mutations and environmental degradation. The trade-offs of innovation and unexpected consequences of action inspire the aesthetic of this dissertation. The research employs an ambivalent aesthetic—a sensibility that holds two or more opposing ideas in tension and foregrounds the limits of knowledge and representation. An ambivalent aesthetic seeks out conflicting ideas and sensibilities and highlights contradiction and paradox. When this aesthetic engages with the three dialectics, it highlights epistemological doubt, ontological confusion and corporeal transgressions.

An ambivalent aesthetic embraces contradiction. Contradiction is not viewed as a byproduct of failed theory or flawed argument; instead, contradiction is re-cast as a challenge to totalizing and reductive systems of thought. Incompatible views become a valid response to the limits of language and perception. Contradiction may indicate we have reached the limit of conventional thought—we have arrived at a point where language fails to comprehend the complexity of experience. We are left with incomplete knowledge and partial truths. Contradiction acknowledges our limited understanding and counters epistemological arrrogance.

Recognizing the limits of understanding provides a space for detachment. We perceive contradictions within and without and recognize the humor in our subjective position. This opens the way for self-deprecation and a sense of play. We note the absurdity of our passions and habits. An ambivalent aesthetic often addresses serious issues in a whimsical way. It recognizes the humor in complicated situations.

An ambivalent aesthetic highlights uncertain boundaries and unstable combinations. It argues that action occurs through a mixture of individual and collective effort. We are both independent and interdependent. Ambivalence embraces multiplicity and hybridity and suggests that unrelated parts are actually related. Hybridity's intimate union of discrete components challenges our ontological assumptions. At the same time, hybridity recalls the components' original state. As an object both new and old, a hybrid oscillates between merger and dissolution.[8]

An ambivalent aesthetic welcomes the complications of affiliation. This looser form of hybridity requires close collaboration—it combines several into an unbounded whole.

Affiliation questions clear-cut boundaries and tidy solutions and asks us to re-imagine established taxonomies. The walls between humans and nonhumans become porous—subject-object boundaries are blurred. Affiliation brings together different perspectives and multiple truths. Subjective positions are in flux. Deleuze and Guattari see affiliation in the interactions of animal packs and in the making of a truffle—a delicacy made possible through the loosely coordinated action of a tree, a fly and a pig.[9] There are also elements of affiliation in symbiotic and parasitic relationships.

Affiliation acknowledges our intersubjectivity. Rather than acting only as independent agents, we often achieve our goals through cooperation—we work through human, animal, and machine associations. We also respond to context, reacting to material restraints and social interactions. In the process, Bruno Latour suggests we become liaisons between humans and nonhumans, go-betweens negotiating the divisions of nature, culture and discourse and creating new networks of activity.[10]

Finally, an ambivalent aesthetic welcomes irresolution. Ambivalent theory-practice is open-ended and resists closure. It houses multiple and irreconcilable motivations, acknowledges incompatible desires, and invites us to participate in indeterminate worlds where rules and strategies are temporary and flawed. It encourages dissonance, activating forgotten compromises and liminal tensions. Conflicts remain unresolved, keeping the dialectics as well as human-nonhuman participants in play.

The ambivalent animal project promotes irresolution through open-ended works in a variety of media. This dissertation mixes writing and making and mingles ideas and discourse with materials and craft. This mixture of disparate items creates ephemeral experiments that are evolving and incomplete. The work generates as many question as it answers.

Employing an ambivalent aesthetic creates moments of doubt and confusion which in turn gives us time to pause and ask questions that are often overlooked or undervalued.

This aesthetic welcomes a temporary delay to implementation—it slows down our rush to conclusion and encourages us to contemplate the possible consequences of our action. This is a chance to ask complex questions and an opportunity to rethink our assumptions. Moments of doubt or uncertainty create the potential for change; at such moments we may invent new animal, human and machine machine affiliations and also reject protocols that require the animal to be an instrument of anthropocentric needs.

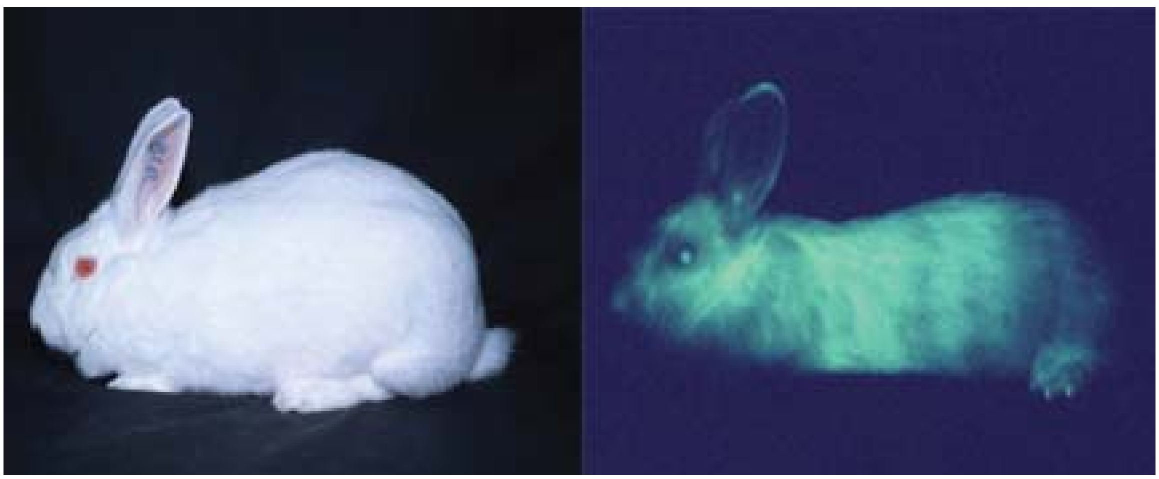
### 1.5 Ambivalent Alba

Eduardo Kac's 2000 *GFP Bunny*[11] project helps illustrate the ambivalent aesthetic along with the framework of the three dialectics. Kac's bio-art project features Alba, a transgenic rabbit developed in the labs of France's Institut National de la Recherche Agronomique (INRA). INRA created Alba by transferring the phosphorescent gene of a jellyfish into a rabbit zygote. The insertion of the phosphorescent gene makes Alba's eyes and skin glow green under blue light.[12] She is one of many chimeric creatures created by research labs around the globe.

In some ways Kac's *GFP Bunny* project aligns itself with the art tradition of adopting new materials. During the 20th century artists moved beyond canvas, fabrics, clay, wood, metal and stone to experiment with plastics, plants, mass-produced objects, film and video, and computer technologies. Seeking out new methods and materials became part and parcel of artistic practice. Kac's work follows this tradition but also breaks new ground in the use of "live" materials. Plants, animals and humans often appear in artworks but rarely are they the final object of creative output. And Alba is not an ordinary "live" material— outside the world of biotech research laboratories, she is an unconventional combination of rabbit and jellyfish. She represents a different kind of corporeality made possible by genetic modification.

The first dialectic, irreducibility and procedurality, is touched on by Kac in an interview in which he differentiates between the methods of science and art. For Kac, science's truth is established by creating a hypothesis, testing it out, and validating results. The process of validation requires repeatable tests. "It's really ultimately the sharing of that evidence that forms the idea of truth." Kac suggests that art, on the other hand, is about idiosyncratic, non-repeatable experiments: "I as an individual, subjectively produce something that I cannot repeat, nor do I want to repeat."[13] Kac's own work, at the intersection of art and science, contains both procedural and irreducible elements. On the one hand, Alba's body is viewed as pure code, an informational body that is altered by inserting an extract of jellyfish DNA code. As such, Alba is the result of a procedural innovation employed by labs around the globe. At the same time, Alba is a unique body born at a particular time and framed within Kac's art context. Kac introduces Alba at a moment when biotechniques are unfamiliar to many outside the field of biology. The project's timing is critical to Alba's reception—she is seen as a novelty in part because the general public is unaware of the proliferation of trans-species animals created by biotch labs. Alba becomes a non-repeatable art experiment tied to a particular cultural moment.

The *GFP Bunny* project also vacillates between embodiment and discourse. The authorship or conception of Alba remains unclear. While Kac states he "commissioned" Alba, INRA has refuted his claim, stating instead that Alba was one of many transgenic rabbits it created at the turn of the 21st century. INRA initially agreed to loan the rabbit to Kac for an art exhibit, but later withdrew its offer, possibly fearing political backlash at a time when mad-cow disease had called into question untested manipulations of an animal's diet and body. Kac countered that INRA promised to release Alba to his care. When INRA refused Kac's request to take Alba home, he fought back with a "public campaign" in Paris designed to promote his claim on Alba.[14] In his interactions with INRA and the press, Kac realized his project extended far beyond the limits of Alba's body. The bunny project piqued the curiosity of a global media community, and Kac happily took on the role of media provocateur. Paradoxically, the project moved in a discursive direction because of Alba's embodiment. If Alba was a transgenic bacterium instead of a furry mammal, the discursive interest in Alba might not have emerged. Alba's familiar yet transgenic body added fuel to the discursive fire: her material manipulations provoked intense cultural debate. She became a symbol of aesthetic and corporeal experimentation.



1.2 IRNA transgenic rabbit[15]

The second dialectic of autonomy and integration is manifest in the myths of modernism and postmodernism. Modernism's myths frequently side with autonomy. They portray a starving artist indifferent to financial concerns, suffering for the cause of art. This artist is viewed as a cultural prophet, ahead of her time, required to forecast and implement the socio-cultural future. In this salvific role, the artist fights against social and economic corruption.[16] In its most extreme form, the art-prophet myth encourages didactic excess: art zealously seeks to uplift the degraded masses.

If modernist myths exaggerate detachment, postmodernist myths overemphasize integration. We lose the art prophet but are left with the art marketeer. In this new conception of cultural production, the artist is one node in a network of cultural production. Her work is promoted and preserved by established institutions, galleries and museums, and is bought and sold as a precious commodity. Art caught in this myth is seen as just another cultural product in a media saturated, consumption-oriented society.[17] The dialectic of autonomy and integration seeks to keep both modern and postmodern myths in play. Artists are simultaneously detached and complicit—they participate in the art market but also pursue non-instrumental action. They continue to carve out spaces of semi-autonomy and opposition while being influenced by patrons and the culture they inhabit.

Kac's *GFP Bunny* project engages this dialectic of autonomy and integration. Kac uses Alba to raise cultural, ethical and scientific questions about bioengineered animals. In the process he detaches from the commercial concerns of corporate research. But because Alba is created by a research arm of the state, Kac's is also aligned in part with institutional interests. Kac explains his middle-path position:

> Since artists do not have a stake in corporate biotechnology, and neither do they blindly oppose the presence of new technologies in the larger social context, artists are in a unique position to create subtle ambiguity where the dominant discourse oscillates between extreme pro or con positions.[18]

Kac argues for an ambivalent artist, one both integrated and autonomous. It seems possible that a conflicted artist, drawn to new materials and techniques but detached from a market-driven agenda, may be able to create unconventional transgenic projects. These artworks may also generate public discourse about the ethics of biotechnology, as Kac's *GFP Bunny* project did. But Kac may be overstating the artists' autonomy when he writes: "artists do not have a stake in corporate biotechnology." It is the success of institutional research that supports his material investigations. If artists can maintain an ambivalent, critical view of their methods, they may be able to walk a fine line between autonomy and integration. The balancing act, though, is difficult to maintain. Artists, like most people, may simultaneously support and subvert the status quo. Just as scientists sometimes fail to recognize the consequences of their research, artists enamored with the power of new materials and techniques may contribute to economic and institutional abuse.

Autonomy and integration also interrogates the myth of non-instrumental art. Most artists rarely think of their work as solving problems. Instead, they pursue their own inclinations, sometimes generating new problems in the process. This work approach can be experimental and non-pragmatic. Not all artists, however, pursue such independent methods. Art activists have clear political problems in mind they hope to address. Other artists happily create cultural commodities designed to appeal to an art market. Indeed the economic survival of most artists requires some form of engagement with the economy they inhabit. The myth of non-instrumental art, however, remains strong. And when artists associate with instrumental procedures and institutional resources, their artistic intentions may be questioned.

This seems to be the case in the reception of Alba. Using bio-techniques for an art project generated anger and anxiety.[19] While research labs routinely manipulate the genes of animals, the work is typically framed as a search for a medical cure. The culture generally supports biotech projects that promise to alleviate human suffering; genetic manipulations that have utilitarian outcomes tend to engender less controversy than impractical bio-artworks. When art takes up the technique of transgenic manipulation, though, what is mundane for scientists becomes transgressive for artists. Animals altered for expressive effect carry far more charge than their counterparts modified for instrumental purposes.

Issues of aura and abjection also emerge in Kac's project. Kac's fame as an artist rose as he played the role of outsider fighting to win back Alba from an implacable research institute. That is, his influence soared as he played the part of marginalized “other.” Alba also performs auratic and abject roles. As one of many phosphorescent rabbits created by INRA, she does not qualify as a unique creation. Yet Alba is the only INRA rabbit with a name (the other rabbits are numbered) and is also the only rabbit at the center of a custody battle. The fight between Kac and INRA and the associated media attention ultimately give Alba the aura of fine art. Despite her fame, though, she remained an ambivalent creature. She spent the rest of her life caged with the other INRA rabbits, eventually dying in the lab, far from the comforts of Kac’s welcoming home—an abject end for an iconic work of art.

Kac’s *GFP Bunny* project resonates because of the oscillations between individual and institution, organic and artificial, embodiment and discourse, art and science. Kac’s work sets in motion irresolvable conflicts that explore political and cultural questions. As we engage with his art, we reflect on the contradictions and ambiguities of animal and human interactions.

Throughout this work, I’ll be using the three dialectics to explore the animal’s complicated status and examine a range of texts and artifacts. I’m seeking out irresolvable tensions that arise when the animal engages with human privilege and cultural-economic-technological mechanisms. Issues of epistemology, ontology, and materiality are present in each chapter. These issues are explored through the varying roles of cyborg, clone, chimera and shapeshifter. As I move through these roles, the dialectics remain in place but are also distorted by the insights of changing perspective and focus. Examining the ambivalent animal makes more apparent the limits of language and representation, the ubiquity of anthropocentrism, and the animal’s complex participation in ongoing changes in human and nonhuman identity and corporeality.

[1] Norbert Wiener documents examples of feedback loops in both machine and animals. His experiments on cats illustrate the merger between biological and mechanical mechanisms as well as the animal's early association with cybernetic systems:

> This time we decided to take a nervous problem directly from the topic of feed-back, and to see what we could do with it experimentally. We chose the cat as our experimental animal, and the quadriceps extensor femoris as the muscle to study. We cut the attachment of the muscle, fixed it to a lever under known tension, and recorded it contractions isometrically or isotonically. We also used an oscillograph to record the simultaneous electrical changes in the muscle itself. We worked chiefly with cats, first decerebrated under either anesthesia later made spinal by a thoracic transection of the cord. In many case strychnine was used to increase the reflex responses. The muscle was loaded to the point where a tap would set it into a periodic pattern of contraction, which is called *clonus* in the language of physiologist. We observed this pattern of contraction, paying attention to the physiological condition of the cat, the load on the muscle, the frequency of oscillation, the base-level of oscillation, and its amplitude. These we tried to analyze as we should analyze a mechanical or electrical system exhibiting he same pattern of hunting.

Norbert Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine* (New York: Technology Press, John Wiley & Sons, 1947), 28.

[2] Virtual Reality pioneer Jaron Lanier in an essay on the influence of cybernetic culture argues that contemporary investigations into bio- and nano-technology are the direct result of cybernetic processes. Biotechnology makes "flesh into a computer," nanotechnology "hopes to do the same for materials science." Both fields develop techniques designed to make "the body, and the material world at large…more manipulatable."
Jaron Lanier, "One-Half of a Manifesto," *WIRED*, 8:12, December 2000, 178.

N. Katherine Hayles also notes the reach of cybernetics:

> When the body is revealed as a construct, subject to radical change and redefinition, bodies of knowledge are similarly apt to be seen as constructs, no more inevitable than the organic form that images them. At the same time, that cybernetics was reconfiguring the body as information system, it was also presenting itself as a science of information that would remap intellectual terrains. Branching out into disciplines as different as biology, psychology, and electrical engineering, it claimed to be a universal solvent that would dissolve traditionally disciplinary boundaries.

N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics* (Chicago, IL: The University of Chicago Press, 1999), 85.

[3] Donna J. Haraway, *Simians, Cyborgs, and Women: The Reinvention of Nature* (New York: Routledge, 1991), 164.

[4] Wyatt Andrews, “Growing Miracles,” Part One, *CBS Evening News*, February 6, 2008. Highlights from the report:

> Andrews, voiceover: From blood vessels to muscle tissue, Atala [Anthony Atala, regenerative medicine researcher] and his team at Wakeforest University believe, in theory, anything inside the body can be grown outside the body.
>
> Atala: We are making body parts that we can implant right back into patients.
>
> Andrews, voiceover: Once considered a Frankenstein fantasy, the field of regenerative medicine is on the verge of unimagined breakthroughs. Scientists believe every part of the body has cells capable of regeneration, all researchers need to do, is isolate those cells and coax them to grow.
>
> Andrews, talking to researcher: You’re using heart cells in an ink-jet printer?
>
> Researcher in Atala’s lab: Yes, yes.
>
> Andrews, voiceover: In this lab, they’re making the heart of a mouse. A heart they grew layer by layer by spraying the cells with a printer.
>
> Andrews, voiceover: In order to cure your disease, your physician will order a replacement organ or body part which will be custom made for you using your own cells. For the tens of thousands of patients who need organ transplants, this technology brings hope….
>
> Nichtberger: In regenerative medicine, I think it’s similar to the semi-conductor industry of the 1980s. You don’t know where it’s going to go, but you know it’s big.

Dr. Steven Nichtberger, CEO, Tengion. Tengion is a start-up company that creates in-vitro bladders and hopes to soon mass produce blood vessels and kidneys.

[5] Marc Ballon, “Animal-Tissue Values at Heart of Edwards’ Success.” *Los Angeles Times,* July 16, 2001 (http://articles.latimes.com/2001/jul/16/business/fi-22886).

[6] Brain Handwerk, “Mice with Human Brain Cells Created,” *National Geographic News*. December 14, 2005 (http://news.nationalgeographic.com/news/2005/12/1214_051214_stem_cell.html)

[7] Julie Kristeva notes abjection’s connection to the animal:

> The abject confronts us, on the one hand, with those fragile states where man strays on the territories of *animal*. Thus, by way of abjection, primitive societies have marked out a precise area of their culture in order to remove it from the threatening world of animals and animalism, which were imagined as representatives of sex and murder.

Julia Kristeva, *Powers of Horror: An Essay on Abjection*, trans. Leon S. Roudiez (New York: Columbia University Press, 1982), 12-3.

[8] Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993) 57

[9] Gill Deleuze and Felix Guatarri, *A Thousand Plateaus: Capitalism & Schizophrenia* (Minneapolis, MN: University of Minnesota Press, 1987), 242.

[10] Latour, 138-9.

[11] Eduardo Kac, "Life Transformation—Art Mutation," in Eduardo Kac, ed., *Signs of Life: Bio Art and Beyond* (Cambridge, MA: MIT Press, 2005), 165-171.

[12] Christopher Dickey, "I Love My Glow Bunny," *WIRED*, 9:04, April 2001 (http://www.wired.com/wired/archive/9.04/bunny.html).

[13] Riz Kahn, "One on One: Eduardo Kac," *Al Jazeera English,* February 23, 2008. Kac was intereviewed on Kahn's television show:

> Kahn: What are, in your opinion, the boundaries between science and art?...
>
> Kac: …We have come to a level of specialization of the disciplines. Art is in fact quite distinct from science. Science is based on a hypothesis, that goes through a series of tests. And then you arrive at a proof. Meaning that your hypothesis has been demonstrated through these steps. And if that proof that you arrive at, and those methods that you employ can be replicated by others, no matter where, then the notion of truth is built, is constructed and shared. It's really ultimately the sharing of that evidence that forms the idea of truth. That's how science basically works. Art doesn't work that way. Art is essentially individual. Art is a singularity. I as an individual subjectively produce something that I cannot repeat, nor do I want to repeat. If others can duplicate that, that's usually called plagiarism.

[14] Kac, *Signs of Life: Bio Art and Beyond,* 170.

[15] Louis-Marie Houdine, "Dealing with difficult topics in public: A communication workshop focused on controversial issues in science," European Molecular Biology Organization (EMBO) Members Meeting, Barcelona, 28 October 2007 (http://www.embo.org/scisoc/media_wkshop07_houdebine.pdf).
Houdebine is a researcher at INRB and was Alba's custodian when the controversy erupted.

[16] Calinescu describes the constraining role of the avant-garde artist:

> …on the one hand, the artist enjoys the honor of being in the forefront of the movement toward social prosperity; on the other, he is no longer free but, on the contrary, given—by the same political philosopher who so generously proclaimed him a leader—a whole program to fulfill, and a completely didactic one, at that. All of this definitely reminds us of the theory of 'socialist realism' in our century. This didactic-utilitarian conception, which assigns to the artist an avant-garde role only to make of him a disciplined soldier or militant…
>
> Matei Calinescu, *Five Faces of Modernity: Modernism, Avant-Garde, Decadence, Kitsch, Postmodernism* (Durham, NC: Duke University Press, 1987),103.

[17] Johanna Drucker explores these issues in her book *Sweet Dreams: Contemporary Art and Complicity*. Drucker cogently criticizes the mindless acceptance of the salvific function of art. While I agree with many of Drucker's insights into contemporary art, I worry that Drucker replaces the art-prophet myth with an embedded-artist myth. Artists are indeed integrated into society, but they are often one-step removed from the aims of the culture industry and the marketplace. This minimal detachment gives some of the most powerful contemporary art works a resonance that is difficult to find in many culture-industry products. Also, it's worth noting that just as artists rebelled against modernism's high-mindedness, after decades of postmodern domination, some artists now seek new methods to escape the myth of complicity.

[18] "Behold, Alba: Genetically Modified Glow Bunny Sparks a Debate Between its Creator, SAIC Professor Eduardo Kac and Students," *F-News*, student newspaper at The School of the Art Institute of Chicago. November 2000, 15.
In the article, Kac responds to questions about his *GFP Bunny* project from students enrolled at The School of the Art Institute of Chicago.

[19] Susan Rubinowitz, "Glowing Rabbit Sparks Controversy," *Petplace.com,* September 23, 2003 (http://www.petplace.com/Articles/artShow.asp?artID=1365; http://www.ekac.org/petplace.html).

# CHAPTER 2

# CYBORG

Technological marvels of the $20^{th}$ century are now common objects in our everyday lives. Machines routinely process information, communicate with each other, and some are said to learn and think. These active machines inspire questions like: What is cognition? What is agency? What is autonomy? What does it mean to be human? And, perhaps, more fundamentally, what is life? Donna Haraway writes: “Our machines are disturbingly lively, and we ourselves frighteningly inert.”[1]

We have a complicated relationship with technology. We celebrate our innovations, cherish the latest gadget, take comfort in never-ending flows of data, and find solace in the feedback loop. At the same time, our reliance on integrated technologies makes us uneasy. High-tech, highly mediated environments attempt to respond to our immediate needs, but they also require us to conform to their protocols and are increasingly able to track and document our every move.

The pleasure and pain of technological development is illustrated by the cyborg. He is embedded in complex networks and his identity is caught up in the actions of sentient and inanimate beings. His tight integration of real and virtual, natural and artificial, organism and machine challenges traditional subject-object boundaries. In this chapter, most of my examples highlight animal-machine integration; humans are seen as secondary characters in my portrayal of the cyborg. Nonetheless, humans are always present when cyborgian animals appear. Humans facilitate the integration of animal and machine and their anthropocentric desires shape the nonhuman cyborg's capabilities.

A cyborgian animal is a familiar presence in the research and practice of art, agriculture, industry and science. Ethologists collect streaming video data from cameras attached to animals. Automated mechanisms support farm-animal labor. Lab animals are fitted with brain interfaces that let them maneuver robotic limbs. Animal movement generates data visualizations and acoustic arrangements. And a pet's health and social interaction are traced with sensors, data scanners and online software. This mingling of animals and technology increases knowledge and enhances animal behavior but also engenders new forms of abuse. A cyborg has access to altered perceptions and insights and she is sometimes coddled by technological innovations, but she is also regulated by the mechanisms of cybernetic control. These cyborgs are simultaneously liberated and repressed, supported and surveilled, monstrous and banal.

## 2.1 Irreducibility & Procedurality

### 2.1.1 Cybernetic Totalism

Cybernetic systems routinely frame our understanding of the world. Simulations explain and predict complex phenomena. Augmented reality systems overlay information on physical objects and spaces. Data-mining procedures highlight anomalies and emerging trends. The speed and agility of these systems expand our epistemological reach. Yet these systems are influenced by culture and economics and their insights are often filtered through the ideologies of a particular place and time. Cybernetic systems excel at capturing and organizing vast amounts of information, but we should never forget their editing abilities. Our simulations and augmentations always elide data and often produce reductive, distorted experiences of reality.[2]

The reductive character of cybernetic systems stems in part from a privileging of information over materiality. Katherine Hayles argues that post-WWII cybernetic models stripped a system's informational message of its meaning, materiality and context. She traces the foundational moves of Claude Shannon and Norbert Wiener as they develop a theory of information. The first step is to make probability of message the measure of information. This definition of information removes the ambiguities of meaning from the concerns of information theorists. With meaning gone, information theory can be applied to a wide array of contexts.[3]

Wiener's theory of cybernetics is derived from his assessment of both biological and mechanical systems. Information stands apart from medium; it is detached from its physical instantiation. Eugene Thacker notes:

> When information is regarded as information, no matter what medium "carries" it, it then becomes a universal, disconnected from the material-technical necessities of the medium, the processes, and the context. It is this universalizing and decontextualizing of information the enables Wiener to conceive of machines and organisms as the same from the perspective of cybernetic systems operating through feedback loops.[4]

Information detached from materiality and context privileges pattern over presence.[5] Presence is thought to be based in information—matter dissolves into pattern. Roboticist Hans Moravec sees life's informational essence as the key to overcoming corporeal limits—he imagines transcending materiality through cybernetic enhancements that eliminate scarcity, disease and death. Immortality can be achieved through uploading a coded version of human consciousness into a computer.[6] Thacker notes a conservative streak in the optimistic visions of cyberneticists like Moravec. They maintain an essential human core—an essence informed by the Enlightenment's values of autonomy and agency—even as the human is radically altered. Such scenarios ignore the effects of tightly integrated human-nonhuman interaction; they fail to acknowledge the distributed agency and altered boundaries that new techniques bring.[7] Consciousness that resides inside a computer creates a different kind of subjectivity—a subjectivity that does not easily align with the Enlightenment's idea of individualism.

Computer scientist Stephan Wolfram interprets the rise of pattern over presence as evidence of life's computational basis. Wolfram argues "that programs based on simple rules can produce behavior of great complexity."[8] He sees these simple programs as the basis for a variety of natural and social phenomena. The world becomes a giant computer program made up of many smaller programs that implement relatively simple algorithmns. Wolfram extends his computational approach to a range of disciplines including mathematics, physics, biology, social sciences, computer science, philosophy, art and technology.[9] Computational processes become the foundation for a unifying theory of reality.

Jaron Lanier, Virtual Reality pioneer, notes that dematerialized information and computational models of life and matter are inflected with an ideology he calls "cybernetic totalism"—a system of thought that suggests "people are no more than cybernetic patterns" and that corporeal knowledge and experience are secondary to these patterns.[10] Cybernetic totalism equates idealized models of the world with the physical world. Thus Moravec is able to equate encoded consciousness with embodied consciousness.

Lanier argues cybernetic totalism extends the influence of cybernetics to biology and physics "resulting in life and the physical universe becoming mercurial; achieving the supposed nature of computer software."[11] Lanier counters this idealized view of easily programmable material with his own experience of creating software. He sees cybernetic systems are far from idealized systems and highlights instead the "brittleness" of software. Despite advances in hardware—increased chip speed, memory and storage—software development remains a difficult task. Cybernetic systems suffer the effects of legacy code, have difficulty processing ever-larger data sets, and unevenly integrate the components of large-scale applications. As programmers scramble to keep up with hardware innovations, they often create inefficient and flawed code.[12] Cybernetic totalists imagine perfectly integrated cybernetic configurations, but Lanier reminds us of the material and cultural constraints that shape our contemporary technologies.

Cybernetic totalism argues for a dramatic epistemological change in the way we understand the world. Computational models are seen as underpinning real-world phenomena. The dialectic of irreducibility and procedurality acknowledges the power and potential of abstracted models but argues that procedurality by itself fails to grasp the complexity of embodied experience. Our models generate new insights, but they remain reductive snapshots of the physical world.

### 2.1.2 Cyborg Animals

#### 2.1.2.1 Wild Cyborgs

Just as we mistake dematerialized computational models for real-world phenomena, we also equate mediated data with embodied experience. Issues of mediation and embodiment arise when ethologists employ mechanized systems that track wild animal behavior. These ethologists attach a lightweight, wireless camera to an animal's body and capture streaming video recorded from the animal's viewpoint. The technology allows researchers to document animal behavior from afar, observing intimate details of animal life without encroaching on the animal's territory. The wild animal who carries the camera becomes a cyborg embedded in a feedback loop that includes the animal, equipment and human observer.

Crittercam is emblematic of the behavior-recording devices used by ethologists. In the last fifteen years, Crittercam inventor Greg Marshall has attached cameras to sharks, whales, turtles, penguins and seals. Recently, he adapted the technology to the land-and-water habitat of Alaskan grizzly bears. Many ethologists are enthusiastic about these mediated records of animal behavior. They witness new behaviors that were previously unknown.[13] But the technology is not without its complications—it may permit observation of animal behavior with minimal human intrusion, but the camera becomes an intrusive piece of equipment.[14] Engineer Rob MacIntyre attached a miniature camera to a peregrine falcon to record her stoop—a moment of high-speed chase that occurs as the peregrine dives and catches prey in midair. Even microelectronic augmentation, however, proved cumbersome for the falcon. The camera's size, shape and weight altered the aerodynamics of the bird, creating awkward attempts at flight before she eventually adjusted to her new payload.[15] In another study, attaching a camera to an elephant matriarch required chasing, isolating and sedating the animal. This procedure separated matriarch from her calf and herd and caused considerable stress for the entire group of elephants. When the camera equipment was removed and the matriarch released, her herd appeared nervous as she approached them and hesitantly accepted her return.[16]

Not only is the mounting and extracting of equipment stressful to animals and sometimes dangerous for researchers, but the imagery captured is often poor quality. The grizzly-bear Crittercam transmits claustrophobic, jittery video. Researchers describe the video footage as seeing through the animal's eyes,[17] but such rhetoric ignores the footage's limited view. Cameras are generally attached in ways that ignore the animal's eye-line. The elephant's camera sits on top of her head, the grizzly bear's camera hangs from her neck, and the falcon's camera protrudes from her back. The view from the grizzly bear's neck may contribute to the Crittercam's claustrophobic aesthetic—the camera is angled toward the ground and reveals only a small slice of the bear's visual field. More troubling, though, is the elephant's straight-ahead camera view. An elephant's eyes are positioned on the side of her head. This configuration provides elephants with wide-angle side views and limited frontal views. Such views protect elephants from predator attacks—they can detect animals approaching from behind. In the case of the "elecam," media conventions rather than elephant phenomenology determine the camera's viewpoint. A better view of the elephant's perspective would require two wide-angle lenses pointing sideways instead of forward. This panoramic view would be unfamiliar to humans—we, like most predators, have our eyes oriented to frontal views and as media consumers are accustomed to single-camera perspective—but would provide biologists with a better sense of elephant perception.

Perhaps more phenomenologically accurate views will have to wait for technological improvements. For now, researchers seem pleased with the insights they gain from augmented animals. They view Crittercam footage as an intimate and detailed record of animal behavior. But lessons learned from media studies should make biologists less confident in the data they record; the tools and technology we employ filter and distort our knowledge.[18] Crittercams' streaming video is far from an immediate experience. (Although perhaps the poor quality image, eye-line mismatch, and limited visual field are read as signs of "real life" views.) Just as we alter our behavior to adapt to increasingly mediated environments, animals may also alter their behavior when they find cameras attached to their bodies. A sentence from National Geographic's web site highlights and hides the subtle shifts that Crittercams engender: "Some animals, especially female seals, show initial interest in the package they are carrying, but soon resume their day-to-day life in the wild."[19] This statement alludes to many important questions that remain unanswered: Do different species and different animals within species respond to Crittercam in different ways? How do these technologies alter an animal's behavior? What are the effects of mounting and extracting equipment from an animal? How does augmentation affect an animal's sociability? How is video data different from more traditional in-field observations? And when we track animals in packs or tribes, do we miss important group dynamics when we emphasize data collected from a single animal?

To view an animal cyborg as no different than any other animal ignores the effects of mediation. A cyborgian mix of flesh and machine creates new perceptions and alters phenomenology. Perceiving a cybernetic system as an objective representation denies the influence of culture and the reductions of code. Cybernetic systems introduce a certain amount of noise. A device like Crittercam facilitates a dialogue between animal, human and machine that is simultaneously immediate and mediated. Our knowledge of the animal other is enhanced, but our view of animal behavior and phenomenology remains incomplete.

#### 2.1.2.2 Domesticated Cyborgs

Domesticated animals are also enlisted to participate in cybernetic projects. Dutch company Lely is an innovator in the automation of farm labor. The company's products include mobile and stationary robots, specialized sensors, and networked software applications. Dairy cows require consistent, daily care and are a prime target of Lely's labor-saving devices. Lely's *Astronaut*, a robotic milking station, and *Juno*, a mobile robot "feed pusher," are two of Lely's offerings.[20] The marketing materials for these products recount the difficulties of dairy production and showcase the advantages of Lely's cybernetic solutions. An excerpt from *Juno's* promotional material notes the mobile robot's ability "to provide cows with fresh feed 24 hours per day":

> The Lely Juno contributes to the welfare of your herd by stimulating the cows to approach the feeding fence more often. The cows have a better roughage intake and the herd is calmer and more tranquil. Low ranked animals will now also have sufficient access to fresh feed.[21]


2.1 Lely's *Austronaut*[22]

Lely’s tract argues that *Juno’s* regular distribution of feed compensates for the injustices of bovine social hierarchies—even the weakest members of the herd have access to food after dominant herd members are satiated. The robot continually delivers food, a time-consuming and tedious task that humans would be unwilling or unable to do. Lely’s automated milking machine, the *Astronaut*, also caters to bovine needs. The robotic milker is available at all hours—the cow simply enters the milking stall when she is ready to be milked. Before automation, cows were milked at fixed times twice a day; the cow’s body accommodated the farmer’s schedule. With Lely’s equipment, the machine accommodates the cow’s body. Lely also manufactures systems that clean barn floors and massage cows’ backs. These products are designed to promote healthy and productive cows.

With increased automation there are inevitability some trade-offs. A cyborgian cow has better access to food, enjoys frequent back rubs, and milks at her convenience, but farm labor replaced by robotic labor creates more refined methods of regulation. Each cow has an RFID inserted in her ear, permitting the *Astronaut* milker to record and track her milk production. The milk's quality is assessed through chemical sensors and discarded if deemed unfit. A cow's long-term productivity is tracked through visual graphs available to the farmer online.

Lely's cybernetic attention both accommodates and regulates the cow's body. Before automation, dairy farmers named the members of the herd. After shifting to Lely's system, many farmers distinguish cows by number instead of name. This new abstraction may alter in subtle ways the farmer's perception of her herd. When milk quality and quantity can be tracked, day by day, and charted over months and years, how does the animal's status shift? Are cows primarily defined by the quantity and quality of their milk? Is productivity the ultimate measurement of bovine labor? And do a few pieces of data provide an accurate assessment of productivity? One could imagine a less productive cow who nonetheless contributes in unquantifiable ways to the herd's health. What happens to the least productive animals now that they are easily tracked? Do they become expendable? Or does the system encourage farmers to quickly address health concerns within the herd? Lely's procedural abstractions generate material consequences. The cow is reframed (and enframed) by these cybernetic mechanisms. Her success as an animal laborer is measured through the mediation of Lely's system.

As the farmer is distanced from the daily ritual of milking, she is also distanced from a certain type of knowledge. Cybernetic visualizations and chemical sensors provide a different kind of knowledge than hands-on interactions between farmer and herd. These cybernetic systems focus the farmer's attention in ways that expand and restrict her understanding of the herd. In Lely's view, human labor is best focused on specialized managerial tasks—monitoring productivity trends and making high-level decisions. For some farmers, this may be a welcome relief. For farmers who enjoy the complexities of material engagement and animal-human interaction, this managerial role may require difficult adaptations.

Another commercial product creates canine cyborgs. Social Networking in Fur (SNiF) monitors a dog's social life and activity levels. The system's main hardware component is a networked, accelerometer-enabled dog collar. The collar, like traditional collars, identifies the dog but also tracks the dog's movement and records encounters with other SNIF-collared dogs. Collar data is uploaded to SNiF servers and fed into social networking/health-monitoring software. Dog guardians can enter pet profiles and upload canine pictures. They can set up "doggy dates," arranging to meet other dogs for walks or to play. The amount of time a dog interacts with other SNiF dogs is displayed online, giving guardians a sense of dog-to-dog interaction and compatibility. Early designs of the system allowed custodians to rate the interactions of their pet with other SNiF dogs. The guardian simply pressed a "negative" or "positive" button on the dog's leash to rate the compatibility of the two dogs.[23] Since SNiF captures each dog's unique ID, dogs who are deemed too aggressive could be tagged and future encounters avoided, protecting a pet from potential fights or injuries.

Guardians monitor the dog's activity level online, viewing exercise patterns throughout the day. SNiF charts the amount of time a pet is "inactive, low activity, walking, trotting or galloping." SNiF software also lets a guardian compare her dog's activity with dogs of the same breed or dogs living in a particular zip code. Guardians are encouraged to use the activity data to regulate the dog's diet—a sluggish canine may find his portions cut.[24]

Like Lely's systems, SNiF both accommodates and regulates its animal cyborgs. It adds interest to a pet's domesticated life, encouraging social encounters and exercise. At the same time, it enables a caretaker's most controlling instincts. The system provides a dog's guardian with new tracking tools and impressive data visualizations—a dog's every move and encounter can be displayed online. Measuring a dog's activity or sociability against dogs of the same breed or neighborhood enforces normative behavior—a dog is judged by a standard that may or may not align with his own corporeal and social needs. SNiF's quantifications of health and sociality determine a dog's optimal behavior. Yet despite SNiF's surveillance capabilities and normative regulations, the product challenges the traditions of human-centered design. An animal tagged as "inactive" is likely to induce caretaker guilt which in turn may result in more frequent walks and play activities—an outcome many dogs would enjoy. SNiF's disciplinary mechanisms likely alter human behavior as much as dog behavior. The system mingles human and animal desires and requires moments of compromise and adjustment for both guardian and pet. A SNiF dog's corporeal needs are highlighted and social life expanded, and at the same time his habits are scrutinized and his character define by taxonomies and measurements of a cybernetic system.

### 2.2 Autonomy & Integration

Technological augmentation not only affects ways of knowing and behaving, but the cyborg's tight coupling of animal and machine creates a new kind of subjectivity. Katherine Hayles notes that cybernetics establishes boundaries along the inputs and outputs of a system. If "flow of information" becomes a binding thread, then humans, animals and machines become components in an assemblage. This integration challenges the Enlightenment's notion of autonomy. The cyborg redraws our corporeal boundaries by incorporating anything that resides within the feedback loop. Hayles recounts that Gregory Bateson asked graduate students to consider the effects of tools and technologies that assist our understanding of the world. Bateson gave as an example the cane carried by a blind man. He asked if "a blind man's cane is part of the man?” From the perspective of cybernetic systems that “are constituted by flows of information…the cane and man join in a single system, for the cane funnels to the man essential information about his environment.”[25] Hayles notes:

> Of all the implications that first-wave cybernetics conveyed, perhaps none was more disturbing and potentially revolutionary than the idea that the boundaries of the human subject are constructed rather than given. Conceptualizing control, communication, and information as an integrated system, cybernetics radically changed how boundaries were conceived.[26]

Donna Haraway also highlights the cyborg’s invention of new boundaries. Haraway’s cyborg challenges traditional identity and proposes new political alliances. She calls for “*pleasure* in the confusion of boundaries and for *responsibilit*y in their construction.”[27] “So my cyborg myth is about transgressed boundaries, potent fusions, and dangerous possibilities which progressive people might explore as one part of needed political work.”[28]

Haraway re-imagines the cyborg’s mix of animal, human and machine as an empowering metaphor. The cyborg may be a dangerous byproduct of the military-industrial complex, but she also invents a new way of being: “…a cyborg world might be about lived social and bodily realities in which people are not afraid of their joint kinship with animals and machines, not afraid of the permanently partial identities and contradictory standpoints.”[29]

For Haraway, the cyborg’s impurity—her endless, promiscuous mingling—counters Western narratives of wholeness and completion. From a feminist viewpoint, a cyborg becomes an emblem of metamorphosis that frees herself from the rigid roles imposed by patriarchal power. A woman need not attach herself to masculine authority in a quest for completion.[30] And a cyborg rejects the Christian concept of a fallen subject restored to

God through obedience to deity's commandments. The cyborg is impure from birth; she has no loss of innocence to overcome:[31]

> …there are also great riches for feminists in explicitly embracing the possibilities inherent in the breakdown of clean distinctions between organisms and machine and similar distinctions structuring the Western self. It is the simultaneity of breakdowns that crack the matrices of domination and opens geometric possibilities.[32]

Haraway's cyborg also questions established binary oppositions. She argues that these oppositions have placed the minority other in a subordinate subjective position. These "dualisms" have "been systemic to the logics and practices of domination of women, people of color, nature, workers, animals—in short, domination of all constituted as *others,* whose task is to mirror the self."

> Chief among these troubling dualisms are self/other, mind/body, culture/nature, male/female, civilized/primitive, reality/appearance, whole/part, agent/resource, maker/made, active/passive, right/wrong, truth/illusion, total/partial, God/man. The self is the One who is not dominated, who knows that by the service of the other; the other is the one who holds the future, who knows that by the experience of domination, which give the lies to the autonomy of the self. To be One is to be an illusion, and so to be involved in a dialectic of apocalypse with the other. Yet to be other is to be multiple, without clear boundary, frayed, insubstantial. One is too few, but two are too many.[33]

Haraway argues that the Enlightenment's notion of an autonomous individual was always an exclusive subjective position. The Enlightenment may have extended agency and autonomy to a wider range of white, Western males but refused to grant the same level of subjectivity to all races, ethnicities, genders, classes and sexualities. Hayles comes to a similar conclusion in her analysis of the posthuman:

> But the posthuman does not really mean the end of humanity. It signals instead the end of a certain conception of the human, a conception that may have applied, at best, to that fraction of humanity who had the wealth, power, and leisure to conceptualize themselves as autonomous beings exercising their will through individual agency and choice. What is lethal is not the posthuman as such but the grafting of the posthuman onto a liberal humanist view of the self.[34]

Hayles argues this posthuman subjectivity emerges in the interactions of discourse, culture, technology, and embodiment:

> The chaotic, unpredictable nature of complex dynamics implies that subjectivity is emergent rather than given, distributed rather than located solely in consciousness, emerging from and integrated into a chaotic world rather than occupying a position of mastery and control removed from it. Bruno Latour has argued that we have never been modern; the seriated history of cybernetics—emerging from networks at once materially real, socially regulated, and discursively constructed—suggests, for similar reasons, that we have always been posthuman.[35]

The cyborg exaggerates these posthuman tendencies. Her corporeal and ontological boundaries are difficult to untangle. She acts by coordinated and collaborative means and integrates flesh and data, software and hardware, animals, humans and machines.

Bruno Latour's writing on modernity adds to this examination of altered subjectivity. Latour argues that the material and social transformations of modernity arise through establishing divisions between nature, society and God (in a secular society, discourse is substituted for deity).[36] Modernity separates humans from nonhumans, spirit from materiality, and nature from culture. The moderns account for the complexity of lived experience by considering nature and culture to be "transcendent" in some contexts and "immanent" in others. Nature is within our grasp in the research lab but beyond our reach in the universal laws of physics. We elect a government with our individual votes, yet historical movements are beyond our political control. Our world is described by switching back and forth between transcendent and immanent modes while maintaining the distinct divisions between culture, nature and discourse. This epistemology becomes the undeclared “Constitution” of modernity.[37]

> By playing three times in a row on the same alternation between transcendence and immanence, the moderns can mobilize Nature, objectify the social, and feel the spiritual presence of God, even while firmly maintaining that Nature escapes us, that Society is our own work, and that God no longer intervenes.[38]

In pre-modern cultures, Latour asserts the boundaries between nature, culture and discourse are less clear. Humans and nonhumans are closely connected, nature is not easily objectified, and cultural traditions remain secure. The moderns “purification” process permits a “mobilization” of nature and a new scale of material manipulation, social organization and technical exploration. Paradoxically the modern divisions generate an array of hybrids; the process of “translation,” bridging the gap between nature, culture and discourse, results in a rich network of intermediary concepts, procedures and artifacts.

For Latour the rise of hybrids emphasizes the interconnectedness of nature, society and discourse. Isolating the human from this web of connection risks losing subjectivity altogether.[39] Latour echoes in part the sentiments of Hayles and Haraway. By incorporating the effects of technology—acknowledging the active agents that constitute contemporary identities—we are able to re-think the divisions of society, nature and discourse. Rather than completely abandon the Enlightenment’s agency and autonomy, Latour ask us to expand our concept of subjectivity to include a mixture of humans, animals, machines, and ideas. In so doing, we modify our subjectivity and expand our discourse:

> …the human, as we now understand, cannot be grasped and saved unless the other part of itself, the share of things, is restored to it. So long as human is constructed through contrast with the object that has been abandoned to epistemology, neither the human nor the nonhuman can be understood.[40]

Latour argues that subjectivity is restored when the individual is redefined as the go-between of what was once considered human and nonhuman groups—this new subject mediates the divisions of nature, culture and discourse. To be human is to be "a weaver of morphisms;"[41] continually creating and navigating intermediary networks. "The human is in the delegation itself, in the pass, in the sending, in the continuous exchange of forms."[42]

The cyborg embodies the altered subjectivities proposed by Hayles, Haraway and Latour. Latour's mediator, Hayles posthuman and Haraway's politically engaged cyborg imagine alternatives to the Enlightenment's autonomous subject. Each theorist celebrates new human-nonhuman intimacies that challenge our sense of identity. From this perspective, the human is less central and the assemblage of human, animal and machine comes to the fore.

## 2.3 Aura & Abjection

### 2.3.1 Auratic Cyborg

Haraway's empowered cyborg is re-imagined in the form of James Auger and Jimmy Loizeau's conceptual design piece *Augmented Animal.* The project proposes cybernetic systems and technological enhancements that focus on animals' needs. Each integration of animal and machine enhances an animal's status. Auger and Loizeau imagine technologies that assist squirrels in finding food, protect rodents from predators, and help dogs adapt to the restrictions of domestic life.[43] Auger and Loizeau's comment on domestication is emblematic of their approach:

When animals are domesticated they enter an uncertain territory between the natural and the artificial. They must live within human terms and conditions, dislocated from their original environment, often leading a frustrating life. Many animals have developed ingenious mechanisms of defense, and with the help of technology they can overcome evolutionary shortfalls.[44]

In one *Augmented Animal* scenario, a dog's tail signals emotional and physical state with the enhancement of LED text. Phrases like "I'd like my dinner" or "I really love you" appear when the dog wags her tail. In another scenario, a squirrel records the GPS location of a buried nut using a device attached to his wrist. When he needs to retrieve the nut, a red light on his device blinks to indicate the exact position of his stash. A third scenario gives night vision goggles to a rodent, helping her avoid predators that hunt in low light.[45]

2.2 James Auger and Jimmy Loizeau, *Augmented Animal*[46]

While *Augmented Animal* is part tongue-in-cheek, the serious side of the work aims to diminish animal-human miscommunication and human-driven regulation. Human concerns are minimized and animal desires privileged. *Augmented Animal* proposes an auratic animal cyborg, an animal who is enabled through cybernetic systems.

Cyborgian animals play starring roles in several art performance and installations. Joseph Beuys' 1974 *Coyote: I Like America and America Likes Me* is a human-animal performance that serves as a precursor to contemporary animal-machine performances. Beuys sequestered himself in a gallery space for three days with a wild coyote. The performance's central tension is the animal's unknowable reaction to being housed in close quarters with a human. While Beuys describes the performance as a symbolic working through of the unresolved abuses of Native Americans, the piece also resonates for its investigation of social interactions in general. The display of conflicting human and animal desire is key to the project's enduring power. An iconic image of the performance shows Beuys hunched over wrapped in a felt blanket and the coyote biting and pulling on the blanket's edge. The image resembles the play fighting of human and domestic dog, but Beuys' recollection of the performance suggests the image captures a struggle for control. In the closed-off gallery space, human dominance was no longer assured. Beuy's notes: "the roles [between animal and human] were exchanged immediately."[47]

Contemporary art-and-technology projects continue Beuys' interest in unpredictable animal behavior except that these works replace human performer with machine. Tiffany Holmes' art project *Follow the Mou*se tracks mouse movements to generate a variety of abstract, screen-based drawings.[48] In a similar fashion, Natalie Jeremijenko's *Ooz Inc.* uses animal movement to trigger cybernetic procedurality. Jeremijenko's *Amphibian Architecture* places custom-made buoys in the Hudson River that glow and provide blood-cleansing fish food whenever fish swim near by. The buoys, arranged in close proximity, create light trails that reveal the dance of aquatic life hidden beneath the water. And Jeremijenko's Whitney Biennial project, titled *For the Birds,* broadcasts messages about biodiversity into the Whitney Museum when birds land on sensors embedded in bird perches attached to the museum's exterior.[49] Jeremijenko considers the aesthetic experience of the animal performers—she places miniature replicas of artworks alongside the bird perches, giving the animals a survey of the art concealed by the Whitney Museum's walls.[50] In another version of *For the Birds* installed on the roof of Postmaster's Gallery, Jeremijenko enlisted the help of architects, designers and artists to create a housing development for Manhattan's birds. The birdhouse architecture experimented with a variety of forms and colors in an effort to satisfy the birds' aesthetic and social desires. The development also included gardens, waste facilities, a concert hall and shopping mall as well as food and water for the birds.[51] These are relatively auratic animal cyborgs that perform when they please and are free to enjoy or ignore the attempts of humans to draw them in.

Vicky Isley and Paul Smith of Boredom Research also create a permissive space with minimal performance requirements for their cyborgian snails. Their project *Real Snail Mail* enlists snails in the delivery of email messages. To transmit an email by snail mail, you enter a message and recipient email address at Boredom Research's web site. Your message is queued, awaiting pick up and delivery by actual snails housed in a customized tank in Bournemouth, UK. Each snail has an RFID tag and wireless antennae attached to his shell and their tank houses message pick-up and sending stations. When a snail passes by a pick-up station, a message's ID is encoded in the snail's RFID tag. When a snail enters the sending station, the message's ID is read and the pending "letter" is sent on its way over the internet. The snail's movement between pick-up and sending stations determines the length of time it takes to deliver a message. Isely and Smith highlight the uncertainly of snail mail delivery—they note an email message may never reach its final destination given the snails' unknowable movements within the tank.


2.3 Boredom Research, *Real Snail Mail*[52]

### 2.3.2 Abject Cyborg

Not all animal cyborgs are free to perform as they wish. Haraway's hope that the cyborg might destabilize entrenched hierarchies remains more political wish than reality. When animals are incorporated into cybernetic systems, human interests are served more than animal concerns. Even in open-ended art projects, animals serve as entertainer or spectacle for a human audience. Perhaps Haraway's human-nonhuman hybrids are empowered because the human is the most important component of the human-animal-machine mix. When we focus on animals incorporated into these assemblages, the cyborg's status becomes less certain.

An animal's diminished subjectivity likely contributes to his circumscribed role. Animal status is often indistinguishable from machine status. At the dawn of modern science—as tools evolved into machines—Rene Descartes viewed animals and machines as equivalent. Descartes noted the regular patterns of migrating birds and the instinctual, automatic behavior of dogs and cats. From these observations he characterized the animal as a soulless biological machine. Descartes' animals act without cognitive abilities or human emotions.[53]

By aligning the animal with the machine, Descartes' sought to disambiguate the status of animals and make human-nonhuman divisions more certain. The autonomous human, standing apart from and above the nonhuman, is able to exploit the animal with impunity. We objectify animals in our breeding, farming and hunting practices and coerce animals in our training regimens. John Berger highlights abusive farming techniques that exceed Descartes' conception of animal as machine:

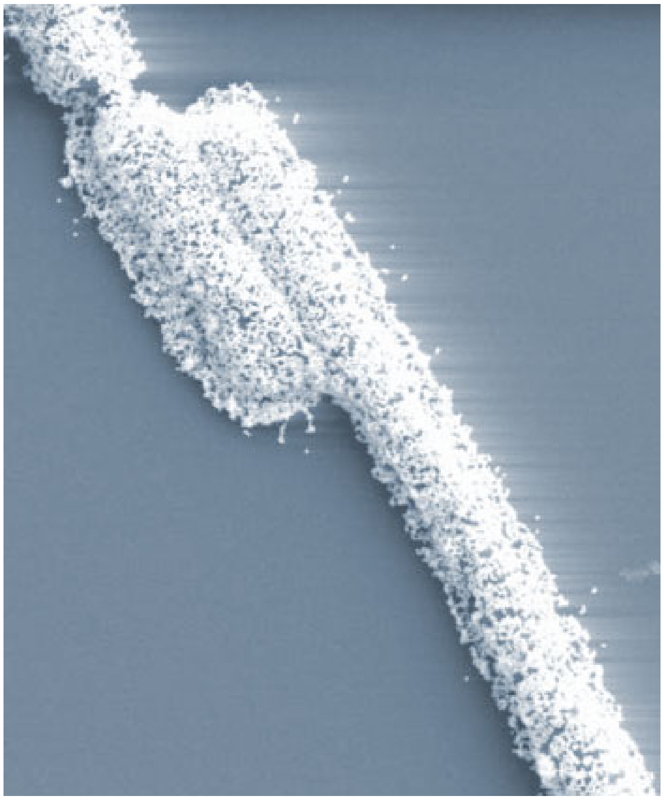
> In the first stages of the industrial revolution, animals were used as machines. As also were children. Later, in the so-called post-industrial societies, they are treated as raw material. Animals required for food are processed like manufactured commodities.[54]

As machines continue their 21st century rise, some animals appear to be falling below machine status. Factory farming methods have brought beef cattle to new levels of abjection. To ensure fast weight gain, cattle are prevented from exercising, given corn-based diets (instead of grass), and injected with growth hormones. Many cattle succumb to immune system and digestive track difficulties because of crowded conditions, limited mobility and modified diet. Farmers administer medicine to counter the effects of factory-farming techniques. The result is cheap but fat-and-chemical-filled beef, a poor quality substitute for the beef produced by cattle who roam fields and feed on grass.[55] Similar methods are applied when raising chickens and pigs. Animals destined for the human plate are poorly maintained meat machines.

When nonhuman, living beings are enmeshed in technological mechanisms, the resulting mix of animate and inanimate material can turn into new levels of abjection. Though technically not an animal-machine combination, a new fusion of bacteria and silicon illustrate the nonhuman cyborg's degraded status.

Long before the invention of cyborgs, animals and bacteria lived in intimate if unrecognized association. Bacteria are the bane and blessing of mammal life. They both sicken and nourish us. These microscopic organisms live on our skin and in our mouths, stomachs and intestines.[56] If it were possible to extract them from our bodies, they would weigh over two pounds.[57] The bacteria we host play a crucial role in helping us break down food and convert it into nutrients and energy.

The abundance of bacteria and their ability to reproduce in a variety of environments makes them an object of interest for bio-engineers. The emerging clean-energy industry hopes to enlist bacteria in the production of biofuels. Bacteria are also included in cybernetic systems. The *Cellborg*, a highly accurate humidity sensor, relies on the unique corporeal characteristics of bacteria. The sensor is created by covering a silicon chip with live *Bacilus cereus* bacteria. The chip-bacteria combination is then immersed in "a solution containing tiny gold particles, each one about 300 nanometers across." The gold particles attach to "hair-like proteins" on the bacteria, turning the gold-plated bacteria into a circuit that conducts electricity. When humidity levels rise, the bacteria swell, diminishing the gap between them and consequently increasing electron flow through the circuit. Changes in conductivity, caused by expanding and contracting bacteria bodies, allow unusually precise humidity measurement. The *Cellborg's* sensitivity exceeds that of purely mechanical sensors.[58]



2.4 *Cellborg* humidity sensor.[59]

The bacteria die within two days, but their bodies continue to respond to humidity fluctuations for months. Bacteria caught in cybernetic mechanisms—immobilized and used for the minute expansions and contractions of their bodies—seem particularly abject cyborgs. Even in death, they are unable to escape the system's control. The *Cellborg's* measurements of humidity are achieved through instrumentalized living-dead biological matter.

Laboratory animals are also transformed into abject cyborgs. Andrew Schwartz heads a research project at the University of Pittsburgh, School of Medicine that tests brain interfaces on monkeys. 96 electrodes are inserted into a monkey's brain in order to read motor cortex signals. The electrodes become a direct interface to neurons that fire when the monkey tries to move his arms. A prosthetic robot arm is connected to the electrode inputs and the monkey's arms are restrained in plastic tubes. The monkey accommodates his new phenomenology by using his motor-cortex interface to maneuver the robotic arm. With his arms immobile, his robotic arm delivers food to his mouth.

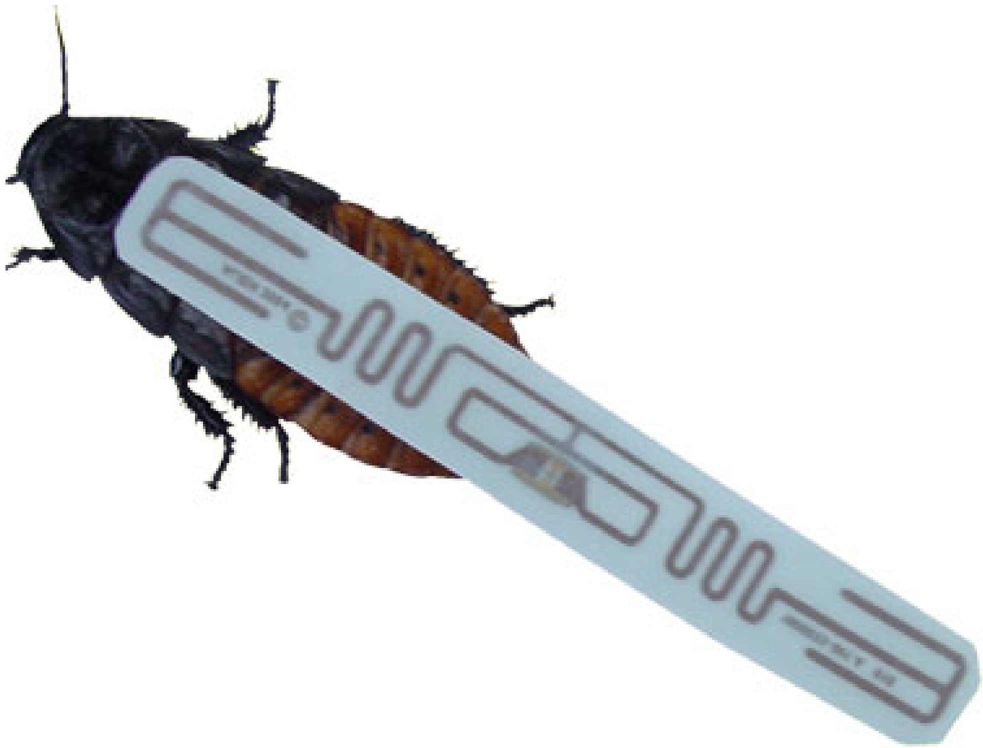
Schwartz notes that the placement of electrodes and the algorithmic interpretation of motor movement do not need to be very precise. The monkey conforms to the constraints of the cybernetic system: his "brain actually adapts its neural signal to be closer to the algorithm."[60] The monkey's body also adapts to his cyborgian transformation. When the monkey's arms are first restrained, they "twitch" with the expectation of grabbing food, but after a day of restraint, his arms become limp, without any anticipatory motion.

2.5 Augmented Monkey, University of Pittsburgh.[61]

These research efforts are promoted as experiments that someday may restore lost mobility to human paraplegics. Such research could improve the lives of many people.

But the animals incorporated in these experiments seem particularly abject—a monkey, fully capable of movement, is required to submit to invasive surgery, house cranial implants, and accommodate unwieldy augmentation. Some online images of the cyborgian monkey carefully crop out the animal's restrained arms and all images conceal the multi-electrode brain interface. These promotional photographs seem designed for popular media consumption—they diminish the monkey's corporeal modifications and foreground the spectacle of animal-machine integration.

Outside the laboratory, cyborgian animals find their bodies similarly modified to serve human needs. *Zapped!,* a project developed by the art collective Preemptive Media, enlists cockroaches in a fictional attack on Wal-Mart's RFID-enabled inventory system. Preemptive Media sees RFID technology as a serious threat to individual privacy—some RFID tags can be encoded and decoded simply by being in close proximity to an RFID reader. This gives unscrupulous institutions the ability to secretly monitor, update and track RFID-tags carried by a person or animal. To frustrate the adoption of RFID technology in Wal-Mart's inventory system, the collective imagined a scenario in which they attached RFID tags encoded with bad data to cockroaches and set the roaches loose in a Wal-Mart warehouse. With a little luck, the roaches' bad data would be scanned and transferred into Wal-Mart's inventory system.



2.6 Preemptive Media, *Zapped!*[62]

The project provides an amusing image of cyborgian animal frustrating corporate command-and-control technologies. The lowly roach disrupts the latest procedural innovation. Yet, the collective's take on technology is at times reductive: technology's ambiguous mix of light and dark is lost in their enthusiastic negation. And the cockroach is coerced into serving the needs of propaganda. Permanently gluing an RFID tag to a roach radically alters his mobility. For the project to succeed, the roach needs to freely scuttle around Wal-Mart's warehouse. The collective appears unconcerned that RFID augmentation might inhibit roach movement. The cockroach's body is just another material employed for artistic effect.

## 2.4 Conclusion

Cyborgian animals reveal the complicated nature of intimate human-animal-machine assemblages. Cybernetic systems promise enhanced cognition and performance, yet what they deliver is far more complex. Technologies like Crittercam gather new information about animal behavior, but they also alter an animal's embodiment and possibly his behavior. These technologies promote their immediacy—we almost see through the animal's eyes—but we gain this immediacy only through a high degree of mediation. Hours of video footage may generate new knowledge, but they also miss important details of the animal's world. A single camera cannot fully convey embodied experience or the social dynamics of a pack or herd; our mediated methods may hide as much as they reveal.

Cyborgs not only alter the way we see and know, they also change our sense of subjectivity. Haraway highlights the cyborg's political potential. The fusion of animal and machine challenges binary oppositions and presents the possibility of altered identities. The animal cyborg, however, seems less empowered than Haraway's human cyborg. Some cybernetic systems accommodate animal concerns—Lely and SNiF, for example, design products that support animal health—but these systems also discipline their animal participants. In general, animals serve human priorities when they are incorporated into cybernetic systems. Cyborgian animals become instruments in the pursuit of profit, propaganda, aesthetic experimentation and entertainment. Rarely do cybernetic systems focus primarily on animal concerns; an auratic cyborg is hard to find. Even when an animal is the central spectacle of a cybernetic system, he remains strangely peripheral—he is the main performer, but his status is uncertain. Animal cyborgs find their desires both acknowledged and denied. They are simultaneously connected and alienated, liberated and burdened, cajoled and coerced.

[1] Donna Haraway, “A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century,” in *Simians, Cyborgs and Women: The Reinvention of Nature* (New York; Routledge, 1991), 150.

[2] Sherry Turkle describes a critical approach to simulations in this way:

> One can accept simulations on their own terms…This might be called simulation resignation. Or one can reject simulation to whatever degree is possible…This might be called simulation denial. But one can imagine a third response. This would take the cultural pervasiveness of simulation as a challenge to develop a more sophisticated social criticism. This new criticism would not lump all simulations together, but would discriminate among them. It would take as it goal the development of simulations that actually help players challenge the model’s built-in assumptions. This new criticism would try to use simulation as a means of consciousness raising.

Sherry Turkle, *Life on Screen: Identity in the Age of the Internet* (New York: Simon and Schuster, 1995), 71.

[3] N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics* (Chicago, IL: The University of Chicago Press, 1999), 53-54.

[4] Eugene Thacker, “Data Made Flesh: Biotechnology and the Discourse of the Posthuman,” *Cultural Critique 53 (*Winter, 2003), 85.

[5] Katherine Hayles documents a key epistemological shift in our cybernetic age. Existence was once viewed through the binaries of presence and absence; now it's understood through pattern and randomness. I go into more detail about this in the "Chimera" chapter, "Platonic Forehand" section.

[6] Hayles, xi-xii.

[7] Thacker, “Data Made Flesh, 74-6.

[8] Stephen Wolfram, *A New Kind of Science* (Champlain, IL: Wolfram Media, 2002), 42.

[9] Wolfram argues for a unifying theory based on his computational approach:

> …I have been amazed at just how many issues central to the foundations of the existing sciences I have been able to address by using the idea of thinking in terms of simple programs. For more than a century, for example, there has been confusion about how thermodynamic behavior arises in physics. Yet from my discoveries about simple programs I have developed a quite straightforward explanation. And in biology, my discoveries provide for the first time an explicit

way to understand just how it is that so many organisms exhibit such great complexity. Indeed, I even have increasing evidence that thinking in terms of simple programs will make it possible to construct a single truly fundamental theory of physics, from which space, time, quantum mechanics and all the other known features of our universe will emerge.

See also Wolfram, 4, 7-11.

[10] Lanier lays out the basic tenets of cybernetic totalism as follows:

1. Cybernetic patterns of information provide the ultimate and best way to understand reality.

2. People are no more than cybernetic patterns.

3. Subjective experience either doesn't exist, or is unimportant because it is some sort of ambient or peripheral effect.

4. What Darwin described in biology, or something like it, is in fact also the singular, superior description of all creativity and culture.

5. Qualitative as well as quantitative aspects of information systems will be inexorably accelerated by Moore's law.

6. Biology and physics will merge with computer science (becoming biotechnology and nanotechnology), resulting in life and the physical universe becoming mercurial; achieving the supposed nature of computer software. Furthermore, all of this will happen very soon! Since computers are improving so quickly, they will overwhelm all the other cybernetic processes, like people, and will fundamentally change the nature of what's going on in the familiar neighborhood of Earth at some moment when a new "criticality" is achieved - maybe in about the year 2020. To be a human after that moment will be either impossible or something very different than we now can know.

Jaron Lanier, “One-Half of a Manifesto,” *WIRED*, 8:12, December 2000, 160.

[11] Lanier, 160

[12] Lanier, 172,174.

[13] Bear expert LaVern Beier provides one example of a new insight provided by Crittercam. Before using Crittercam to document Alaskan bear behavior, Beier assumed there was little familial interaction between adult bears. After seeing via Crittercam an adult bear spend time with her mother, Beier’s assumptions about bear sociability were altered—he now suspects that bears maintain familial relationships long after childhood.

“Bear Island.” *National Geographic Television*, 2007, executive producer/cinematographer,Greg Marshall.

[14] National Geographic, sponsor of Crittercam, responds to questions about the intrusive nature of the technology in this way:

> Do Crittercams bother animals?
>
> The purpose of using Crittercam systems is to record animal behavior that's not influenced or distributed by the presence of a human. If Crittercam bothered the animal, we would not be able to record natural behavior.
>
> We deploy as quickly and gently as possible, and most animals are back to diving, feeding, and interacting soon after being outfitted with a Crittercam. Some animals, especially female seals, show initial interest in the package they are carrying, but soon resume their day-to-day life in the wild.

"Crittercam Chronicles, Frequently Asked Questions," *National Geographic*, http://www.nationalgeographic.com/crittercam/faqs.html (January 22, 2010).

[15] "Raptor Force." *Nature*. Producers John Rubin and James Donald. Co-Producer and Cinematographer, Neil Rettig. National Geographic Television and Educational Broadcasting Corporation, 2007.

[16] "Elephant TV." *Animal Planet/Discovery Communications*. Director, Clifford Bestall, producer, Tracey Harding, 2008.

[17] The narrator of Elephant TV describes the initial broadcast images of the "elecam" as:

> Beyond, lies the world as she [the elephant] sees it.

[18] Sherry Turkle reflects on mediated environments and the interactions of real and virtual worlds:

> …there is a circularity in our relationship with simulations that complicates any simple notion of using them for consciousness-raising [see previous Turkle quote]. We turn games into reality and reality into games. Nowhere is this more apparent than in the game of war. In commercially available battle games, the view of the enemy from within the game resembles what soldiers on real battlefields see on the video screen inside their tanks. Indeed, real soldiers are prepared for battle by using advanced video games. Simulations are modeled after the real but real war is also modeled after its simulations.

Turkle, 72.

[19] "Crittercam Chronicles, Frequently Asked Questions," http://www.nationalgeographic.com/crittercam/faqs.html (January 22, 2010).

[20] Lely, www.lely.com (January 22, 2010).

[21] "Lely Juno: Feed Pusher." Marketing brochure downloaded from Lely's web site: http://www.lely.com

[22] www.lely.com

[23] Lakshmi Sandhana, “Collar Cultivates Canine Cliques” *WIRED*, April 4, 2005. http://www.wired.com/culture/lifestyle/news/2005/04/67160 (Feburary 1, 2010).

[24] SNiF Tag, http://www.sniftag.com, (February 1, 2010).

[25] N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics* (Chicago, IL: The University of Chicago Press, 1999), 84.

[26] Hayles, 84.

[27] Haraway,150.

[28] Haraway,154.

[29] Haraway,154.

[30] Haraway,158-9.

[31] Haraway, 175.

[32] Haraway, 173.

[33] Haraway, 177.

[34] Hayles, 286.

[35] Hayles, 291.

[36] Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993) 34, 118, 127-8.

[37] Latour, 32.

[38] Latour, 34.

[39] Latour, 138.

[40] Latour, 136.

[41] Latour, 137.

[42] Latour, 138.

[43] Lakshmi Sandhana, "Augmenting the Animal Kingdom." *WIRED,* 3 May 2005. http://www.wired.com/science/discoveries/news/2005/05/67349 (January 22, 2010).

[44] Paola Antonelli, ed., *Design and the Elastic Mind* (New York: The Museum of Modern Art, 2008), 35.

[45] Sandhana, http://www.wired.com/science/discoveries/news/2005/05/67349 (January 22, 2010).

[46] James Auger and Jimmy Loizeau, *Augmented Animal*, composite image from RCA staff pages. http://www.interaction.rca.ac.uk/people/staff/james-auger/projects/project2.html.

[47] Baker, 44.

[48] Tiffany Holmes, "Tiffany Holmes: Early Work," http://tiffanyholmes.com/?page_id=11 (January 22, 2010).

[49] Kevin Berger, "The Artist as Mad Scientist," *Salon*, June 22, 2006 (http://mobile.salon.com/ent/feature/2006/06/22/natalie/index.html).

[50] *Salon,* June 22, 2006.

[51] "Natalie Jeremijenko at Postmasters," (http://post.thing.net/node/1024).

[52] "Real Snail Mail," Boredom Research (http://www.boredomresearch.net/rsm/).

[53] Descartes explains his concept of the machine-animal:

> I know that animals do many things better than we do, but this does not surprise me. It can even be used to prove they act naturally and mechanically, like a clock which tells the time better than our judgment does. Doubtless when the swallows come in spring, they operate like clocks. The actions of honeybees are of the same nature, and the discipline of cranes in flight, and of apes in fighting, if it is true that they keep discipline. Their instinct to bury their dead is no stranger than that of dogs and cats who scratch the earth for the purpose of burying their excrement; they hardly ever actually bury it, which shows that they act only be instinct and without thinking.

Rene Descartes, "From the Letters of 1646 and 1649" in Linda Kalof and Amy Fitzgerald, eds., *The Animals Reader: The essential classic and contemporary writings* (New York: Berg. 2007), 60.

[54] John Berger, "Why Look at Animals?" in Linda Kalof and Amy Fitzgerald, eds.,*The Animals Reader: The Essential Classic and Contemporary Writings,* 147.

[55] *Fresh Air, WHYY, NPR*. Terry Gross interview with Michael Pollan. April 3, 2002. Pollan discusses his research into the beef industry. Online transcript of interview at: http://www.math.uic.edu/~takata/some_articles/FreshAir_Michael_Pollon_on_beef_industry,_hormones,_antibiotics.html (February 10, 2010).

[56] Alphonso Lingus describes our symbiotic relationship with bacteria:

> Human animals live in symbiosis with thousands of species of anaerobic bacteria, six hundred species in our mouths with neutralize the toxins all plants

> produce to ward off their enemies, four hundred species in our intestines, without which we could not digest and absorb the food we ingest. Some synthesize vitamins, other produce polysaccharides or sugars our bodies need. The number of microbes that colonize our bodies exceed the numbers of cells in our bodies by up to hundredfold.

Alphonso Lingus, “Animal Body, Inhuman Face” in Cary Wolfe, ed., *Zoontologies: The Question of the Animal* (Minneapolis, MN: University of Minnesota Press, 2003), 166.

[57] “Friendly Bacteria in the Digestive System,” http://www.typesofbacteria.co.uk/friendly-bacteria-digestive-system.html (January 22, 2010).

[58] Ker Than, “Microbe and Machine Merged to Create First ‘Cellborg,’” *Live Science*, October 27, 2007. http:///www.livescience.com/technology/051927_cellborg_sensor.html (February 10, 2010).

[59] "Cellborg Humidity Sensor." *Nanoarchitecture*. 10 January 2007. http://nanoarchitecture.net/article/cellborg-humidity-sensor/.

[60] Michael Schriber, “Monkey’s Brain Runs Robotic Arm,” *Live Science*, February 2, 2005. http://www.livescience.com/technology/050218_monkey_arm.html (January 22, 2010).

[61] "Monkey's Robot Arm Feel Natural," *Live Science*, May 28, 2008, http://www.livescience.com/health/080528-monkey-brain.html (January 22, 2010).

[62] Régine Debatty, "Interview with Heidi Kumao," *We Make Money Not Art*, May 25, 2008, http://www.we-make-money-not-art.com/archives/2008/05/-you.php (January 22, 2010).

# CHAPTER 3

# CLONE

The three dialectics—procedurality and irreducibility, autonomy and integration, aura and abjection—bring the ambivalent status of the clone to the fore. These dialectics frame key questions that are invoked by the clone's arrival: What is life? What is subjectivity? And what is identity?

Genetic essentialism argues that life is primarily governed by information. An ambivalent approach emphasizes the importance of materiality and context along side code. Cloned animals both support and refute the claims of an informational body. These animals illustrate the influence and limitations of genetics.

Animals that participate in biotechnology's innovations claim an ambiguous subjectivity. Their bodies are elevated to human-like status—an animal's body acts as proxy for the human body; we assume a successful technique applied to mouse or ape can be applied to humans. At the same time, animal bodies are seen as less than human. They suffer the effects of imperfect and often violent biotech procedures. At one moment they are equivalent to the human, and at the next moment they become subhuman objects.

Finally, the clone is an emblem of identity's stability and contingency. The clone's perceived informational perfection promises continuity—the ability to achieve immortality through replication. An alternative view sees the clone as a way to generate new possibilities. Hidden multiplicities and unrealized "becomings" can be tested out with each instantiation of the code.

## 3.1 Irreducibility & Procedurality

### 3.1.1 Genetic Essentialism and Material Variation

Before the age of genetics, a clone was an exact replica of an existing body. In the cultural imagination, a clone matched the original in form and character. Contemporary biotech clones, however, house a copy of the original's genome. DNA sequences rather than corporeal resemblance determine clone status. A clone may or may not reproduce the original's appearance and behavior, but his genetic code must match the original's code. Life becomes a product of information—alter the information and change life; copy the information and create a clone. Genetic essentialism follows in the wake of an idealized, informational body—genes define identity and presence, genotype is privileged over phenotype. With genetic codes at the center, biological matter becomes plastic. Flesh is a new medium to explore.

Despite the clone's association with genetic essentialism, he is also aligned with the contingency of materiality. A clone is a new body born at a particular moment—his biology, experience and behavior are separated from the original's body and history. A clone inhabits a new context and responds to a changing environment. He is like the original but still different, attached yet distinct. When a clone matches and deviates from the original, he simultaneously supports and refutes the power of genetic codes. Gilles Deleuze's celebrates the difference that each repetition of form brings. He emphasizes identity's fluidity. Extending Deleuze's philosophy to the clone argues that each instantiation of DNA code generates unexpected desires and innovations. The clone becomes something other than a copy; he explores an alternative identity.

This conflicted clone is both quantifiable code and uncertain material "becoming." He represents an epistemological clash. At one moment, he suggests idealized codes are the essence of corporeality. At the next moment, he argues that code can never capture the complexity of life. He is a copy created through procedural innovation but also an individual with contingent corporeality and unrepeatable experience. He joins idealism and materiality in an uneasy alliance.

The debates of idealism and materiality are long-standing. In ancient Greece, Plato following Socrates proposes that "pure knowledge" is detached from the bias of sense-based interpretations. The highest forms lie outside bodily perceptions; ideas precede material instantiation. Our earthly attempts to create beauty, maintain justice or discover truth are based on pre-existing abstractions of beauty, justice and truth.[1] Plato seeks out immutable essences that he calls Forms. These Forms are eternal, existing above and beyond our earthly attempts at beauty, justice or truth. The material world and our sense-based knowledge are unsubstantiated opinions when compared with transcendental Forms. For Plato, the material world provides a partial knowledge; Forms contain the ultimate truth. If Deleuze celebrates the difference that each copy of Form engenders; Plato sees variation as evidence of degradation. Our attempts to create beauty, justice or the good always fall short of the ideal Forms of Beauty, Justice and the Good.[2]

Plato promotes *a priori* knowledge as the surest knowledge. Aristotle, former student of Plato, rejects his teacher's Forms in favor of an *a posteriori* understanding of the world. Materiality not idealism underpins Aristotle's philosophy. We develop universal truths through inductive and deductive reasoning based on our experience of the world. Aristotle's emphasis on materiality lays the groundwork for a "demonstrable" science that seeks generalization through studying specific instances. [3] The particular is no longer a degraded copy of the Forms, but becomes a important object of inquiry. Aristotle explains his material approach:

> 'But,' it might seem to some, 'it is better to get to know the Idea with a view to the good that we can possess and pursue action; for if we have this as a sort of

> pattern, we shall also know better about the goods for us, and if we know about them, we shall hit on them.'
>
> This argument does indeed have some plausibility, but it would seem to clash with the sciences. For each of these, though it aims at some good and seeks to supply what is lacking, proceeds without concern for knowledge of the Idea; and if the Ideas were such an important aid, surely it would not be reasonable for craftsmen to be ignorant and not even to look for it.
>
> Moreover, it is a puzzle to know what the weaver or carpenter will gain for his own craft for knowing the Good Itself, or how anyone will be better at medicine or generalship from having gazed on the Idea Itself. For what the doctor appears to consider is not even health [universally, let alone good universally], but human beings' health, even more than that, presumably, this human being's health, since it is particular patients he treats.[4]

The philosophical differences of Plato and Aristotle are explored anew in the age of the Enlightenment. This time rationalists promote transcendence and empiricists argue for immanence. Rene Descartes replaces Plato's Forms with an analytical mind. Like Plato, Descartes distrusts external sensory perceptions, favoring instead interior reason.[5] Descartes' truth resides in the purity of mathematical models and introspective thought. Form is quantified and elegant abstractions ground the messiness of the physical world.[6] David Hume counters Descartes rationality with an understanding of the world that arises in observation and inductive experimentation. Hume argues that the sense experience determines our understanding of the world; *a priori* hypotheses do not transcend experience but rather emerge from our material interactions in the world.[7]

Biology combines both material and idealistic methods. Darwin's theory of evolution rejects an idealized human form created in the image of a transcendent God. Humans are no longer mortal copies of God's eternal Form, instead they are mutable animals altered by environmental changes and biological mutations. When evolution is supplemented by genetics, biology reclaims an idealism lost in Darwin's material observations. Gregor Mendel's analysis of inheritance follows a mathematical logic; recessive and dominant genes trade places as if obeying binary operators. The abstractions of Mendel's model underpin Darwin's material metamorphoses. Genetics provides an informational origin to evolution's variation. The body begins to look as if it may be formed by the logic of code.

The idealized, informational side of biology is expanded through the influence of physics and chemistry. [8] These disciplinary interactions create molecular biology and set the stage for the discovery of DNA's double helix structure.[9] Once DNA is established as the coding script of life, decoding DNA sequences becomes a central concern of research. By the end of the 20$^{th}$ century, the entire human genome is documented. This new book of life promises to reveal our past, present and future. Medicine and bioengineering promote soon-to-appear gene therapies and already-available diagnostic tests. Reading an individual's genome reveals his ancestral roots[10] and predicts his tendency to succumb to a particular disease. Code circumscribes the body. DNA sequences, like a Form, exist before the body is fully developed and determine embryonic growth and postnatal state; information underpins bodily form and function.

Yet biology's embrace of idealism does not mean that materialism is entirely discarded. Genetic sequences may be inspired by Cartesian abstractions but they are validated through material manipulations.[11] Body and environment continue to exert influence on genetic code. Plato's Forms and Aristotle's materiality reside side by side in biotech labs. The clones created in these labs are the products of idealized code *and* contingent materiality. Contemporary cloning procedures are far removed from the abstractions and rhetoric of genetic essentialism. Clones are born only after tremendous effort and great waste. Often the copy deviates from the original's form and behavior.

Each material instantiation of DNA reveals complex interactions of code, flesh and environment.

### 3.1.2 Biotech's Transcendence and Immanence

Biotech employs procedures that are both transcendent and immanent. Eugene Thacker argues that the interactions between cybernetics and biology during the last century combined "nature and artifice" to the point that "there is no extratechnological, preinformatic biology. All biology is informatic from the beginning." This new informational body, however, is always tied to materiality:

> …it is a primary strategy of the biotech industry to insist on a dual aspect of 'life itself': biology is at once the 'stuff of life' and essentially informatic. Not only is biology accounted for via informatics, but informatics is always qualified by biological materiality.[12]

Thacker notes that biotech's informational manipulations are always directed at material transformations. DNA's genetic sequence can "stand in for the subject" but at the same time "all information derives from and culminates in some form of biological materiality, such as lab-grown tissues, cell cultures, or genetically engineered plasmids."[13]

Biotech's cloning process also participates in this mingling of idealized code and physical flesh. In 1996, Ian Wilmut led a research team that cloned the sheep Dolly, the first mammal to be cloned from an adult cell. Creating Dolly required patience, attention to detail, and a certain amount of luck. Dolly was born only after hundreds of unsuccessful attempts.[14] The physical process of cloning—combining adult cell with unfertilized, nucleus-free egg, triggering cell grow, and implanting the resulting blastocyst into a surrogate mother—is more art than automated process. For most species of animals, every successful clone birth requires a hundred or more failed attempts.[15] Producing a copy of an informational body is far removed from the elegance of mathematical models or the computational processes of copying and pasting. Instead, cloning procedures tend to be complicated and uncertain. Biologists working in labs know only too well the material constraints of informational bodies. Their successes are often hard won and difficult to explicate and proceduralize. Eckhard Wolf notes the mysterious nature of the mechanism that reverts somatic cell to pluripotent status in the cloning of cows:

> After nuclear transfer, *something fascinating happens that we reproductive biologists have not yet fully understood.* The nucleus that heretofore had been totally specialized to take over the function of a mammal gland cell is reprogrammed. It is rejuvenated and transformed into nuclear cell able to activate the programming for all potential organ functions.[16]

Wolf reveals the limits of contemporary biotechnology knowledge but also promotes a biomechanical and informational view of the body. He invokes the metaphors of programming while acknowledging the mystery of nuclear DNA metamorphosis.

The difficulty of turning cloning procedures into efficient and consistent methods is illustrated by the fortunes of Genetic Saving and Clone (GSC), the first company to offer commercial cloning of domestic cats. After cloning just a few cats, the company shut down in 2006. It never became a profitable company despite charging $50,000 for each cloned cat. GSC found cloning pets difficult to commercialize: complex lab procedures never achieved assembly-line efficiency and demand for cloned pets failed to materialize. The idealized vision of perfect biological copies confronted the complexities of materiality and markets.

Genetic Saving and Clone encountered another material complication when it set out to clone dogs. John Sperling and Lou Hawthorne founded GSC with the goal of cloning Hawthorne's mother's dog, Missy.[17] This goal was hampered by species-specific difficulties—cloning a dog is a particular complex task.

General procedures for mammal cloning involve removing the nucleus from an ovum and injecting into the ovum the nucleus of a cell taken from an adult animal.  The ovum and nucleus are fused and encouraged to begin cell growth with an electrical shock or chemical stimulant. The ovum grows in vitro before being implanted in a surrogate mother. A dogs' estrus cycle—her fertility cycle—is infrequent and inconsistent. Unpredictable ovulation makes ovum extraction difficult. Most mammal ovaries release a mature egg; canine ovaries send out an ovum that is not fully developed—it matures while descending the fallopian tube. Extracting the ovum at exactly the right moment is more difficult when there's a possibility the egg is not fully mature. Even if an ovum is extracted at the right moment, the egg is viable only for two or three hours after reaching maturity. The cloning process is further complicated by the physical properties of dog ovaries. Most mammalian ovaries are translucent. Canine ovaries, however, are opaque—a dark lipid obstructs the researcher's view to the cell's interior elements.[18] This small window of viability, irregularity of estrus cycle, and opacity of the ovum requires a skillful dance between lab workers, biological materials, and canine donors and surrogates. In 2005, almost a decade after Dolly was cloned, researchers at Seoul National University finally succeeded in creating Snuppy, the first dog clone.

GSC closed its doors in 2006 without creating a clone of Missy. Some of the company's employees migrated to BioArts International, a company that primarily clones livestock but recently added pet-cloning services to its offerings. BioArts with the help of Sooam Biotech Research Foundation was able in 2007-8 to create three Missy clones. GSC's starting goal was finally achieved but only with the expertise of outside researchers and a total investment by John Sperling of around 20 million dollars.[19]

Beyond the material hurdles of creating clones, the cultural conception of a clone is challenged by contemporary cloning procedures. A clone is thought to be a perfect genetic copy of the original, but the clone's genetic makeup is not an exact copy of the original. A clone could be created from a single donor—if both ovum and somatic cell are donated by the same animal—but often a clone is a product of three animals: somatic cell donor, egg donor, and surrogate mother. This mixed parentage makes the clone more of a hybrid than pure copy. At the genetic level, the clone combines nuclear DNA from the parent and mitochondrial DNA from the ovum. The surrogate mother's health and diet also affect the clone's body.[20] Ian Wilmut hints at this hybridity when he notes that Dolly is "(almost) genetically identical" to the donor-cell parent:

> So Dolly and the ewe who provided the original nucleus have identical DNA but they do not have identical cytoplasm…although the cells in Dolly's body are descended from a cell which mainly contained Scottish Blackface [breed of donor-cell parent] cytoplasm, that cell also contained some Finn-Dorset [breed of egg donor] cytoplasm surrounding the donor nucleus.[21]

Wilmut is describing Dolly's mix of nuclear DNA and mitochondrial DNA. Dolly's nuclear DNA comes from the somatic cell donated by the sheep we think of as her double. Mitochondrial DNA (mtDNA) is provided primarily by the ovum that houses the double's nucleus. In Dolly's case, the ovum and nucleus are donated by different sheep. A mammal is considered a clone when nuclear DNA is replicated; duplication of mitochondrial DNA is not viewed as necessary to attain clone status. The role of mtDNA in the functioning of an organism may not be as critical as nuclear DNA, yet it does affect corporeal characteristics. A clone created with the original's mitochondrial *and* nuclear DNA would require a female donor who provides both ovum and somatic cell. A male clone would be impossible to create using contemporary cloning techniques. mtDNA's inconsequential status—copying this particular genetic sequence is not required to be considered a clone—suggests the category of clone is culturally rather than genetically defined. The clone as a close-but-not-exact genetic copy of her double reflects the material and cultural conditions of biotech labs.

The above examples illustrate the complicated mix of code, culture and materiality that contribute to biotech procedures. Bioengineering keeps the tension of materiality and idealism in play. Thacker argues that a key difference between genetic and cybernetic idealism is that cybernetics tends to dematerialize the body while biotechnology places the body front and center. “Instead of being focused on disembodiment and virtuality, biotech research’s approach to informatics is toward the capacities of information to materialize bodies.” Information undergirds and drives the material, but the material is always the end goal.[22] These interactions between code and body are critical to our understanding of the cloned animal. The dialectic of irreducibility and procedurality argues for a tempered view of the informational body, a view that embraces genetic code but also acknowledges the influence of environment and unrepeatable experience. This is a clone who engages with issues of transcendence and immanence and highlights the interdependence of information and body.

## 3.2 Autonomy & Integration

### 3.2.1 Human, Nonhuman Subjectivity

A clone not only asks us to examine our ways of knowing and defining life, she also challenges our sense of subjectivity. She can never claim the original’s full autonomy and agency; the original has already charted that terrain. Yet she is a new body born at a different moment and as such maintains a degree of individuality. She is both attached to and separated from the original—this is her ambiguous status. In some ways, the clone’s diminished individuality echoes the limited subjectivity ascribed to animals. The human is individuated and the animal is an indistinct other. The human acts and the animal reacts. This division between human and nonhuman creates the central conflict of several film versions of Jack Finney's novel, *The Body Snatchers.* In each film a clone is viewed as something less than human. The first film, *Invasion of the Body Snatchers*, released in 1956, is set in Santa Mira, a fictional Californian suburb. The film's protagonist Miles Bennell struggles to maintain his human identity when Santa Mira is taken over by alien life forms. This an unusual alien invasion that occurs through a process of cloning—large pods hidden in the homes of Santa Mira's residents transform themselves into copies of the townspeople as they sleep. A resident's memories and abilities are transferred to the clone, but his ego and emotion are removed during the duplication process. When the corporeal copy is complete, a clone emerges from the pod and the original human body is destroyed.

Lacking human ego, the clones share a communal subjectivity. And without human emotion, they are eerily impassive, unable to express fear or anger. Harmony and cooperation instead of individualism and competition are the organizing principles of their culture.

The template of *The Body Snatchers* is re-worked over the next fifty years in three Hollywood remakes: *Invasion of the Body Snatchers,* 1978; *Body Snatchers,* 1993; and *Invasion,* 2007. [23] The films are united in their depiction of a protagonist's struggle to maintain his or her identity. And this struggle renders the alien other subhuman, a life force to be feared and destroyed. The '90s copy of *Body Snatchers* illustrates the cheapness of alien life. Marti Malone, a teenage army brat, keeps her human identity by shooting her father and tossing her younger brother from a helicopter as it takes off. Both family members are expendable because they have become alien clones. Malone maintains her subjective position only by purging the alien others from her family.

The most recent copy of *Invasion* released in 2007 is less certain of human superiority over alien life forms. The pull of alien communal culture is stronger than before. When aliens invade, human wars and terrorist attacks cease and unstable dictators relinquish their power. The alien replacements halt the global flow of violence. Ben Driscoll, best friend of protagonist Carol Bennell, converts to alien status and tries to persuade Bennell to give up her human identity and integrate with the aliens:

> Have you seen the television? Have you read the newspapers? Seen what's happening here, what we're offering? A world without war, without poverty, without murder, without rape. A world without suffering. Because in our world, no one can to hurt each other or exploit each other or try to destroy each other, because in our world there is no other.

Bennell is almost persuaded but continues to resist after she learns that her son, who is immune to the alien virus, would be destroyed if the aliens' invasion succeeds. A human's innate selfishness has no place in alien culture.

At the end of the film, after humans successfully challenge the invasion, war and conflict between humans begins anew. In the final scene, Bennell sips morning coffee while Driscoll, who has regained his human identity, reads aloud a newspaper report of fatalities in Iraq. As Driscoll's words fade into the background, Bennell recalls the cynical opinion of a Russian diplomat she met before she battled alien invaders:

> In the right situation we are all capable of the most terrible crimes. Can you imagine a world where this was not so? Where every crisis does not result in new atrocities? Where every newspaper is not full of war and violence? This is to imagine a world where human beings cease to be human.[24]

The human victory with its associated return to global violence questions the privileged position of human subjectivity. The film's ending creates a moment of hesitation, a moment of doubt. This hesitation aligns with the sensibility of ambivalence. We are less certain of the inherent superiority of one life form over another; less confident that human subjectivity should be the central subjectivity.

The body-snatcher films replay the desperate act of Western philosophy to privilege humans over all other living entities. The human alone is truly autonomous; all other life forms are subject to our will. The foundational assumptions of our philosophies separate and distinguish human life from nonhuman life. The animal plays a critical role in this process. Aristotle's *scala naturae* maps out the divisions in organic life. The first dividing line in his subject-object hierarchy is drawn between animated and inanimate objects—there are rocks and then there are plants, animals and humans. Mobility increases one's status; a rooted plant is ranked below ambulatory animals and humans. A wide range of activity and sophisticated sensual capabilities are traits of distinction in the animal kingdom. Unsurprisingly, the philosopher proclaims his own species the teleological zenith of nature. Humans inevitably take the top position in the hierarchy.[25] Rene Descartes also makes clear distinctions between humans and animals. He views the animal as a soulless, biological machine. Animals act, according to Descartes, on instinct, manifesting neither cognitive insight nor human emotion.[26] The human alone is worthy of subjectivity.

This philosophical tradition, so critical to our understanding of human subjectivity, is challenged by contemporary cultural and technological changes. The informational body plays a part in our shifting sense of subjectivity. Biotechnology argues that animal bodies are equivalent to human bodies. Animals are used as human-body proxies; they play a critical role in the testing of pharmaceutical and gene therapies. Researchers assume a therapy that works on animals may also be effective for humans. Genomics also relates the animal other to the human. Popular discourse emphasizes the striking similarities between human and animal genomes. A chimpanzee, our closest genetic relative, differs from us in chromosomal code by less than two percentage points.[27] The close association of animal and human bodies is evident in the political reaction to Dolly, the first mammal to be cloned from an adult cell. After Dolly's birth, governments around the globe quickly moved to implement legislation that banned cloning of humans. This ban makes apparent the cultural links between human and animal bodies—alterations to animal bodies are seen as foreshadowing soon-to-be human transformations.[28]

Yet even as the animal's informational body is aligned with the human, animal bodies are denied the status of human bodies. The same article that equates human and animal genomes often goes out of its way to note that minor genetic differences have profound effects. That is, despite similarities between species, the human retains unique—meaning superior—qualities.

The divide between animal and human bodies appears in the level of violence and suffering tolerated in the biological manipulations of animals. Death hangs over cloning procedures; contemporary techniques require significant waste. In many animal species, only one or two percent of cloning attempts result in viable clones. Along the way, eggs, embryos and newborn animals are sacrificed in the drive to replicate the original. Ian Wilmut, lead researcher of the team that cloned Dolly, notes that "it is surely inhuman to think of doing this [cloning] with a human being."[29] Wilmut argues that the culture could not accept the level of destruction required to create human clones.

The restrictions on human cloning and general acceptance of animal cloning illuminate the division between human and animal subjectivity. Derrida examines this division as he thinks through the animal "other." He highlights the anthropocentrism that influences the binary oppositions of Western thought. These oppositions are based on established hierarchies that promote one side at the expense of the other. The long-standing divide between humans and animals is driven by this binary logic.

Derrida expands Saussure's insight that the sign derives its meaning from its relationship to other signs. Difference is constructed in these relationships; that is, what a sign is not determines its signification. Derrida's focus on difference leads him to imagine that the center could be replaced by the margin. This transfer of power, however, is temporary; one hegemonic system is not substituted for another. Instead

Derrida seeks out alternative subjectivities and ontologies that maintain the tension between opposing hierarchical systems. [30]

This approach acknowledges that the gap between human and nonhuman cannot easily be bridged by making animals and humans equivalent. Making the "other" a subject does not erase the limits of subjectivity; the subject, after all, is created through submission to a higher authority. Not to mention that leveling animal-human hierarchies ignores the differences between man and beast.[31] And such a move would also suggest that human subjectivity is the only kind of subjectivity that counts.

Leonard Lawlor, reviewing Derrida's conception of the animal, argues for a new kind of human and animal subjectivity that holds in tension "biological continuism"—animals and humans are the same—and "transcendental separatism"—humans are essentially different (or superior) to nonhumans. Lawlor's approach acknowledges difference while limiting animal suffering. Both he and Derrida speak of "twist[ing] free of Platonism,"[32] escaping the limits of a transcendental soul housed only by human bodies. Yet at the same time, they avoid a mere reversal of Platonism; they do not promote a biological equivalency that erases difference. Derrida explains this complex ontological terrain:

> I was dreaming of inventing an unheard-of grammar and music in order to make a scene which is neither human nor divine nor animal, with a view to denouncing all discourses of the so-called animal, all the anthropo-theomorphic or anthropo-theocentric logics and axiomatics, philosophy, religion, politics, law, ethics, with a view to recognizing in them animal strategies, precisely, in the human sense of the term, stratagems, ruses, and war machines, defensive or offensive maneuver, search operations, predatory, seductive, indeed exterminatory operations as part of a pitiless struggle between what are presumed to be species. As if I were dreaming, I myself, in all innocence, of an animal that didn't intend harm to the animal.[33]

The clone as both subject and object plays a part in this "unheard-of grammar." He is both self and other; simultaneously he and me. When we confront the clone, we also confront the hierarchies and divisions of subjectivity. When the other is so much like me, can he remain the other? Who is the *I* who is also *He?* Even if I manage to reassert a unitary, independent subjectivity—quickly separating myself from the clone other—I'm likely to have a moment of doubt. My autonomy and agency are less certain. And like the characters in *Invasion,* I am less confident of the superiority of one life form over another.

### 3.3 Aura and Abjection: Multiplicity

Jean Baudrillard examines the altered presence of replicated objects. He argues that the simple act of creating a duplicate changes the status of both original and copy. As an example, Baudrillard points to a replica of Lascaux cave—a Lascaux copy built to protect the original from the damage of tourist traffic. "One glances through a peephole at the authentic cave, and then one visits the reconstituted whole." But the copy not only preserves the original, it alters the famous cave. Creating a copy of the cave "suffices to render both [original and copy] artificial."[34]

Seeing the copy as a threat to authenticity is part of a long-standing tradition of cultural and philosophical discourse. Walter Benjamin's examination of aura in an era of mass production addresses a cultural object's changing status as it expands from one to many. For Benjamin, early artistic practice emerges from ritual—from sacred rites that encapsulate the values and aspirations of a particular culture. In a secular age, art is no longer consciously associated with the sacred, but its ritual aura remains. An artwork's aura is linked to both its uniqueness and presence. An artwork's path across space and time, its particular history and its current physical presence, give it aura. And for Benjamin, this history and presence bestow authenticity on the artwork.[35]

Benjamin writes that commodity culture detaches an artwork from its aura. "To pry an object from its shell, to destroy its aura, is the mark of a perception whose 'sense of the universal equality of things' has increased to such a degree that it extracts it even from a unique object by means of reproduction."[36] I'm interested in connecting Benjamin's ideas of mechanical reproduction to some of the conceptual and technological shifts in biology. Programmable flesh creates a similar "universal equality" of biological material. Genetic sequences are extracted from an individual and replicated in a clone's body. And a clone copy, like a photograph of a great work of art, is separated in time and space from the original—the clone engages with a different historical moment. Given Benjamin's framework, the clone copy should appear as less authentic and auratic than the original. Yet central to such a framework is an unwavering belief in an essential and genuine identity. In the process of replication, this essential quality is threatened.

Bolter, MacIntyre, Gandy and Schweitzer argue that Benjamin's particular view of aura is tinged with loss. Benjamin describes nature's aura as "a mountain range on the horizon or a branch which casts it shadow over you." This aura is "a unique phenomenon of distance, however close it may be." [37] Nature's detached presence contrasts with the cheap availability of modern media. Bolter et al note:

> Benjamin's nature analogy is heavy with nostalgia. Benjamin, an urban scholar of the twentieth century, chooses to describe aura as a moment of communing with nature in the absence of any media technologies. When Benjamin calls aura a feeling of distance however near, he is not only describing a desire for immediacy; he is also acknowledging that that desire cannot be fulfilled in an age of mechanical reproduction.[38]

Benjamin's longing for a more authentic identity and experience is countered by a Deleuzian view that privileges "becoming" over essence; difference determines identity rather than fidelity to an idealized template. Repetition in this framework becomes a chance to explore new terrain. A clone can test out new roles. And with difference as the defining term, the clone(s) and original respond to each other, differentiating in the process. In this context, the clone does not invoke artificiality—there is no authentic self to restore—he simply participates in the play of multiplicity.

The clone as an opportunity to explore hidden difference is the theme of the film *Mulitplicity.* Michael Keaton plays Doug Kinney, a harried contractor unable to keep up with the demands of work and family. Kinney meets a scientist who offers to reduce his stress by making a clone of Kinney. The clone would take on Kinney's work responsibilities, giving Kinney more time to spend with his family. Kinney resists the scientist's offer at first, but eventually decides to have a clone made. The clone that emerges is not a newborn child, but rather a copy that matches Kinney's physical attributes as well as houses his memories and abilities. Yet this clone is not an exact copy; he is a more aggressive version of Kinney.

At first the arrangement works well, Kinney finds time for his family and also his golf game. The clone goes to work and hides out at night in Kinney's garage apartment. The clone soon tires of his all-work-and-no-play life and decides to have another clone made to keep him company. This clone explores another facet of Kinney's personality—he plays the role of nurturer. The clone of the clone tends to domestic matters; cooking for the first clone and helping around the house. Eventually a third clone is created, and again the copy deviates from the original; the final clone is mentally challenged.

The comedy and conflict of the film emerges as each clone engages with the world in ways that deviate from Kinney's character. The aggressive clone fires a long-time coworker. He is unconcerned that the worker needs to support a family since he has no familial obligations himself. And Kinney's wife is surprised at the enthusiasm the nurturing clone brings to domestic chores. Kinney's perceived erratic behavior—really the behavior of four different personalities—causes him to lose his job and nearly lose his family. By the film's end, the clones help restore household harmony and leave Kinney's care to pursue their own lives in another city.

The films denouement could be seen as a tidy resolution to multiplicity's complexity—the many others are sent off to another city, returning Kinney to his unitary subjectivity. But despite this unexceptional ending, *Multiplicity* does challenge us to think of repetition as something other than a return of the same; repetition generates difference. Deleuze pursues a similar theme in his interpretation of Nietzsche's eternal recurrence. Nietzsche proposes an alternative to linear time, he argues for each moment repeating itself, time folding back on itself. For Deleuze this is not an endless cycle but instead something closer to variation on a theme. Difference for Deleuze is the foundational principle shaping identity and repetition creates new "becomings":

> That identity not be first, that is exist as a principle but as a second principle, as a principle *become;* that it revolve around the Different: such would be the nature of a Copernican revolution which opens up the possibility of difference having its own concept, rather than being maintained under the domination of a concept in general already understood as identical. Nietzsche meant nothing more than this by eternal return. Eternal return cannot mean the return of the Identical because it presupposes a world (that of the will to power) in which all previous identities have been abolished and dissolved. Returning is being, but only the being of becoming. The eternal return does not bring back "the same," but returning constitutes the only Same of that which becomes. Returning is the becoming-identical of becoming itself. Returning is thus the only identity, but identity as a secondary power; the identity of difference, the identical which belongs to the different, or turns around the different. Such an identity, produced by difference, is determined as "repetition." Repetition in the eternal return, therefore, consists in conceiving the same on the basis of the different.[39]

True to Deleuze's insight, when the clone is perceived as repetition of the same, he often disappoints. The first cloned cat, Cc, resulted in a public relations fiasco for Genetic Savings and Clone. Cc was born a stripped tabby; the donor-cell adult, Rainbow, had orange calico fur.[40] Cc's failure to resemble the original called into question the cloning procedures. For multi-colored cats, fur patterns are determined by a combination of genetic and environmental factors: the genes required for orange markings were dormant in the donor cell used to make Cc;[41] coat patterns are also affected by the position of the embryo in the womb.[42] Variation emerges in the interactions of nature and nurture.

Deleuze argues that generality is composed of two parts: "the qualitative order of resemblances and the quantitative order of equivalences." Cc's stripped fur falls into the "qualitative order" and her genome into the "quantitative." Yet Deleuze argues that repetition is not generality—and Cc shows that the clone should not be thought of as a generalization of an idealized Form. Deleuze notes:

> Repetition as a conduct and as a point of view concerns non-exchangeable and non-substitutable singularities. Reflections, echoes, doubles and souls do not belong to the domain of resemblance and equivalence; and it is no more possible to exchange one's souls than it is to substitute real twins for one another.[43]

Eugene Holland contrasts Deleuze's mutable repetition with the fixed repetition of Freud. If Deleuze sees the potential for new "becomings" in repetition, Freud argues that excessive repetition leads to neurosis. Holland sees this as the difference between materialist and metaphysical repetition. Deleuze's materialist tendencies open up repetition to the singularities of each new instantiation. Freud's metaphysical repetition seeks to return to the same. Holland notes that "repetition of the same constitutes a static neurotic form of pleasure fixed on the past, the repetition of difference takes pleasure in variation, ramification, improvisation."[44]

When metaphysical filters frame materialist “becomings,” unexpected oscillations and contradictions emerge. The case of a cloned bull illustrates these effects. Ralph and Sandra Fisher run a show-animal business in Texas. They hire out their horses, cattle and armadillos to theme parties, conventions, commercials and parades.[45] The star of their menagerie was a Brahman bull named Chance—an unusually sociable and gentle bull. Before Chance died, the Fishers had some of Chance’s cells frozen and stored at a Texas A & M cloning lab (the same lab that created Cc for Genetic Savings and Clone). After Chance’s passing, the Fishers persuaded the lab to create a clone of their deceased bull. They named Chance’s double Second Chance.

At first, Second Chance seemed an uncanny duplicate of Chance. When the Fishers brought Second Chance home, the calf immediately went to Chance’s favorite spot in the front yard and lay down there. The original’s habitual resting place was occupied by the copy without any prompting, something the Fishers found a little “spooky.” Second Chance also inherited Chance’s unusual eating style—both bulls raised their heads and closed their eyes when chewing their food. And the cloned calf was instantly fond of Ralph Fisher. Ralph states: “I thought it was the same animal. I would say…'We got him back.'”

The happy “reunion” lasted a while, but on Second Chance’s fourth birthday, the bull attacked Ralph. Ralph’s shoulder was dislocated, and he narrowly avoided serious injury. A year and half later a second attack occurred, this time Ralph was seriously injured and required hospitalization. Despite the attacks, Ralph still believes that given time Second Chance will acquire Chance’s gentle nature. He bought Chance when the bull was seven years old and speculates that Chance may have been aggressive in his youth; he argues that many animals settle down as they age. If Second Chance’s aggression continues past the age of seven, then, and only then, will Ralph concede that the cloned bull is different than Chance.

Mark Westhusin, researcher at the Texas A & M lab, understands the desire of pet owners to bring back to life their favorite animal. But he emphasizes the difference between original pet and cloned animal: “People want to believe that it is resurrection sometimes. And it is in fact not resurrection. It’s just…it’s reproduction.” Westhusin explains that a clone is the equivalent of an identical twin; it’s genetically similar but may not look or act the same as the original.[46]

Ralph Fisher’s belief in the power of genetic codes blinds him to the possibility that Second Chance may never be the same as Chance. Baudillard states that “when the double materializes, when it becomes visible, it signifies imminent death.”[47] For Baudrillard this is not death of the original body but rather death of a ghostly double. “Everyone can dream, and must have dreamed his whole life, of a perfect duplication or multiplication of his being, but such copies only have the power of dreams and are destroyed when one attempts to force the dream into the real.”[48] Second Chance’s violent attacks suggest that Chance’s soul cannot be revived—genetic codes do not completely capture the presence of Chance. For now, Ralph Fisher continues to believe that the genes transferred from Chance to Second Chance make both bulls identical. He clings to a fixed metaphysical repetition and ignores the materialist “becoming” of Second Chance. Following Deleuze, the clone is not more of the same—though at times the copy may be strikingly similar to the original. The clone represents instead a repetition founded on difference, a return with variation. Each material instantiation provides the potential to explore a new kind of existence.

### 3.4 Conclusion

The clone dances between the forces of idealism and materialism. He serves as evidence of life’s informational underpinning and also as emblem of the contingency of biological manipulations. The idealized procedures of biotechnology imagined in popular culture omit the material messiness of the cloning process. Material and cultural constraints temper the effects of information's dominance.

The clone challenges human and animal divisions. Animal clones incorporate biotech procedures that may one day be transferred to human bodies. As a result, human and animal flesh become equivalent. Yet despite this close affiliation, animal subjectivity is denied. Animals remain expendable objects that suffer the violence of biological manipulation. Derrida argues that the suffering of animals calls for a rethinking of human and animal subjectivity. This new subjectivity neither ignores the differences between species nor extends a transcendental essence to the human. Instead it seeks to weaken the power of binary oppositions and imagine less violent human-animal interactions.

As a copy, the clone may be viewed as artificial or secondary. From a Freudian view, he could be seen as a corporeal symbol of neurotic fixation. Yet the clone need not be more of the same. The influence of materiality and context argue that a clone explores a new kind of “becoming.” The clone's repetition of genetic code may lead to variation. In this Deleuzian framework, the clone is re-imagined as an opportunity to explore hidden multiplicity. The clone participates in the possiblity of becoming.

The projects of Derrida and Deleuze challenge in part the foundations of Plato's philosophy. Deleuze argues that "[o]verturning Platonism, then, means denying the primacy of original over copy, of model over image; glorifying the reign of simulacra and reflections."[49] The clone participates in this challenge to the traditions of identity and subjectivity. It represents both continuity and change and blurs the line between subject and object. The clone argues for new kinds of ontologies—ways of being, seeing, and thinking that do not easily conform to the oppositions of idealism and materialism or autonomy and integration. A framework of ambivalence seeks to hold these dialectics in tension while welcoming the clone's alterity.

[1] Plato writes of the search for "absolute justice", "absolute beauty" and "absolute goodness":

> And he attains to the purest knowledge of them who goes to each with the mind alone, not introducing or intruding in the act of thought sight or any other sense together with reason, but with the very light of the mind in her own clearness searches into the very truth of each; he who has got rid, as far as he can, of eyes and ears and, so to speak, of the whole body, these being in his opinion distracting elements which when they infect the soul hinder her from acquiring truth and knowledge…

Plato, *Phaedo* in *Plato: Apology, Crito, Phaedo, Symposium, Republic,* trans. B. Jowett Roslyn (New York: Walter J. Black, 1942), 95.

[2] Plato, *The Republic* in Steven M. Cahn ed., *Classics of Western Philosophy* (Indianapolis, IN: Hackett Publishing Company, Inc, 197), 161, 164-6, 172.

[3] Aristotle, *Nicomachean Ethics* in Steven M. Cahn ed., *Classics of Western Philosophy* (Indianapolis, IN: Hackett Publishing Company, Inc, 1977), 224, 248, 272-3.

[4] Aristotle, 221.

[5] Rene Descartes, *Discourse on Method and Related Writings* (New York: Penguin Books, 1999, first published 1637) 24, 29.

[6] Sarah Broadie, "Soul and Body in Plato and Descartes" online version of paper delivered at the Foerster Lecture on the Immortality of the Soul, University of California, Berkeley, 2000 (http://www.newdualism.org/papers/S.Broadie/Soul-and-Body.htm).

[7] *Classics of Western Philosophy*, 781-2.

[8] Physicist Erwin Schrodinger posits some initial insights for the field of molecular biology. Schrodinger argues that biological life is defined by underlying codes. These chromosome "code-scripts" determine phenotypic expression. Schrodinger uses his expertise in quantum physics to explicate the biological processes: "the mechanism of heredity is closely related to, nay founded on, the very basis of quantum theory." In particular, quantum physics' discovery of discrete energy changes at the atomic level—leaps in energy levels (unfamiliar to our experience of continuous energy change at the scale of the body) provide the explanation for discrete genetic changes that create mutations. Schrodinger argues that genetic mutations are derived from energy fluctuations that reconfigure the chemical bonds but maintain the overall molecular integrity of the chromosome. This structural shift is like a "quantum jump":

> We shall assume the structure of the gene to be that of huge molecule, capable of only discontinuous change, which consists in a rearrangement of the atoms and leads to an isomeric molecule. The rearrangement may affect only a small region of the gene, and a vast number of different rearrangements may be possible.

Schrodinger explains how a “tiny speck” of nuclear material could direct the entire body. “A well ordered association of atoms, endowed with sufficient resistivity to keep its order permanently, appears to be the only conceivable material structure that offers a variety of possible (‘isomeric’) arrangements, sufficiently large to embody a complicated system of ‘determinations’ within a small spatial boundary. Indeed, the number of atoms in such a structure need not be very large to produce an almost unlimited number of possible arrangements.” Schrodinger’s chromosome becomes a programmable molecule, a mutable informational structure critical to phenotypic variation.

Erwin Schrodinger, *What is Life? The Physical Aspect of the Living Cell & Mind and Matter* (Cambridge, UK: Cambridge University Press, 1967, first published 1944), 51, 60, 65.

[9] Richard Doyle describes the influence of physicist Erwin Schroder on James Watson and Francis Crick’s discovery of DNA’s double helix structure and the consequent rise in the importance of genetic codes in studying biological life:

> For example: by his own account, Watson’s work with Crick leading to the articulation of the double helix resulted less from careful progress toward revelation than from a complex of gender effects, play, and desire for a speed. This work was itself, in turn, inflected by Schrodinger’s seemingly marginal writings of the 1940s. Both of these texts—Schrodinger’s and Watson and Crick’s—were part of the transformation in the very concept of life, a transformation that places life in crisis—hence Shrodinger’s title, *What is Life?*, a question that had, for several centuries at least, seemed either self-evident or nonsensical. More than a critique of vitalism, the challenge to the notion of the ‘specialness’ of vitality made possible a biological model of life that actively ignored the organism. The fact that life is not beyond the laws of physics led swiftly to a less obvious conclusion: that life’s mooring in the body could be overlooked.

Richard Doyle, *On Beyond Living: Rhetorical Transformations of the Life Sciences* (Stanford, CA: Stanford University Press, 1997), 40.

[10] DNA Tribes promises the following service:

> DNA Tribes Genetic Ancestry Analysis is a service that uses genetic material inherited from both maternal and paternal ancestors to measure your genetic connections to individual ethnic groups and major world regions.  Your top ranked results indicate places where your blend of ancestry is most frequent and where your genetic ancestors left the strongest traces.

DNA Tribes, “Frequently Asked Questions About DNA Tribes® Genetic Ancestry Analysis”, updated March 14, 2009 (http://www.dnatribes.com/faq.html).

[11] I write further on this in the “Chimera” chapter, “Platonic Forehand’ section. Eugene Thacker notes the paradoxical mix of materialism and idealism in biotechnology in *The*

*Global Genome: Biotechnology, Politics, and Culture* (Cambridge, MA: MIT Press, 2005), xvii.

[12] Eugene Thacker, *The Global Genome: Biotechnology, Politics, and Culture* (Cambridge, MA: MIT Press, 2005), 48.

[13] Thacker, 48.

[14] Ian Wilmut, "The Rights and Wrongs of Cloning Humans," transcript of an address given to The American Association for the Advancement of Science, Philadelphia, PA, *2wice*, N. 3, 1998,  31.

[15] http://www.biotecnika.googlepages.com/animal_cloning.html

[16] Eckhard Wolf, "Animal Cloning in Germany" in Reinhard Renneberg, *Biotechnology for Beginners*, (Burlington, MA: Academic Press, 2008), 248 (emphasis my own).

[17] Wade Roush, "Genetic Savings and Clone: No Pet Project" *Technology Review,* March 2005 (http://www.technologyreview.com/Biotech/14215/).

[18] BioArts International run by one of the founders of Genetic Saving and Loan, Lou Hawthorne. The company offers pet and livestock cloning as well genetic diagnostic tests for humans. The company's "Best Friends Again" program offer canine cloning services. BioArts was able to realize the dream of Genetic Saving and Loan founder by creating three clones of Missy in 2007-8. The "Best Friends Again" web site lists the complications of cloning canines. The site also documents the process of cloning Missy. BioArts International, "Challenges Unique to Dog Cloning." http://www.bestfriendsagain.com/about/challenges.html

[19] Julia Layton, "What is the Missiplicity Project."*How Stuff Works*. (http://science.howstuffworks.com/genetic-science/missyplicity2.htm).

[20] Renneberg, 255-57.

[21] Renneberg, 252-255.

[22] Thacker, "Data Made Flesh,"  88.

[23] Martin Anderson, "Versions: Invasions of the Body Snatchers," *Den of Geek*, January 29, 2008, http://www.denofgeek.com/movies/8781/versions_invasion_of_the_body_snatchers.html

[24] *Invasion*, director, Oliver Hirschbiegel, screenplay, David Kajganich, 2007.

[25] Aristotle, "The History of Animals" in Linda Kalof and Amy Fitzgerald, eds., *The Animals Reader: The Essential Classic and Contemporary Writings* (New York: Berg, 2007), 5-6.

[26] Descartes explains his concept of the machine-animal:

> I know that animals do many things better than we do, but this does not surprise me. It can even be used to prove they act naturally and mechanically, like a clock which tells the time better than our judgment does. Doubtless when the swallows come in spring, they operate like clocks. The actions of honeybees are of the same nature, and the discipline of cranes in flight, and of apes in fighting, if it is true that they keep discipline. Their instinct to bury their dead is no stranger than that of dogs and cats who scratch the earth for the purpose of burying their excrement; they hardly ever actually bury it, which shows that they act only be instinct and without thinking.

Rene Descartes, "From the Letters of 1646 and 1649" in Linda Kalof and Amy Fitzgera, eds., *The Animals Reader: The essential classic and contemporary writings* (New York: Berg. 2007), 60.

**[27]**H. Watanabe, A. Fujiyama, M. Hattori, T. D. Taylor, A. Toyoda, Y. Kuroki, H. Noguchi, A. BenKahla, H. Lehrach, R. Sudbrak, M. Kube, S. Taenzer, P. Galgoczy, M. Platzer, M. Scharfe, G. Nordsiek, H. Blöcker, I. Hellmann, P. Khaitovich, S. Pääbo, R. Reinhardt, H.-J. Zheng, X.-L. Zhang, G.-F. Zhu, B.-F. Wang, G. Fu, S.-X. Ren, G.-P. Zhao, Z. Chen, Y.-S. Lee, J.-E. Cheong, S.-H. Choi, K.-M. Wu, T.-T. Liu, K.-J. Hsiao, S.-F. Tsai, C.-G. Kim, S. OOta, T. Kitano, Y. Kohara, N. Saitou, H.-S. Park, S.-Y. Wang, M.-L. Yaspo and Y. Sakaki, "DNA sequence and comparative analysis of chimpanzee chromosome 22," *Nature* 429, May 27, 2004, 382-388.

[28] Donna Haraway notes the connections and disconnections between humans and lab animals. She writes:

> The mice…in laboratories everywhere, are also sentient beings who have all the biological equipment, from neuronal organization to hormones, that suggest rodent feelings and mousy cognition, which, in scientific narratives, are kin to our own hominid versions. I do not think that fact makes using the mice as research organism morally impossible, but I believe we must take noninnocent responsibility for using living beings in these ways and not to talk, write, and act as if OncoMouse™, or other kinds of laboratory animals, were simply test systems, tools, means to brainier mammals' ends, and commodities. Like other family members in Western biocultural taxonomic systems, these sister mammals are both us and not-us; that is why we employ them.

Donna J. Haraway, *Modest_Witness@Second_Millenium.FemaleMan_Meets_OncoMouse: Feminism and Technoscience* (New York: Routledge, 1997), 82.

[29] Ian Wilmut states:

> …about a fifth of the lambs that are born alive will die within a few days…In addition to death after birth there is actually an increased loss of the fetuses during pregnancy. Usually in mated animals you would lose about five or six percent of the fetuses, which you can detect by ultrasound about a third of the

> way through pregnancy. The incidence of loss is almost ten times higher when we produce the embryos by nuclear transfer.
>
> Now the reason for going into this [detail] is not so much to highlight the limitations of the technology when it comes to animals, but to emphasize that point that at present it is surely inhuman to think of doing this with a human being. It is distressing enough if the animal that dies soon after birth is a lamb, but I shudder at the thought that it might actually be a child.

Wilmut, 31-2.

[30] Nicholas Royle, *Jacques Derrida* (New York: Routledge, 2003), 16, 26, 72, 77.

Royle quotes Derrida in *Ellipsis*, 297:

> Why would one mourn for the centre? Is not the centre, the absence of play and difference, another name for death? (16)

And Royle goes on to note the shift from essence to difference:

> 'There is no atom' [Dialanguages, 137] as Derrida remarks in what is one of his most succinct and most quietly, subterraneously explosive formulations. Everything is divisible. Unity, coherence, univocality are effects produced out of division and divisibility. This is what gives rise to the elaboration of terms such as difference, iterability, the trace, the supplement… (26)

[31] Derrida while acknowledging the false divide between humans and animals also keeps in the play the difference between species. Writing of the "rupture or abyss" between humans and animals, he states:

> To suppose that I, or anyone else for that matter could ignore that rupture, indeed that abyss, would mean first of all blinding oneself to so much contrary evidence; and, as far as my own modest case is concerned, it would mean forgetting all the signs that I have managed to give, tirelessly, of my attention to difference, to differences, to heterogeneities and abyssal ruptures as against the homogeneous and the continuous.

Jacques Derrida, *The Animal That Therefore I Am* (New York: Fordham University Press, 2008), 30.

[32] Leonard Lawlor, *This is Not Sufficient: An Essay on Animality and Human Nature in Derrida* (New York: Columbia Press, 2007), 72.

[33] Derrida, p. 64.

[34] Jean Baurdillard, *Simulacra and Simulation*, trans Sheila Faria Glaser (Ann Arbor, MI: University of Michigan Press, 1994), 9.

[35] Walter Benjamin, “The Work of Art in the Age of Mechanical Reproduction” in *Illuminations*, Hannah Arendt, eds., (New York: Schooken Books, 1968), 220-1, 223.

[36] Benjamin, 223.

[37] Benjamin, 222-3.

[38] Jay David Bolter, Blair MacIntyre, Maribeth Gandy, and Petra Schweitzer. “New Media and the Permanent Crisis of Aura,” *Convergence: The International Journal of Research into New Media Technologies,* 12:1, 2006, 20.

[39] Giles Deleuze, *Difference and Repetition*, trans. Paul Patton (New York: Columbia University Press, 1994) 40-41.

[40] Roush, http://www.technologyreview.com/Biotech/14215/

[41] Roush, http://www.technologyreview.com/Biotech/14215/

[42] Reinhard Renneberg, *Biotechology for Beginners* (Burlington, MA: Academic Press, 2008), 257.

[43] Deleuze*,*1.

[44] Eugene W. Holland, *Deleuze and Guattari’s Anti-Oedipus: Introduction to Schizoanalysis* (New York: Routledge, 1999), 28.

[45] The Fisher’s “photo animals” web site: http://www.ralphfishersphotoanimals.com/

[46] Ira Glass, “Reunited (And It Feels So Good): Act Two. If By Chance We Meet Again.” *This American Life,* July 1, 2005.
http://www.thisamericanlife.org/Radio_Episode.aspx?episode=291

[47] Baudrillard, 95.

[48] Baudrillard, 95.

[49] Deleuze, 66.

# CHAPTER 4

# CHIMERA

Integration of difference is an everyday occurrence in contemporary culture. The urban centers of most industrialized nations are lively multiethnic spaces. Global manufacturing produces a variety of products formed from transnational capital, labor and materials. In the humanities and sciences, disciplinary fields overlap and blend together to create new domains of knowledge like bioinformatics, astrophysics and comparative literary and cultural studies. Cultural production also foregrounds eclectic combinations—food (fusion cuisine), fashion (contemporary vintage), architecture (Calatrava's sculptural, biomorphic buildings), music (trip-hop) and art (Takeshi Murakami's anime-inspired fine art) all promote unusual juxtapositions and mergers.

This hybrid sensibility is often noted as a distinguishing trait of postmodernity—a movement that discounts modernity's essentialism and embraces the dynamism of fusion and multiplicity. Postmodern hybridity is driven by contradictory desires. Welcoming the outsider into the fold can be both progressive and patronizing. The dominant culture seeks new signs, tastes, experiences and knowledge and finds them in the marginalized "other." This celebration of difference sometimes leads to productive transformations—the civil rights movement illustrates the possibility of slow but real material and cultural change. At other times, the mixing of difference does little to disrupt the status quo; the outsider is integrated to serve the interests of the dominant culture. Witness the rapid metamorphosis of Hip Hop from oppositional music to mainstream pop-music success. Or, note the co-option of punk-rock style detached from its anarchic roots and marketed by the fashion industry to affluent teenagers.[1]

The chimera is at home in the contradictory space of postmodernity. Oscillating between rebellion and submission, the chimera is simultaneously a triumph of Deleuzian becoming and a pawn of Foucauldian biopower. He represents unbounded and unconventional alterity but also succumbs to—perhaps even celebrates—social and economic imperatives. In biotech research, the chimera breaks species barriers and challenges the hierarchies of human culture. The biotech chimera promotes the concept of a universal flesh; he possesses an unconventional body that integrates nonhuman and human genes and transcends traditional biological barriers. At the same the chimera demonstrates the reach of power. His corporeal and subjective innovations are designed to serve the economic interests of multinational capital. His arrival subverts the divisions between humans and animals, yet he is primarily born to serve human needs and desires. Though the chimera shares biological mechanisms with the human, he is always restricted from full participation in human subjectivity. These contradictions make the chimera an ambiguous symbol. He represents liberation, innovation and rebellion but also abuse, conformity and maladapted abjection.

### 4.1 Irreducibility & Procedurality: Informational Bodies

Humans have long altered animals through domestication, breeding and behavior modification. These practices require extensive human and animal cooperation and tend to be slow moving and uncertain endeavors; selective breeding and training regimes may or may not produce the desired outcome in a consistent or timely manner. The arrival of the biotech chimera signals a change in the scale and scope of human-lead modifications to animals. It also represents a shift in biology's view of the body. Contingent methods to modify animal bodies and behavior give way to quantifiable, code-driven techniques. This new biology perceives information as the essence of life; all flesh is underpinned by genetic codes. Flesh is reduced to genetic sequences, those sequences are spliced and rearranged, and new flesh is created through the reconfigured code.

Informational biology hopes to achieve speedy, precise and repeatable methods of corporeal manipulation. These info-techniques are aligned with the market objectives of agriculture, energy and medicine. They promise innovations in food, bio-fuels and health while also expanding markets and increasing profits. But beneath the utopian visions of biotechnology, dystopian possibilities lurk. Perceiving the body as decodable-encodable information ignores the irreducibility of lived experience. The complexity and richness of life is subsumed under the logic of genetic code. And increasingly refined and intimate bioengineering techniques make the body susceptible to new forms of regulation and abuse. Political, social and economic imperatives threaten to shape the form and function of these bio-innovations. Informational biology's procedural methods encapsulate the best and worst tendencies of technology and capital.

The effects of informational biology can be seen in a variety of genetically modified plants and animals. Biotechnology aims for a new kind of corporeal plasticity. Traditional species barriers are routinely breached; researchers combine human, animal and plant genes to create chimeric novelties. The GloFish®, a genetically modified Zebra Fish, serves as an example of biotechnology's efforts. In the wild, Zebra Fish are black and silver, GloFish®, however, are marked with saturated red, orange or green streaks. Their atypical coloring is the result of inserting sea anemone or jellyfish genes into Zebra Fish zygotes. The genes produce fluorescent proteins that alter the hatched fish's color. Once the fish are genetically modified, they produce offspring that inherent their parents' fluorescent colors. The transgenic fish sell for five times the cost of non-modified Zebra Fish.[2] Genetically modified mice serve as another example of chimeric innovation. Mice embryos are altered to include human neurons as well as human immunological cells.[3] Knock-out mice have specific genes removed from their genome to help researchers determine the effect of a particular gene on phenotype. These transformations of the mouse's genome serve the interests of medical research—the mouse is often at the forefront of bioengineering experiments designed to test remedies for human cancer and disease. Millions of mice and other rodents are enlisted in the research of labs around the globe.[4]

### 4.1.1 Informational Biology's Alliance with Cybernetics

Transgenic creatures are often developed with the assistance of sophisticated cybernetic systems that analyze, store, manipulate and reproduce genetic codes. Cybernetics' association with biology is nothing new. Norbert Weiner's foundational writings on cybernetics never limited the logic of feedback loops to machines. His vision always included biological *and* mechanical systems: "We have decided to call the entire field of control and communication theory, *whether in the machine or in the animal*, by the name *Cybernetics*…"[5] Wiener used the body's mechanisms as a template for the components of cybernetic systems: "It has long been clear to me that the modern ultra-rapid computing machine was in principle an ideal central nervous system to an apparatus for automatic control; and that its input and output need not be in the form of numbers and diagrams, but might very well be, respectively, the readings of artificial sense-organs such as photo-electric cells or thermometers, and the performance of motors or solenoid."[6] The body's structure—its central nervous system, sense organs, and musculature—inspire the computation, sensor inputs and actuators of cybernetic systems.

As computational cybernetic systems matured, they not only borrowed from biological mechanisms but also influenced the research of biologists. The embodied concerns of Weiner's cybernetics were often surpassed by an interest in the computer's ability to store, sort and retrieve data, generate models of real-world processes, and assist in the automation of genetic manipulations. Mapping something as complex as the human genome—3.4 billion base pairs—requires a series of labor-saving tools and procedures.

One such procedure is capillary electrophoresis, a method of recording DNA sequences that uses laser beams to detect florescent dyes attached to nucleotides. The color codes are read and translated into DNA sequences with the help of computers. DNA chips also assist in the analysis of genetic data. These chips are inspired by microchips that pack millions, sometimes billions, of transistors on a silicon wafer. DNA chips house hundreds to thousands of single-strand DNA sequences arranged in a grid pattern. The genetic material being studied is denatured (the double helix structure is broken into single strands) and tagged with fluorescent markers. When a denatured strand lines up with a known genetic sequence attached to the DNA chip, the denatured strand's florescent maker is detected by scanners. Since the genetic material's sequence is the complementary code of the known DNA strand on the chip, it can be easily decoded.[7] All of these procedures require a certain degree of material manipulation—particularly in the preparation of biological materials before analysis—but these material processes are complemented and often framed by the capabilities of digital applications. Biotechnology's focus on genetic code requires sophisticated data processing—digital technologies scan, read, sort and store massive amounts of genetic data. Biology accesses the hidden information of the body through the tools and techniques of cybernetic systems.

### 4.1.2 Platonic Forehand

The alliance of cybernetics and informational biology extends beyond hardware and software affinities. Both fields have a tendency to view underlying codes as the essence of materiality. An informational body is closely tied to the mechanisms and logic of cybernetic systems. Eugene Thacker argues that the conceptual foundations of biotechnology are aligned with the framework of cybernetics. He notes: "The common notions of a genetic 'code' derive from a tradition in molecular biology (indeed, a tradition that is molecular biology) of appropriating concepts from cybernetics and information theory into the biological sciences."[8]

The influence of code suggests that the complexity of life emerges in biology's genetic data or in cybernetics' programmable rules. Katherine Hayles' examination of Artificial Life (AL) research sheds light on the bottom-up approach that inspires both informational biology and cybernetics. AL research models evolutionary scenarios using computer simulations. Often virtual creatures "mate" and "mutate" as part of an algorithmic natural selection process. These simulations test out biological mechanisms by condensing time and reducing material complexity. The slow results of natural selection in the physical world are replaced with sped-up transformations of virtual creatures and environments. Despite a variety of AL mediums—wetware, hardware and software—Hayles notes that each approach "shares[s] the sense of building life from the 'bottom up.'" Software AL projects "begin with a few simple rules and then, through structures that are highly recursive, allow complexity to emerge spontaneously." The living things of AL are born and modified through algorithmic procedures.

Hayles points out that the rhetoric of AL often equates algorithmically generated data with material life. The ontologies and associated naming conventions as well as contextualizing narratives of AL equate virtual life with biological life. Virtual creatures—sometimes represented only by a limited sequence of binary numbers—are described as entities with autonomy and agency. Writing about *Tierra,* an AL program directed by Thomas Ray at the Santa Fe Institute, Hayles states:

> For them, genotype and phenotype amount to the same thing; the organism is the code, and the code is the organism. By representing them as phenotypes, visually by giving them three-dimensional bodies and verbally by calling them 'ancestors,' 'parasites,' and such, Ray elides the difference between behavior, properly restricted to an organism, and execution of a code, applicable to the information

> domain. In the process, our assumptions about behavior, in particular our thinking of it as independent action undertaken by purposive agents, are transported into the narrative.[9]

These AL programs illustrate an overarching theme of Hayles' research into cybernetic culture. Hayles argues that the logic of cybernetic systems encourages a new view of presence that privileges algorithm over material, code over embodiment. In the most extreme cases, the human subject is seen as a program built "to run on the cosmic computer."[10] "In the AL paradigm, the machine becomes the model for understanding the human."[11]

Hayles describes cybernetics' bottom-up, rule-based approach as Platonic forehand. Theorists traditionally generalize through observation and experimentation in the physical world (Platonic backhand); they abstract from the "world's noisy multiplicity." Platonic forehand, however, inverts this approach, creating the complexity of everyday life from abstracted rules. This approach is made possible through the use of powerful computers—it "starts from simplified abstractions and, using simulation techniques such as genetic algorithms, evolves a multiplicity sufficiently complex that it can be seen as a world of its own." [12]

> The two moves thus make their play in opposite directions. The backhand goes from noisy multiplicity to reductive simplicity, whereas the forehand swings from simplicity to multiplicity. They share a common ideology—privileging the abstract as the Real and downplaying the importance of material instantiation. When they work together, they lay the groundwork for a new variation on an ancient game, in which disembodied information becomes the ultimate Platonic Form. If we can capture the Form of ones and zeroes in a nonbiological medium—say, on a computer disk—why do we need the body's superfluous flesh?[13]

Hayles argues that divorcing information from its materiality alters the way we interpret the world. Once informational paradigms are applied to a range of disciplines, existence is defined as a “pattern rather than a presence.” That is, what is real (or valuable) is no longer a book, newspaper, web page or even a body, but an encodable/decodable pattern that can be applied across mediums and materials. Hayles sees our perception of reality shifting from a framework of absence and presence to pattern and randomness.[14] Viewing our bodies as genetically defined patterns aligns with this paradigmatic shift.

Yet despite the rise of pattern, biotechnology remains firmly attached to material presence. Eugene Thacker sees this as a defining contradiction of biotechnology:

> Modern biological thought always makes two demands of “life itself”: that it be essentially information (or pattern) and that it also be essentially matter (or presence). The tensions in this dual demand often lead to contradictory positions within the biotech industry.[15]

As an example of this contradiction, Thacker points to the process of patenting biological materials. To be able to patent genetic sequences or modified organisms, a research company argues that these entities are artificial and constructed; they are “new, useful and nonobvious.” At the same time, to successfully market its products, the company promotes the natural, organic properties of their discoveries. The products developed by biotechnology are portrayed as both natural and artificial.[16]

### 4.1.3 Synthetic Biology

This unfamiliar oscillation between artificial and natural, pattern and presence, is evident in the rhetoric and research of biologists who hope to resuscitate the extinct mammoth. A recent discovery in the Siberian permafrost of a well-preserved mammoth corpse led some to speculate that mammoths might be brought back to life through biotechnology. A National Geographic article describes four bio-techniques that might reanimate the species. The first two procedures are primarily material—they employ artificial insemination, cross breeding and cloning. These procedures combine preserved mammoth cells with living elephant cells and bodies, creating chimeras that merge extant and extinct species.

The article suggests two other methods that have synthetic starting points. These Platonic forehand procedures generate genetic codes rather than extract biological material. The first synthetic method relies on the work of researchers at Pennsylvania State University who mapped 70 percent of the mammoth genome. The genome map was constructed using mammoth hair samples. The samples were too fragmented to provide a full genome sequence, so unreadable sections of the mammoth genome were supplemented with information from the elephant's genome, the mammoth's closest living relative. Researchers speculate that a complete mammoth genome could be recreated by modifying elephant DNA. Modifying the elephant's chromosomes to match the mammoth's would not be an easy task; the procedure requires inserting mammoth-specific sequences at approximately 400,000 points in the elephant's genome.

The other synthetic method is possible only after the mammoth genome is fully documented. In this scenario, researchers create from scratch mammoth DNA strands, shape them into chromosomal structures, and house them in an "artificial nuclear membrane." After modifying or constructing a genome sequence, both synthetic approaches employ the material methods of cloning—insert genetic material into elephant ovum and rely on a surrogate elephant to bring the mammoth embryo to term.[17] And, as noted in the previous chapter, these material procedures are often fraught with complications. They require the trail-and-error process of getting all material elements to coalesce into a successful pregnancy and birth.

These synthetic procedures expand the informational frontier of biology. Researchers are interested in bottom-up, informational approaches in part because they promise greater control, efficiency and precision. Researchers describe these procedures by making analogies to the fields of mechanical and software engineering. MIT's Tom Knight is creating BioBricks—snippets of genetic sequences—that can be inserted into cells to alter DNA. Knight views the invention of BioBricks as analogous to the development of standardized parts introduced in the middle of the 19th century. And J. Craig Venter of Synthetic Genomics aims to create "an operating system for biologically-based software"—"a plain genetic platform able to direct the basic functions of life" that can be modified with "DNA modules."[18] Venter's research team recently developed the first fully synthetic bacterial genome.[19] Venter hopes to use this discovery to create rudimentary bacteria—bacteria with just enough genetic material to sustain life—that can be modified to perform a variety of tasks by adding specific genes.[20] The stripped-down, synthetic bacteria become operating systems; the genes inserted into the bacteria function as software programs that extend the bacteria's metabolic abilities.

More important than incorporating the speed and precision of digital tools and standardized parts, synthetic DNA promises to literally make flesh programmable. In the process, synthetic DNA research hopes to alter the scale of biotechnology. A Washington Post article describes the change in this way: "Unlike conventional biotechnology, in which scientists induce modest genetic changes in cells to make them serve industrial purposes, synthetic biology involves the large-scale rewriting of genetic codes to create metabolic machines with singular purposes."[21] This is a reworking of life from the ground up, designing new genetic sequences that conform to the needs of science and industry. This is a biotechnology that is not simply enhanced by the tools of information technology and cybernetic systems but is also inspired by the methods of software engineering. Biologists become programmers.

### 4.1.4 Biopower

A body viewed as an operating system that can accommodate a variety of genetic modules provides a new way of framing life. Synthetic biology aspires to create hyper-plastic organisms that mimic the dynamic systems of digital media. This desire to remake life at the molecular level takes on new complexity when it is framed by the socio-political drives of biopower, a term coined by Michel Foucault to describe the state's interest in maintaining a healthy and productive population. Foucault's analysis of biopower and power in general highlights the affirmative regulation of society, politics and technology. Bodies made available to genetic manipulation can be shaped in ways the support the interests of powerful institutions. The ability to control informational bodies down to minute genetic sequences promises material advances and insights but also harbors the potential for exploitation and catastrophe. Increasingly refined methods of material control—methods that are underpinned by the logic of information—not only promise new abundance but also forebode enhanced social manipulation.

Foucault argues that socio-material disruptions alter the methods of social regulation. After the 18th century revolution in France, power slips from the sovereign into the hands of the bourgeoisie. This change in power engenders new disciplinary mechanisms to control the liberated masses. The sovereign ruled with a spectacle of terror—acts considered an attack on the sovereign's authority were met with public executions and torture. In post-revolutionary France, the law and court promotes social integration rather than public retribution. Prisons become training sites, places to reform the criminal's anti-social character. The criminal is disciplined through isolation, regulated schedule, forced labor, and moral and vocational education.[22] The sovereign publically punishes the criminal; the bourgeoisie's political apparatus sequesters and reforms the criminal.

Disciplinary action expands beyond the prison's walls. The ruling merchant class employs a variety of methods of social control. These are methods that can coexist with the concept of a liberated individual. Under sovereign rule the masses were ignored; under the rule of the business class, the masses become a central concern.[23] An array of institutions combine to ensure behavioral norms—the school, judiciary, military, prison, factory and hospital produce a productive and orderly citizenry.[24] Foucault argues that the police force pays particular attention to the details of social order:

> It is an apparatus that must be coextensive with the entire social body and not only by the extreme limits that it embraces, but by the minuteness of the details it is concerned with. Police power must bear "over everything"… it is the dust of events, actions, behavior, opinions – "everything that happens"; the police are concerned with "those things of every moment", those "unimportant things"…[25]

Foucault sees disciplinary mechanisms in the regulation of health and life. In his description of a 17th century plague-stricken village, we can see traces of Foucault's theory of biopower. The infected village is first quarantined; guarded to ensure no one enters or leaves. Households are isolated; families are locked in their homes. A syndic monitors each home by calling occupants to appear at an exterior window of their house. The inhabitants, one by one, verify their health through personal account as well as corporeal presence. The syndic reports his findings to a supervisor who in turn passes the information on to a magistrate. This hierarchy manages the medical care of the town by isolating, recording, and monitoring its inhabitants.[26] As villagers submit to the daily ritual of appearing before the syndic they learn to adopt the appropriate signs of vigor. Foucault sees similar mechanisms designed to curb chaotic or subversive behavior in contemporary culture. Productive, healthy citizens conform to culturally sanctioned codes of hygiene, attire, speech, gait, posture and gesture.[27]

In the *History of Sexuality*, Foucault argues that biopower is transformed in ways that echo the shifts in France's post-revolutionary justice system. The sovereign's biological control is "exercised mainly as a means of deduction, a subtraction mechanism."[28] The sovereign can take property and possessions and extinguish life. But as the state replaces the sovereign, “deduction” diminishes and regulation of life comes to the fore. Biopower becomes a productive tool, a power that molds citizens; “a power bent on generating forces, making them grow, and ordering them, rather than one dedicated to impeding them, making them submit, or destroying them.”[29]

The control of citizens is closely tied to economic and political imperatives. Bodies need to be optimized for labor while also remaining submissive to power. The rise of biopower incorporates life “into the order of knowledge and power, into the sphere of political techniques.” The “norm” is privileged over the law. Life becomes the central concern of political struggle.[30] Sexuality is made available to state control. And here, too, Foucault argues that control is administered in a positive way. Power does not limit or curb sexuality but instead forms an alliance with the forces of sex. It calls forth sexuality in its productive potential. Foucault argues that our pursuit of sexual liberation is aligned with the priorities of biopower:

> We are often reminded of the countless procedures which Christianity once employed for centuries to make us detest the body; but let us ponder all the ruses that were employed for centuries to make us love sex, to make the knowledge of it desirable and everything said about it precious. Let us consider the stratagems by which we were induced to apply all our skills to discovering its secrets, by which we were attached to the obligation to draw out its truth, and made guilty for having failed to recognize it for so long. These devices are what ought to make us wonder today.[31]

Biopower always extends beyond prohibition. The most effective—some might say pernicious—power does not repress but rather entices, shapes, calls forth, and draws in. Positive power seeps into everyday biological processes. Biopower goes beyond the desire to break the body down into smaller parts and refined mechanisms. It aims to reconstruct the body, build the body anew. The molding force of biopower is expanded through the techniques of biotechnology. This type of biopower transcends traditional regulating mechanisms—training, monitoring, and tracking populations—by re-writing the body's molecular code. The population is optimized by new means.

While the manipulations of synthetic biology are still in the beginning stages, researchers have already altered animal behavior by modifying specific genes. "Social behavior genes" affect the personalities and interactions of animals. A slight variation in the way a gene is expressed can dramatically change an animal's behavior. Promiscuous meadow voles were transformed into monogamous companions by modifying a gene that regulates the production of the hormone vasopressin. And the level of aggression in rhesus macaques was altered through adjustments to a gene that affects serotonin.[32] These types of experiments illustrate informational biology's alliance with biopower; they propose genetic manipulations that may soon be able to reform nonhuman and human behavior.

Yet these sophisticated bio-techniques may also improve health and increase longevity; many people would embrace such benefits of biopower even if the techniques enhance state control. As always, the innovations of science and technology generate ambivalent gains. Each utopian dream contains the seeds of dystopian nightmares. As the body is defined as programmable flesh, we are likely to see unexpected corporeal, social and technical complications.

The totalizing view of biopower presupposes a highly fluid, informational body exposed to unrestrained bio-techniques. If biologists become programmers—designing a variety of hyper-efficient yet submissive new organisms or optimizing the genetics of existing organisms—they are likely to run into the technical, material and cultural constraints posited by Lanier in the Cyborg chapter. In a similar vein, Hayles argues that the pervasive power proposed in Foucault's writings may be more theoretical than real. She writes that Foucault's abstraction of power misses the complexities of specificity, "it diverts attention away from how actual bodies, in their cultural and physical specificities, impose, incorporate, and resist incorporation of the material practices he describes."[33]

> Fissuring along lines of class, gender, race and privilege, embodied practices create heterogeneous spaces even when the discursive formations describing those practices seem uniformly dispersed throughout society.[34]

In theory, disciplinary mechanisms are all encompassing; in practice, they break down, ignore details, misinterpret and mistranslate, are avoided and sometimes subverted. In a critique of Foucault's disembodied panoptic gaze, Hayles suggests that embodiment permits a level a resistance missed in Foucault's conception of a universal body. It seems likely that embodiment and messy materiality will alter and perhaps diminish some of the effects of informational biology.

At this early stage of synthetic and informational biology, it's hard to tell if the radical manipulations envisioned by biotechnologists will be quickly realized. It seems likely that idealized procedures will encounter stubborn materials and cultural/conceptual constraints. Biologist Tom Gilbert echoes this uncertainty as he discusses the possibility of reviving the extinct mammoth. In an interview about the decoding of the mammoth's genome, Gilbert states he doubts that new genetic data will lead to a physical instantiation of a mammoth. He sees the research as most useful to scientists studying the evolutionary history of elephants. They can trace the adaptive discrepancies between elephants and mammoths and speculate on the effects of genetic difference. Yet Gilbert offers a caveat given the shifting terrain of his field: "I should warn up front I have a history of saying it's not possible, and then within months some technological breakthrough comes through that makes me revise my opinion."[35] Time will tell if mammoths or mammoth-elephant hybrids become the latest curiosities to emerge from research labs. For now, the idealized promises of informational bodies built from scratch are often more rhetorical than real.

### 4.2 Autonomy & Integration

The chimera is not simply an emblem of biopower and its affirmative and at times alarming potential, it also symbolizes a blurring of traditional ontologies. Combining the genetic information of humans, animals and plants challenges the division between humans and nonhumans. A chimera argues that traditional species' boundaries may not be as fixed as once imagined. As the boundaries between species are transgressed, human exceptionalism is less sure. Our close affiliation with the animal becomes evident.

Both animality and the abuse of power are key themes in H. G. Well's novel, *The Island of Dr. Moreau.* The novel's Pacific island hosts a variety of animal-human hybrids watched over by humans. The island's chief researcher, Dr. Moreau, is the creator of these chimeric creatures. He has surgically reshaped the brain and body of each animal, often combining disparate species into a single anthropomorphic shape. These reconstructed creatures walk on two legs and are able to speak as humans speak. To guard against a lapse into animalistic behavior, strict laws are imposed: the animal-humans are forbidden to hunt, eat meat, lap-up water, scratch trees or walk on all fours.

Moreau's methods align with Foucault's description of affirmative power. Not only does Moreau surgically re-shape the animal-humans, he also continually molds their behavior. The novel's narrator, Edward Prendick, has heard the chilling cries of animals suffering the effects of Moreau's surgery, but he writes that the violence of surgery pales in comparison with the long-term psychological suffering of social regulation:

> Before they had been beasts, their instincts fitly adapted to their surroundings, and happy as living things may be. Now they stumbled in the shackles of

> humanity, lived in a fear that never died, fretted by a law they could not understand; their mock-human existence began in an agony, was one long internal struggle, one long dread of Moreau…[36]

In an introduction to a recent edition of the novel, Alan Lightman notes the human characters are far more "beastly" than their animal-human counterparts. "Men get drunk, they act foolishly, they cheat, they leave each other to die, they tell lies, they prowl and sneak about." Though the animal-humans have latent wild-animal instincts, the humans on the island "are the real beasts."[37]

Prendrick's experience on the island alters his sense of subjectivity. Both Moreau and his assistant are killed by the animals, and Prendrick is left alone for many months with the animal-human hybrids before he is able to escape the island. With Moreau gone, the disciplinary mechanisms falter and the chimeras revert back to their instinctive behavior, hunting and walking on all fours. Predrick also undergoes some changes—his clothes become tattered and hair is unkempt. And he begins to develop an animal-like quickness: "I am told that even now my eyes have a strange brightness, a swift alertness of movement."[38]

After his returned to England, Prendrick's island experience affects his perceptions of humans in general. The division between animal and human is no longer so distinct for him. He writes:

> …I could not persuade myself that the men and women I met were not also another, still passably human, Beast People, animals half-wrought into the outward image of human souls; and that they would presently begin to revert, to show first this bestial mark and then that.[39]

Prendick's association with chimeras alters his view of human and animal subjectivity. The chimera's integration of animal and human elements challenges the biological and cultural divisions between humans and nonhumans. A chimera transgresses bio-social boundaries. As an in-between species, she can claim neither human nor animal subjectivity. Her body collapses the hierarchal distinctions of species. Yet this challenge to hierarchy in the realm of real-world laboratory remains unrealized. Biotech's transgenic animals may reveal the close ties of humans and nonhumans, but they are sold as commodities. Transgenic animals are primarily created to alleviate human suffering or enhance human consumption. The human's agenda, his sense of superiority, instrumentalizes the chimera. The chimera is intimately tied to the human but remains a detached object. She casts doubt on human superiority but also supports the privileging of human concerns.

*Utility Pet,*[40] a speculative design project created by Elio Caccavalle, explores this complicated relationship between human and animal-human hybrid. The project is inspired by a bio-technique called xenotransplantation—a developing technology that takes organs from one species and implants them into another. The current medical practice of organ transplantation is frustrated by a limited supply of donor organs and the potential for a patient's body to reject a new organ. As a result, many people die before receiving a transplant; others suffer long hospital stays, sustained by artificial means, hoping the right organ becomes available. Biotechnologists address these issues by proposing an alternative to human donor organs: they argue animals could be genetically modified to make them suitable donors for human patients. By altering the animal's biology to directly match a patient's, the animal's organ can be transplanted into a patient and the possibility of rejection is diminished. And re-conceiving the animal as an organ donor makes available a cheap and abundant supply of organs for human use. The domesticated pig is the animal most likely to become a future transgenic organ donor.

Caccavale is a Design Interactions student at the Royal College of Art and his *Utility Pet* concept is influenced by the work of RCA professors, Anthony Dunne and Fiona

Raby. Dunne-and-Raby projects imagine near-future scenarios informed by the practices of product, information and industrial design. These projects examine the complicated social consequences of cultural and technological interactions. They also tend to have a particular tone—they are slightly off key. The work is neither utopian nor dystopian; instead it creates imperfect solutions to techno-cultural problems and embraces conflicting desires.[41] Dunne describes his approach:

> The kind of pleasures you get from reading a book or watching a film, I think are the kinds of things we're trying to explore in relation to products. How can you design products that provide complex and complicated pleasures?
>
> I guess we're attracted to the bad side of people. The side that is complicated, contradictory, irrational. And we're really curious if you filled up a room or a space with objects that reflected those values, how that material world would look different from the material world that surrounds us now.[42]

Caccavale's project aligns with Dunne and Raby's aesthetic. He imagines a difficult scenario without easy resolution. Caccavale places himself in the position of a transplant recipient. From this position he examines the day-to-day experiences leading up to and following his organ transplant operation. His approach is small-scale and personal—he avoids the spectacle of technical wizardry and the violence of surgery. Instead, Caccavale personalizes medical procedures by foregrounding the interactions between human patient and genetically modified pig. That is, Caccavale focuses on the new relationships and altered subjectivities that emerge in the process of xenotransplatation.

Caccavale complicates the interaction between human and animal by proposing a scenario in which the chimeric pig is adopted as a household pet. The pig is welcomed into his home to ensure that he, and, by extension, Caccavale's future organ replacements are well cared for. The pig as a domestic pet requires a series of accommodations. Since Caccavale smokes, he worries the pig's health may be harmed by second-hand smoke. Consequently, he designs *Smoke Eater*, a filtering mask shaped like a pig's snout, that he wears when enjoying a cigarette. Caccavale's is able to smoke and the pig's respiratory system is protected. He also creates *Toy Communicator*, a device similar to a baby-monitor radio, that lets him hear the pig's activity when the animal is in another room.

Both devices, *Smoke Eater* and *Toy Communicator*, address the concerns of a doting pet owner. They indicate concern for his pig's welfare. But these products are also motivated by the commodity value of the pig—this is not an everyday pig, he houses human-ready organs. The mixed motivations that inspire *Smoke Eater* and *Toy Communicator* reveal the pig's equivocation between subject and object. If the pig attains full subjectivity, Caccavale moral dilemma increases—to extend his life, Caccavale must slaughter his pet pig; to spare the pig's life, Caccavale risks his health. The biotechnologists' tidy solution generates new complications. We place ourselves in Caccavale's position and work through his difficult decision. Would we kill the pig for his organs? Would we risk our health to maintain our position as protective custodian? Would we lose our ability to objectify the pig? Each potential trajectory leaves us ambivalent, uncertain of our choices. No choice is without damning consequences.

A sense of loss permeates Caccavale's fictional world. Death hangs over the project. This is not only the end of the pet pig, but also the death of human identity. By housing pig organs, we become something other than human. And a pig with organs genetically matched to our own no longer conforms to our concept of farm animal. Traditional categories are blurred; both human and animal identities are uncertain. The transgression of human and animal corporeal boundaries challenges psychological and philosophical conventions. If bodies can be so easily merged, perhaps the human mind-body does not stand apart from the animal mind-body.

Caccavale creates two more objects to accommodate the breakdown of human and animal boundaries. The first, *Memento Service*—the tip of a pig snout encased in polyurethane—becomes a desktop memorial of the pig's life and sacrifice. The other object, *Comforting Device,* is the preserved pig's snout attached to a plastic rod. Caccavale holds the *Comforting Device* up to his face while looking in the mirror. The mask assures Caccavale that he is still very much a human after incorporating pig organs in his body. Yet the mask could also remind Caccavale of his altered subjectivity. He is no longer the human he once was—his life is made possible only through becoming a pig-human mixture. The mask confirms Caccavale's human identity but also reminds him of his altered status.

While Caccavale's project examines the complications of subjectivity that arise in the mixing of human and nonhuman flesh, the project ultimately privileges human identity. Though some of Caccavale's artifacts protect the pig from harm, the devices are designed to maintain the value of Caccavale's investment. Caccavale's devices could be read as optimizing rather than accommodating the pig's corporeal needs. And the moral dilemma that Caccavale faces—risk his health to save his pet pig or slaughter the pig to extend his life—ends with the death of the pig. The human body trumps the animal body; the pig is sacrificed for Caccavale's health. The difference in human and nonhuman status remains quite clear.

Derrida in his writing challenges our habitual privileging of human concerns. He sees anthropocentrism as a critical thread that runs through much of Western philosophy.[43] This human-centered view ignores the ethical issues raised when animals are sacrificed for human needs. Derrida interrogates the tradition of sacrifice by examining the Old Testament account of Abraham and Isaac. In this biblical tale, Abraham is asked by God to sacrifice his son, Isaac, as an act of faith. Abraham accepts God's command, binds his son and places him on a sacrificial alter. Just before Abraham is about to kill his son, an angel's voice prevents the murderous act. A ram caught in a thicket becomes a substitute for Isaac; the animal is sacrificed in Isaac's place.

Judeo-Christian-Islamic religions see Abraham's near sacrifice of Isaac as the ultimate manifestation of faith. Christians view the story of Abraham and Isaac as foreshadowing the New Testament sacrifice of Christ. Others view Abraham's action less favorably. Philosopher Susan Neiman contrasts the actively engaged Abraham who negotiates with God to save Sodom and Gomorrah with the passive Abraham who unquestioningly prepares to sacrifice his son. Neiman sees Abraham's faith as mindless adherence to an unjust, murderous decree.[44] Derrida's interpretation of the Abraham-Isaac story is more complex. He sees Abraham's moral dilemma as emblematic of the paradox of morality's simultaneous specificity and generality. When Abraham acquiesces to God's command, he upholds his "absolute responsibility" to the "absolute other," his God. In the process, Abraham abandons his duty to the ethical traditions of his community. "The absolutes of duty and of responsibility presume that one denounce, refute, and transcend, at the same time, all duty, all responsibility, and every human law."[45] This is the moral tension between the universal and specific; the difficulty of balancing the needs of the particular against the needs of community. Derrida sees the sacrifice of Isaac as something "monstrous" but also suggests that a rigid, universal morality is an impoverished morality.[46] No ethical decision can be easily resolved; each choice is torn between the general law and the specific situation.

Derrida argues that our devotion to the singular other inevitably sacrifices the needs of the many others. "I cannot respond to the call, the request, the obligation, or even the love of another without sacrificing the other other, the other others."[47] And he further states that we can never fully justify our choice in responding to a particular other:

> What binds me to singularities, to this one or that one, male or female, rather than that one or this one, remains finally unjustifiable (this is Abraham's hyper-ethical sacrifice), as unjustifiable as the infinite sacrifices I make at each moment.

> These singularities represent others, a wholly other form of alterity: one other or some other persons, but also places, animals, languages. How would you ever justify the fact that you sacrifice all the cats in the world to the cat that you feed at home every morning for years, whereas other cats die of hunger at every instant?[48]

Our response to the particular brings joy and sadness; joy in satisfying the demands of the one and sadness in denying the needs of so many.

Derrida's reference to cats in the above quote suggests a broader sense of otherness than the Old Testament account of Abraham and Isaac. The biblical tale highlights the tension between the demands of God and man. The animal in the story—the ram slaughtered in Isaac's place—is a marginal figure quickly silenced by sacrificial death. Derrida's account of otherness includes the animal other; he constructs a more fluid hierarchy of otherness that welcomes anyone or thing. He argues that "God, as the wholly other, is to be found everywhere there is something of the wholly other." That all others participate in the otherness of the "absolute other": "everyone else, each other is infinitely other in its absolute singularity, inaccessible, solitary, transcendent, nonmanifest, originarily nonpresent to my *ego…every other (one) as every bit other."*[49] Our responsibility to the other is not simply to the most powerful other. Instead Derrida extends otherness beyond God or humanity to the nonhuman, the animal others who are "even more other others than my fellows."[50] With this expansion of the other, we may be able to see more clearly the very real and often "monstrous" sacrifice of the animal other. Like the Christian savior, the animal is called on to suffer and die in order to diminish human suffering. The animal is removed from our land, killed for our food, and subjected to scientific experiments for our health. In countless examples the animal suffers to diminish human suffering.

This animal suffering could be seen as the necessary consequence of devotion to the particular at the expense of the many. Such a dismissal of animal suffering continues the tradition of animal exclusion from the group of others that matter. It ignores the intimate ties between humans and animals and also denies the pleas of the animal other. Derrida addresses this issue of animal suffering by turning to Bentham's question "Can they [the animals] suffer?" Derrida argues that Bentham's query proposes a new ethical framework. No longer does language determine the animal's status; no longer are "*power* and *capability* and *attributes"* the foundation on which human privilege rests. Bentham's simple question encourages us to focus on animal sentience.[51] Derrida suggests that animals feel pain[52] and that humans have a responsibility to diminish animal suffering.[53] Derrida warns, though, that liberating or protecting the animal may generate unexpected consequences. Coercing humans to honor the sentience of animals may encourage new forms of hierarchy and violence as well as diminish "difference or alterity."[54] Rather than create totalizing mechanisms to liberate the animal from human dominion, Derrida argues for a response to animal suffering that does the least damage.

Leonard Lawlor calls this kind of response a "weak response." Here "weak" is not used as a pejorative but as a less direct response to violence that avoids new forms of coercion. Lawlor contrasts the "worst" response with a "weak" response:

> The worst is a superlative, is the most suicidal, the most autoimmune, since in the name of purity it threatens to contaminate everything, in the name of life it threatens to kill everything…[55]
>
> The worst consists in appropriating what is other, making the two identical, or it consists in separating the two, making the one be the negation of the other.…The worst is the worst abuse of power. Although we are not able to make a response that is not violent, that is not evil even in a radical way, we are

> seeking a response that is the least violent, the least evil, the least powerful, a response that is weak.[56]

For Lawlor this “weak” response calls us to “ratchet down” “the property by which man separates himself from animals.”[57] In a practical sense, Lawlor’s argument for a “weak” response would “alleviate animal suffering by changing their conditions on farms, by changing their conditions in laboratories.”[58] A “weak” response also encourages less violence in the way we eat. This doesn’t necessarily mean adopting a strict vegetarian diet or imposing a meatless diet on others, but instead demands a more conscious way of eating. We become aware of the life that is lost in the support of our own. Lawler argues one way to do this is to give the animal a name; an animal with a unique name alters the relationship between the animal who is eaten and person who that eats the animal. He summarizes his weak response in this way:

> With this idea of the least violence, with this idea of a more sufficient response, what I am trying to do (and I think this is something that Derrida himself has done) is occupy a space between undecidability and prescription. I am trying to occupy a space between saying almost nothing…and saying too much (laws for the treatment of animals, laws of vegetarianism, for example). I do not know if this space in between exists. But what I have done is construct a kind of “recipe”—how can we eat *well,* that is, in the least evil way?—for the more sufficient response. The “recipe” is a bet on human psychology as it is viewed by common opinion. The central idea lies in the naming of the animals, which metaphorically “eats” them; naming each and every one of them (naming as we do a child who is coming) will engage our passions, will make us feel differently, and our passion will make us think differently and act differently; naming them, the hope is, will change the way we ‘literally’ treat and eat the animals.[59]

Both Derrida and Lawlor argue for unconventional human and animal interactions that avoid anthropocentrism. They seek to re-negotiate long established divisions between humans and animals. They argue that the animal should not be abused and discarded to satisfy the desires of humans. Derrida views “every other (one) as every bit other” and in the process expands our responsibility to the other beyond the human. In this view, the animal also participates in the status of the “absolute other.” At the same time, Derrida recognizes our limited ability to accommodate and assist the other: our focus on a particular other is at the expense of all others. Derrida’s philosophy simultaneously expands and contracts our perception of the other; the other extends beyond the human to “places, animals, languages” but is also an individuated other—a specific and unique other that we engage while ignoring the many others. Our interactions with the other are both generous and impoverished. Through his investigation of the animal other, Derrida proposes that human desires need not always be central. He challenges the assumption that human concerns be privileged above all other concerns. This rethinking of ethics argues for an alternative way of being human. The human is de-centered as human subjectivity becomes one of many subjectivities.

### 4.3 Aura & Abjection

Human subjectivity in transition echoes the chimera’s ambiguous status. As strange mixtures, chimeras present an opportunity to re-imagine animal subjectivity. Chimeras’ unfamiliar fusions suggest new “becomings.” They challenge our assumptions of purity and reveal the tenuous divisions of species. At the same time, chimeras can be ordinary symbols, everyday hybrids in a world of informational bodies and continual cultural and material exchange. Chimeras raised in global research labs can be thought of as one more example of the influence of multinational capital. The chimera is a material anomaly—an impure mixture—but also a material banality—an everyday emblem of the vast economic, cultural and technology processes of late capitalism. A chimera simultaneously subverts and supports the cultural and economic status quo. He transgresses biological boundaries but also conforms to the mechanisms of industry and commerce. He questions our concepts of life and defies our ontological expectations. But, he is also a commodity shaped by demands of powerful institutions that enlist the his corporeality to sustain and expand their global reach.

Fredric Jameson in his seminal writing on postmodernism argues that the formal investigations of postmodernism are closely aligned with the material demands of multinational, consumer-oriented capitalism. In Jameson's view, late capitalism is the driving force behind the technological innovations of the last half of the twentieth century. He concurs with Earnest Mandel's three-stages of capitalism—monopoly, imperial and postindustrial—and maps these stages to Mandel's three periods of mechanization—"steam-driven motors since 1848; machine production of electric and combustion motors since the 90s of the 19th century; machine production of electronic and nuclear-powered apparatuses since the 40s of the 20th century."[60] Jameson views the contemporary period of late capitalism as an expansion of capitalism's reach:

> Mandel's intervention in the postindustrial debate involves the proposition that late or multinational or consumer capitalism, far from being inconsistent with Marx's great nineteenth-century analysis, constitutes, on the contrary, the purest form of capital yet to have emerged, a prodigious expansion of capital into hitherto uncommodified areas. This purer capitalism of our own time thus eliminates the enclaves of precaptialist organization it had hitherto tolerated and exploited in a tributary way. One is tempted to speak in this connection of a new and historically original penetration and colonization of Nature and the Unconscious…[61]

As an example of capital's "penetration and colonization of Nature," Jameson points to the Green Revolution—a mechanization of farming techniques that includes new configurations of farm equipment, irrigation, modified crops, and more effective pesticides and fertilizers. Writing fourteen years after Jameson, Eugene Thacker proposes new examples of capital's expansive agenda. Profit-maximizing labor can now be extracted not just from humans and machines but also from biological processes. Thacker notes that biotechnology relies on a "specific type of labor performed routinely by cells, proteins, and DNA…the 'naturally occurring' processes of biology at the molecular and genetic levels can be enframed in such a way so as to transform them into an instrument, a technology."[62]

Marx argues that the financial imperatives of capital create alienating, highly specialized work as well as economic exploitation. The easiest way to maximize return on investment is to drive down labor and raw-material costs and create hyper-efficient but highly structured work environments. Such methods often result in physically, socially and economically strained workers. Capital in a biotech age solicits new workers who are less likely to register discontent. Thacker argues that the work of biological processes create "unhuman production" and "labor power [that] is cellular, enzymatic and genetic." This is a labor force that operates at the foundational level of biological life. In this new work environment, Thacker asks: "if there is no human subject or wage, is there still exploitation and/or alienation?"

Thacker highlights two transgenic animals as emblems of biolabor: oncomouse and "mammalian bioreactors." The oncomouse is a genetically modified mouse designed to develop breast-cancer cells—a mouse born to test the efficacy of breast-cancer remedies. Mammalian bioreactors are genetically altered animals designed to supply bioproducts for human medial use. Thacker's specific example of a mammalian bioreactor is a transgenic goat whose milk produces a "blood-clotting protein" used by heart patients.

While Thacker's main concern is to introduce new labor practices that employ cellular and molecular processes, my primary interest is to foreground the effects of biotechnology on animal bodies. And here the effects of exploitation or alienation may be more severe than those generated by biolabor produced through low-level chemical reactions. In addressing labor issues, we are required to confront the question of animal subjectivity. Research labs experiment on millions of animals each year. Increasingly these animals are modified to incorporate genes from other animals and plants. These chimeras are optimized for lab experiments: some have genes removed to test the effect of the missing gene, others are modified to better mimic human biology, still others are modified to enable them to produce medical products. These experiments on animal bodies are designed to serve human interests.[63] The research supports *human* medical industries—better medicine, better diagnostics, better treatments for *humans*. The animal accommodates human priorities.

Donna Haraway argues for a different kind of morality in our interaction with animals. Haraway promotes research and breeding practices that encourage animals to "flourish." According to Haraway, practices that ignore the animal's development should be abandoned. This framework of "flourishing" might involve some animal labor and even at times exploitation, but the framework ultimately brings the animal from the margin to the center.

Haraway notes that biologist Marc Bekoff asks himself, "Does the research benefit the animals?" when he considers using animals in his research.  Haraway emphasizes the importance of Bekoff's question:

> In light of the history of the reduction of lab animals to machine tools and products for big pharma (the technoscientific pharmaceutical research-industrial complex), agribusiness, cosmetics, art performances, and much else, that

> question has particular force. *Not* asking that question seriously is, or ought to be, outside the pale of scientific practice.[64]

Yet asking this question raises new complexities. Haraway suggests that the "entangled assemblages" of human and nonhuman make ontological distinctions difficult; the question of who will benefit is not always clear. Helping the animal "flourish" may not necessarily lead to freeing animals from research labs or shifting to a vegan diet. Such moves could paradoxically lead to destruction of animal populations that are excluded from human-animal "assemblages."[65] But helping the animal flourish does require foregrounding animal concerns, keeping the animal front and center, and diminishing the instrumental use of animals. "Ways of living and dying matter."[66] In the rush to expand human knowledge the animal's life and death are never unimportant details. Haraway argues that animal suffering should be "minimal, necessary, and consequential."[67]

Haraway notes that deciding "which historically situated practices of multispecies living and dying should flourish" is a complex question without easy answers. The decisions we make affect humans and nonhumans in unexpected ways. Making these decisions requires acknowledging the consequences for all participants, even if all consequences are never "fully calculable." "Staying with the complexities does not mean not acting, not doing research, not engaging in some, indeed many, unequal instrumental relationships; it does mean learning to live and think in practical opening to shared pain and mortality and learning what that living and thinking teach."[68]

With Haraway's framework of "flourishing" in mind, we can return to the complexities of late capitalism's materiality. Like Haraway, Jameson emphasizes our encounter with complex issues should not result in retreat or inaction. Though socio-economic changes may be disorienting and at times overwhelming, Jameson argues for an engagement with the logic of late capitalism; we need to "regain a capacity to act and struggle" even as we “hold to the truth of postmodernism”—“the world space of multinational capital.” Jameson does not propose a return to a simpler time, a precapitalistic era, but instead looks for ways to transform the capital we have inherited.[69] This process requires a difficult, contradictory stance: in the same moment, we recognize late capitalism’s potential for good but also acknowledge its exploitative tendencies. Jameson describes this method of critique:

> In a well-known passage Marx powerfully urges us to do the impossible, namely, to think this development positively *and* negatively all at once; to achieve, in other words, a type of thinking that would be capable of grasping the demonstrably baleful features of capitalism along with its extraordinary and liberating dynamism simultaneously within a single thought, and without attenuating any of the force of either judgment. We are somehow to lift our minds to a point at which it is possible to understand that capitalism is at one and the same time the best thing that has ever happened to the human race, and the worst. The lapse from this austere dialectical imperative into the more comfortable stance of the taking of moral positions is inveterate and all too human: still, the urgency of the subject demands that we make at least some effort to think the cultural evolution of late capitalism dialectically, as catastrophe and progress all together.[70]

Such dialectical thinking may open new ways to consider the pop-culture chimera. The complexities of capital and chimeric subjectivity are examined in the 1989 sequel film, *The Fly II.* In the preceding 1986 film, *The Fly*, scientist Seth Brundle invents a teleporter—a technology that dematerializes flesh in one location and rematerializes it in another. While testing the teleporter on his own body, Brundle fails to notice a fly has entered his transport chamber. Both scientist and fly are transported to a second chamber and in the process their molecules become intermingled. As a result, Brundle slowly transforms into a human-fly hybrid.

*The Fly II* opens with the birth of Martin Brundle, the product of a union between Brundle and Veronica Quaife, a journalist who tracked the developments of Brundle's teleporter. Seth Brundle dies at the end of the first film, the result of a lab accident and mercy killing by Quaife. Quaife dies in childbirth at the beginning of the sequel, leaving her son to the care of Bartok Industries, the sponsor of Brundle's research.

Jameson would likely note the marked material difference between the two *Fly* films. The first film shot in Toronto exudes a dark, urban presence. Seth Brundle works alone in an abandoned warehouse, a mad genius following his own idiosyncratic vision. The second film, shot on the west coast of Canada, replaces an urban backdrop with bucolic scenery. The campus-like research center is protected by security guards and detached from the city. The center houses teams of scientists clad in lab coats who support the research ambitions of Bartok Industries, a multinational corporation.

The contrast between the two films extends beyond material environment. In the first film, Seth Brundle is both protagonist and villain; he starts as amiable scientist and ends as monstrous chimera. His villainy emerges in his denial or disregard of his human identity. In this complicated role, he becomes the central character around whom all other characters orbit. In the second film, Brundle's son, Martin, lacks his father's charisma. Often the villain, Anton Bartok, head of Bartok Industries and false father figure to Martin, proves the most compelling personality. Ultimately no character can compete with the film's bloody spectacle. Director Chris Walas, best known for his make-up–and–monster special effects, litters the screen with modified and mutilated bodies.

The protagonists in both films also differ in their acceptance of altered subjectivity. In the first film, Seth Brundle eventually embraces his transformation into insect-human hybrid; he abandons his human identity and accepts his alterity: "I'm an insect who dreamt as a man, but now the dream is over and the insect is awake.” In the film’s climax, Brundle solicits Quaife, now pregnant with their child, to merge with him in an untested fusion of fly-man-woman-son. The new mix may dilute the insect’s genetic influence but transgresses anew species, gender and familial boundaries. In the second film, Martin never fully accepts his hybrid status. Instead he seeks to rid his body of contaminating insect genes. His ambition is to reclaim human identity. If *Fly* explores corporeal transgression, *Fly II* affirms the cultural norm.

Despite privileging human identity, *Fly II* portrays the complications of human-nonhuman power relations. The treatment of lab animals is a subtheme of the film. Martin becomes a symbol of the nonhuman body exploited in research’s quest for knowledge and profit. Martin grows up in the research center’s sequestered space, essentially a prisoner of a long-term research project. His behavior and body are closely tracked, and he suffers daily medical treatments. Martin’s situation is echoed in the film’s portrayal of a lab dog. Martin befriends the dog when he stumbles upon him in a “specimen” sector of the research facility. This dog is later used to test teleporter equipment originally invented by Martin’s father. The test goes badly. The dog’s molecular structure is scrambled, and he emerges from the experiment a painfully deformed creature. Martin witnesses the dog’s mutilation and screams out in shock. Bartok assures Martin the dog was humanely put to sleep, but later Martin discovers that the dog is alive, isolated in a holding pen and monitored by researchers. Martin sneaks into the pen and ends the dog’s suffering by euthanizing him. The film’s closing sequence returns to the same holding pen that now houses a newly formed chimera. This time the imprisoned specimen is Bartok who has been mutated by a modified teleporter that intermingled the molecules of Bartok and Martin. Martin emerges from the interchange fully human. Bartok, like the dog, is horrifically deformed. In the film’s final shot, Bartok painfully crawls toward a bowl and attempts to lap up the container’s mushy contents. Researchers document Bartok's status, viewing his movements from the safety of an observation deck positioned high above Bartok's cage.

Beyond the motif of human abuse of the nonhuman other, the film also offers an opportunity to explore Jameson's idea of multinational capitalism as the best and worst thing to happen to humans *and* animals. Bartok's capitalistic view simultaneously exploits and protects the nonhuman other. At the beginning of the film, Bartok admonishes his researchers to treat Martin well: "Do not think of this child as a laboratory animal. I want you to take care of him as if he were my very own." Though the laboratory is part prison for Martin, it also provides continual protection and intellectual stimulation for him. Martin's chimeric genetic makeup causes him to rapidly age. Within five years, he advances from infant to adult. His intelligence is also exceptional; he quickly surpasses the expertise of his caretakers. A traditional home or school would be hard pressed to adapt to Martin's unconventional development. The lab supports this precocious child in a way that few other institutions could. Bartok eventually gives Martin free reign to explore his engineering talents. This freedom—a false freedom perhaps that keeps Martin tied to the research center—ultimately proves Bartok's undoing. Martin modifies his father's teleporter, creating the gene splicer that deforms Bartok in the film's climax.

Bartok is not only a mindful guardian, he also embraces Martin's unusual status. His market orientation allows him to see the potential of the chimera other. Martin, on the other hand, is horrified by his hybrid status. When his dormant insect genes are activated, and he transforms into a fly-human hybrid, he longs to return to his former human self. Bartok, however, is thrilled that that the metamorphosis is taking place:

> **Bartok**: Martin, you will soon be part of the most unique living creature on the face of the earth. There's nothing you or I or anyone can do to stop it.
>
> **Martin**: You want this happen?

> **Bartok**: Of course I want it to happen. You're the pattern, the prototype for a whole new age of biological exploration. With you as the model, the teleport as the tool, Bartok Industries will control the form and function of all life on earth.

After his transformation, Martin begins a killing spree, murdering his caretakers and security personnel. Even as the chimeric Martin threatens Bartok's safety, Bartok tells his guards not to kill Martin. Bartok's profit motive helps him see the monster's subjectivity when all others see Martin as a mutated insect who must destroyed. For Bartok, Martin's transformation is not a catastrophe but rather the realization of a dream.

Bartok is a symbolic manifestation of capitalism's paradox. Capitalism's greed leaves it open to the transgressive other. Its desire for new markets welcomes the impurity of fusion. Its drive to power is so consuming that it renders hierarchies unstable. And sometimes, once in a while, its energy folds in on itself, destroying or re-making the status quo into something new.

Beyond the world of film and fiction, Jameson's dialectic insight can be brought to the material and social conditions of real-world research labs. Many labs exercise particular care over the animals that support their research objectives. Maintaining the animal's health ensures the research project produces reliable data and successful trials. At the same time, many projects employ abusive practices—animals are caged, genetically modified, and mutilated, and many die during the research process. The lab oscillates between a safe haven that looks after the animal's wellbeing and a brutal, abusive space that seeks knowledge through the suffering of animals. The ambiguity of animal research is perhaps best illustrated by a genre of research that explores animal behavior and cognition and often argues that animals exhibit an active intellectual, social and emotional life. This type of project documents dogs who are jealous, apes who have a sense of justice, and pigeons who acquire aesthetic taste. Such research grants a form of subjectivity to the animal long denied him. Animals become moral, socially conscious, and capable of complex emotions and judgment. At the same time, the animals remain research objects. Though researchers acknowledge a level of animal subjectivity, the animals are captives of the research environment; they cannot end their participation in the research process. And the research is frequently framed by anthropocentric motivations. We study these animals to learn more about ourselves. Researchers justify these projects as ways to understand *human* evolution or cognitive processes. The framing of the research in this way both elevates and degrades the animal. The research implies that animals may be unexpectedly like us, but they nonetheless remain inferior subjects who are most useful when they help us reflect on our development.

Jameson's dialectic could also be applied to the biolabor described by Thacker. Labor performed at the metabolic level could be a new form of effortless and efficient production that generates abundance. It could also be involuntary and perpetual labor, a type of labor that can only be quit when biological life ends. Biolabor solves and exacerbates the problem of alienation. It promises highly integrated and intimate work processes but carries labor beyond the conscious efforts of body-mind into the body's cellular functions. Capital's reach expands to encompass molecular activity; it embeds itself in the building blocks of life.

These practices of research and biolabor combine in the transgenic animal. When animals incorporate human genes, the barriers between human and nonhuman are less certain. When the milk of a transgenic goat produces a medicine, the division between labor and life is less distinct. The chimera represents the collapse of these biological and cultural barriers. Its arrival destabilizes our ontological traditions. He challenges anthropocentric views but also extends the reach of biopower and capital. He argues for increased animal subjectivity but also demonstrates the subhuman status of research animals forced to participate in risky and often painful laboratory procedures. This is the ambivalent chimera; a new kind of animal that challenges human supremacy but also submits to human abuse. The best kind of chimera promotes human and nonhuman "assemblages" that cooperate and "flourish" in unfamiliar ways. The worst kind of chimera symbolizes the exploitative traits of late capitalism and socio-political power. The ambivalent chimera oscillates between these extreme visions—he simultaneously represents liberation and subjugation.

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[1] Marita Sturken and Lisa Carwright*, Practices of Looking: An Introduction to Visual Culture* (New York: Oxford University Press, 2001), 69.

[2] Eduardo Kac and Avital Ronnel, *Life Extreme: An Illustrated Guide to New Life* (Barcelona, Spain: Policrom, 2007), 114-5.

[3] Donald E. Mosier, Richard J. Gulizia, Stephen M . Baird and Darcy B. Wilson, "Transfer of a functional human immune system to mice with severed combined immunodeficiency", *Nature* 335, September 15,1988, 256-259.

[4] Jonathan Burt gives a sense of the number of rats used in laboratories just in the U.K.:

> The numbers of rat used in science during the twentieth century has been countless. To take a small sample from a single country, in 1978, of the 5.2 million animals experimented on in Britain, over 4 million were rats and mice. In 1993 it was noted that animal experiments ran at some 3.5 million procedures a year with rodents the most commonly used. In 2002 the number of animals used for the first time in procedures was 2.66 million, with rat making up 19 per cent and mice 63 per cent.

Jonathan Burt, *Rat* (London, UK: Reakton Books, 2006), 113.

[5] Norbert Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine* (New York: The Technology Press, John Wiley & Sons, 1947), 19, emphasis my own.

[6] Weiner, 36.

[7] Reinhard Renneberg, *Biotechnology for Beginners* (Burlington, MA: Academic Press, 2008), 300-9, 323, 324.

[8] Eugene Thacker, "Open Source DNA and Bioinformatic Bodies" in Eduardo Kac, ed., *Signs of Life* (Cambridge, MA: MIT Press, 2007) 33.

[9] N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics* (Chicago, IL: The University of Chicago Press, 1999) 229.

[10] Hayles, 241.

[11] Hayles continues:

> In the computational universe, the essential function for both intelligent machines and humans is processing information. Indeed, the essential function of the universe as a whole is processing information.

Hayles, 239.

[12] Hayles, 12-3.

[13] Hayles, 12-3.

[14] Hayles, 25.

[15] Eugene Thacker, *The Global Genome: Biotechnology, Politics, and Culture* (Cambridge, MA: MIT Press, 2005), xvii.

[16] Thacker notes:

> The very concept of biotechnology is thus fraught with internal tensions. On the one hand, the product and techniques of biotech are more "tech" than "bio"; biology is harnessed from its "natural" state and utilized in a range of industrial and medical applications. On the other hand, there is no "tech", only "bio"; the unique character of the technology is that it is fully biological, composed of the working of genes, proteins, cells, and tissues. On the one hand, biotechnology appears not to be technology at all, but only "life itself" rearranged or recontextualized, but nevertheless performing the same function it always has. On the other hand, biotechnology appears to be the new nature, the promise of a healthy and optimized body without cyborglike accountrements of artificial organs, pacemakers, prosthetics, or invasive surgery. The advantage claimed for biotechnology is that it is more natural, a direct working with "life itself." In its ideal guise, biotechnology promises to bypass technology altogether, a biology working upon itself.

Thacker, *Global Genome*, xix.

[17] Tom Mueller, "Recipe for a Resurrection," *National Geographic*, May 2009, 52-55.

[18] Rick Weiss, "Synthetic DNA on the Brink of Yielding New Life Forms," *Washington Post*, December 17, 2007 (http://www.washingtonpost.com/wp-dyn/content/article/2007/12/16/AR2007121601900.html).

[19] Emily Singer, "Synthesizing a Genome from Scratch," *Technology Review*, January 25, 2008 (http://www.technologyreview.com/biomedicine/20112/).

[20] Coco Ballantyne, "Longest Piece of Synthetic DNA Yet," *Scientific American*, January 24, 2008 (http://www.scientificamerican.com/article.cfm?id=longest-piece-of-dna-yet).

[21] Weiss, http://www.washingtonpost.com/wp-dyn/content/article/2007/12/16/AR2007121601900.html.

[22] Michel Foucault, *Discipline and Punish: The Birth of the Prison,* trans. Alan Sheridan (New York: Vantage Books, 1995), 139-160, 244.

[23] Foucault, *Discipline and Punish,* 182, 191.

[24] Foucault, *Discipline and Punish,* 304.

[25] Foucault, *Discipline and Punish,* 213.

[26] Foucault, *Discipline and Punish,*195-7.

[27] Foucault note an array of institutions combine to ensure behavioral norms—the school, judiciary, military, prison, factory and hospital invent new roles and disciplinary mechanisms:

> …the judges of normality are present everywhere. We are in the society of the teacher-judge, the doctor-judge, the educator-judge, the 'social-worker'-judge; it is on them that the universal reign of the normative is based; and all individuals, wherever he may find himself, subjects to it his body, his gestures, his behavior, his aptitudes, his achievements.

*Discipline and Punish*, 304.

[28] Michel Foucault, *History of Sexuality: An Introduction. Volume I,* trans. Robert Hurley (New York: Random House, 1978), 136.

[29] Foucault, *History of Sexuality*, 136.

[30] Foucault, *History of Sexuality*, 142-5.

[31] Foucault, *History of Sexuality*, 159.

[32] Nicholas Wade, "A Gene for Romance? So It Seems (Ask the Vole)," *The New York Times: Science Times*, July 19, 2005, D1, D6.

[33] N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics* (Chicago, IL: The University of Chicago Press, 1999), 194.

[34] Hayles, 195.

[35] Joe Palca, *On Science, National Public Radio*, podcast, November, 26, 2008.

[36] H. G. Wells, *The Island of Dr. Moreau* (New York: Bantam Dell, 2005, first published 1896), 99.

[37] Alan Lightman, "Introduction," in H.G. Wells, *The Island of Dr. Moreau*, ix.

[38] Wells, 131.

[39] Wells, 138.

[40] Paola Antonelli, ed., *Design and the Elastic Mind* (New York: The Museum of Modern Art, 2008), 112-113.

[41] Bill Moggridge, *Designing Interactions* (Cambridge, MA: MIT Press, 2007, March 2003 interview documented in the book's companion DVD).

[42] Moggridge, Anthony Dunne in a videotaped interview, March 2003, in book's companion DVD.

[43] Derrida notes the prevalence of anthropocentrism in philosophy:

> All of the philosophers we will investigate (from Aristotle to Lacan, and including Descartes, Kant, Heidegger, and Levinas), all of them say the same thing: the animal is deprived of language. Or, more precisely, of response, of a response that could be precisely and rigorously distinguished from a reaction; of the right and power to 'respond,' and hence so many other living things that would be proper to man.
>
> Men would be first and foremost those living creatures who have given themselves the world that enables them to speak of the animal with a single voice and to designate it as the single being that remains without a response, without a word which to respond.
>
> That wrong was committed long ago and with long-term consequence…

Jacques Derrida, *The Animal That Therefore I Am,* trans. David Wills (New York: Fordham University Press, 2008), 32.

[44] Susan Neiman writes about the sacrifice of Isaac:

> As Kierkegaard taught us, the Abraham who takes his son to Mount Moriah has left ethics and enlightenment behind. Kant's comment on that passage was no less unequivocal: Abraham should have reflected, and concluded that anyone who asked him to do *that* could not be God.

Susan Neiman, *Moral Clarity: A Guide for Grown-up Idealists* (New York: Harcourt, 2008), 10.

[45] Jacques Derrida, *The Gift of Death*, trans. David Willis (Chicago, IL: University of Chicago Press, 1995), 66.

[46] Derrida describes the connection and tension of morality's universalism and specificity:

> The story is no doubt monstrous, outrageous, barely conceivable: a father is ready to put to death his beloved son, his irreplaceable loved one, and that because the Other, the great Other asks him or orders him without giving the slightest explanation. An infanticide father who hides what he is going to do for his son and from his family without knowing why, what could be more abominable, what mystery could be more frightful vis-à-vis love, humanity, the family, or morality?
>
> But isn't this also the most common thing? what the most cursory examination of the concept of responsibility cannot fail to affirm? Duty or responsibility binds me to the other, and ties me in my absolute singularity to the other as other. God is the name of the absolute other as other and as unique (the God of Abraham defined as the one and unique). As soon as I enter into a relation with the absolute other, my absolute singularity enters into relation with his on the level of obligation and duty. I am responsible to the other as other, I answer to him and I answer for what I do before him.

*The Gift of Death,* 67-8.

[47] Derrida, *The Gift of Death*, 68.

[48] Derrida, *The Gift of Death*, 71.

[49] Derrida, *The Gift of Death*, 78.

[50] Derrida, *The Gift of Death*, 69.

[51] Derrida, *The Animal That Therefore I Am,* 27.

[52] Derrida, *The Animal That Therefore I Am.* 28.

[53] Derrida argues that we try to conceal the violence that is done to animals:

> …men do all they can in order to dissimulate this cruelty or to hid it from themselves; in order to organize on a global scale the forgetting or misunderstanding of this violence, which some would compare to the worst cases of genocide…

*The Animal That Therefore I Am*, 26.

[54] Derrida, *The Animal That Therefore I Am,* 92.

[55] Leonard Lawlor, *This is Not Sufficient: An Essay on Animality and Human Nature in Derrida* (New York: Columbia Press, 2007), 21-22.

[56] Lawlor, 71-2.

[57] Lawlor, 24-6

[58] Lawlor, 2.

[59] Lawlor, 108.

[60] Frederic Jameson, *Postmodernism, or, The Cultural Logic of Late Capitalism* (Durham, NC: Duke University Press) 35, quoting Ernest Mandel, *Late Capitalism*, (London: 1978), 188.

[61] Jameson, 36.

[62] Eugene Thacker, "Biomaterial labor and 'Life Itself,'" in catalog for *Touch Me Festival—OutInOpen,* Tomisalv Medak and Petar Milat, eds., 2005.

[63] Derrida writes of the lopsided relationship between human and nonhuman. In our contemporary era, he sees the exploitation of animals extending beyond the the precedents of animal sacrifice—the "hunting, fishing, domestication, training, or traditional exploitation of animal energy":

> It is all too evident that in the course of the last two centuries these traditional forms of treatment of the animal have been turned upside down by the joint developments of zoological, ethological, biological, and genetic forms of *knowledge,* which remain inseparable from *techniques* of intervention *into* their object, from the transformation of the actual object, and from the milieu and world of their object, namely, the living animal. This has occurred by means of farming and regimentalization at a demographic level unknown in the past, by means of genetic experimentation, the industrialization of what can be called the production for consumption of animal meat, artificial insemination on a massive scale, more and more audacious manipulations of the genome, the reduction of the animal not only to production and overactive reproduction (hormones, genetic crossbreeding, cloning, etc) of meat for consumption, but also of all sorts of other end products, and all of that in the service of certain being and the putative human well-being of man.

*The Animal That Therefore I Am*, 25.

[64] Donna J. Haraway, *When Species Meet* (Minneapolis, MN: University of Minnesota Press, 2008), 86.

[65] Haraway writes:

> Try as we might to distance ourselves, there is no way of living that is not also a way of someone, not just something, else dying differentially. Vegans come as close as anyone, and their work to avoid eating or wearing any animal products would consign most domestic animals to the status of curated heritage collection or to just plain extermination as kind and as individuals." [80]

[66] Haraway, 88.

[67] Haraway, 82.

[68] Haraway, 83.

[69] Jameson, 54.

[70] Jameson, 47.

# CHAPTER 5

# SHAPESHIFTER

When Darwin published his theory of evolution in the *Origin of Species*, one of the most controversial aspects of the text was the common ancestry of all animal life. Darwin made the human connection to the animal explicit and threatened the longstanding division between human and nonhuman. The animal became our ancestor instead of merely our subordinate. The human, no longer formed in God's image, became just another byproduct of the interactions of biology and environment. Essential human identity yielded to mercurial possibility. After Darwin, we became shapeshifters, the contingent result of millions of years of biological adaptation and mutation. We emerge from the vast expanse of microbial life and remain in flux, moving from what we once were into what we may become. The latest theories of evolution suggest species are far more mutable than Darwin ever imagined. Within a few generations significant changes can occur.[1] Humans and animals become capable of metamorphosis.

The cultural shapeshifter represents an even greater degree of plasticity than evolution's multigenerational variation. In the myths of vampires and werewolves, humans suddenly transform into the animal other and express repressed violence and sexuality. Shapeshifting also occurs in less spectacular ways—scientists, theorists and artists explore alterity when they attempt to understand the world from another perspective. These shape shifters hope to bridge the gap between animals and humans. Empathic scientific studies of animals embrace new phenomenological possibilities; they welcome unfamiliar behavior, perceptions and culture. Shapeshifter biologists hope to inhabit the world of the animal other. Yet this metamorphosis is often filtered by anthropocentric phenomenology and epistemology; our understanding of the other is shaped by our corporeal and cultural bias. Our attempts at shapeshifting reveal the difficulty of truly understanding the other; we guess and project as we encounter the complexities of human and animal interaction and frequently human-nonhuman divisions remain in place.

Despite these anthropocentric limitations, the shapeshifter proposes new “becomings” and alternative subjectivities. Issues of identity arise when the shapeshifter appears. Human identity based on an exclusion of the animal other is often challenged by the shapeshifter’s denial of essential human behavior or traits. Each metamorphosis questions the centrality and stability of human culture and perspective. At the same time, these moments of transformation create unexpected restraints. New hierarchies can easily replace old; new alienations emerge in satiated desires. The shapeshifter tries on new skins and forms new alliances, but his experimentation may turn to abjection. Shapeshifters find themselves caught between human and animal cultures, unable to integrate into either community. This is the shapeshifter’s ambivalent role: she is both liberated and ensnared. She transcends the boundaries of human subjectivity but also encounters and creates new divisions within and between the human and nonhuman.

## 5.1 Irreducibility & Procedurality

A variety of media and art projects are inspired by the animal’s phenomenology. There are costumed performances, Crittercams, video games from an animal’s perspective, and wearables that re-create animal perceptions. Each artifact attempts to bring us closer to the animal other. Yet they also cut us off from the complexity of alterity. These works hint at alternative worlds but also make apparent the difficulty of understanding *any* “other,” human or animal. We may see the animal in new ways after experiencing a project or performance, but our attempts at mediated animality also create a false sense of understanding. We can never truly inhabit the body or perspective of another animal. We simply map a procedural view of the animal onto the conventions of human perception. And our rudimentary efforts at animality often ignore the animal's unique perceptions and inaccessible knowledge. As a result we omit important differences between humans and animals, erasing key variations within and between animal species. Sometimes these projects unexpectedly create new methods of corporeal regulation. They use alterity to elicit normative behavior. These mediated transformations oscillate between liberation and regulation, new awareness and false epistemological confidence. They simultaneously expand and restrict our understanding of the animal other.

### 5.1.1 Multiple Worlds

Altering our phenomenology can provide a moment of liberation; a chance to transcend familiar habits. The work of German artist Rebecca Horn explores this kind of alterity. In the 1970s, Horn began a series of projects that combined elements of costume design, performance and installation. One of her most famous pieces, *Unicorn,* attaches a large horn-like structure to a woman's head using straps of fabric that surround the body. As the wearer moves, the secondary motion of the horn pulls on the fastening straps and provides sensual stimulation as well as modifies the wearer's gait. Horn filmed a friend wearing only the unicorn costume walking around the countryside; stills from the film document the otherworldly yet elegant sensibility of her friend's performance.[2] In another piece titled *Feather Fingers*, Horn attached feathers to the fingers of her hand using metal rings. The feathers turned the hand into a wing-like extension. As Horn touched the unfeathered hand and arm with her feathered hand, the sensation of soft feathers on skin transformed the winged hand into an unfamiliar appendage.[3] Horn describes her altered phenomenology: "it is as if one hand suddenly became disconnected from the other, as if they were two beings without anything in common."[4] In these and other works, Horns asks the wearer and viewer to embrace new forms of embodiment; unfamiliar ways of seeing, moving and touching.

In the realm of popular culture, altered embodiment is explored in Hip Games' *Dog's Life.* This video game follows the well-known formula of an adventure quest but instead of a human protagonist, the central avatar is a dog named Jake. Jake collects items, solves puzzles, and competes against virtual characters while trying to free a canine companion dognapped by the game's villains. Animal avatars and quest games are not particularly unusual, but *Dog's Life* explores new terrain in the way it represents Jake's point of view. Players can switch between two camera modes—first person and third person. The third person view displays the virtual landscape from a camera angle just above Jake's body, providing an over-the-shoulder shot common to many games. The first person view, however, presents a different perspective. The camera angle is much closer to the ground, aligned with Jake's eye line. The field of view is also diminished; our visual range is cropped in comparison to the wider view of third-person perspective. The colors are less saturated, mimicking the reduced color spectrum of canines. Perhaps most intriguing, Jake's olfactory sensitivity is represented through "smellovision." The scents of humans, animals and bones rise from the ground as brightly colored undulating waves. "Smellovision" also permits Jake to "sniff out" lingering footprints of human activity. Perceiving the world through Jake's nose is critical to completing Jake's adventure. Alterity becomes a key component of game play.

Biologist Jakob von Uexkull's research is a precursor to the creative experiments of Horn and Hip Games. Uexkull explored the intersecting yet disconnected worlds of humans and nonhumans. Philosopher Giorgio Agamben describes Uexkull's approach as follows:

> Where classical science saw a single world that comprised within it all living species hierarchically ordered from the most elementary forms up to the higher organisms,

> Uexkull instead supposes an infinite variety of perceptual worlds that, though they are uncommunicating and reciprocally exclusive, are all equally perfect and linked together as if in a gigantic musical score…[5]

When multiple worlds overlap, the same space or same object engenders different associations. We metaphorically swim within a particular current, unaware of the streams of perceptions that surround us. Agamben continues: “Even a minimal detail—for example, the stem of a wildflower—when considered as a carrier of significance, constitutes a different element each time it is in a different environment, depending on whether, for example, it is observed in the environment of a girl picking flowers for a bouquet to pin to her corset, in that of an ant for whom it is an ideal way to reach its nourishment in the flower’s calyx, in that of the larva of a cicada who pierces its medullary canal and uses it as a pump to construct the fluid parts of its elevated cocoon, or finally in that of the cow who simply chews and swallows it as food.”[6]

Uexkull’s multi-world perspective challenges anthropocentric interpretations of the world. Human perceptions become one of many perceptions. When we foreground phenomenological diversity, we are less certain of our epistemology and ontology. The animal other we thought we knew so well may suddenly become a stranger. And the static world that grounds us may appear more fluid than before.

### 5.1.2 False Sense of Understanding

With Uexkull’s interconnected yet “uncommunicating” worlds in mind, the weaknesses of mediated simulations of animal perception become evident. Smellovision may recognize the olfactory importance of canine experience, but it portrays this unique feature of canine phenomenology through the human’s dominant sensory apparatus of vision. We never truly inhabit a dog’s world; instead, we play at being dog-like by relying on familiar sensory stimulation and are bound by the conventions of video-game interface and equipment. Our experience of a dog's world is always filtered through human perceptions; we retain our privileged position while claiming to see the world anew. Smellovision hints at but ultimately avoids the frustrating and possibly frightening experience of zoocentric alterity.

A similar false sense of intimacy occurs with we claim to see an animal's world by attaching cameras to an animal's body. In the Cyborg chapter, I wrote about the popularity of Crittercam research. A variety of animals are enlisted in experiments that track animal activity by attaching a camera to an animal's upper body. The camera records the animal's perspective and relays this information to researchers in the field. Biologists are able to spy on the everyday details of animal activity; they see a new view of animal behavior in the wild.

Researchers highlight the insights they gain from these experiments. LaVern Beier who studies brown bears in Alaska, for example, is surprised to see, through the lens of a Crittercam, familial interactions between an adult bear and her mother; he had assumed familial ties dissolved as bears aged.[7] Yet Crittercam knowledge is frequently framed by human perceptions and the traditions of broadcast media. For many animals, sight, while important, is greatly enhanced by other sensory mechanisms. The case of a camera attached to a matriarch of an elephant herd illustrates the anthropocentric approach of researchers. An elephant's eyes are set on the side of her head; this arrangement provides a wide-angle view of the world. The camera, however, attached to the top of elephant's head, provides a single lens, limited-scope view of the elephant's perspective. The footage conforms to the traditions of broadcast media rather than risk a two-camera view that might give a better sense of an elephant's visual field.[8] Elephants are also known to have extremely sensitive feet. The fatty pads at the base of their feet as well as sensitive toe bones pick up tremors in the earth. An elephant's call triggers seismic vibrations in the earth that can be felt by other elephants several kilometers away.[9] This kind of pedal perception is unknown to humans and as a result remains an aspect of elephant perception that is lost in our emphasis on visual stimuli. Our mediated experiences are oriented to our own cultural traditions and phenomenological understanding. Because of this we likely miss much of embodied animal experience. Crittercam experiments simultaneously enhance and restrict our sense of the animal's world.

In virtual worlds, a similar kind of ontological arrogance prevails. Sherry Turkle documents the identity play of participants in virtual environments. Gender, age, race, ethnicity and sexuality can be easily modified when the body is no longer required to be present. Such shapeshifting is part of the pleasure of virtual communities. But these experiments in identity give some participants a false sense of understanding the other. The life experience of a digital avatar misses the complexities of lived, real-world otherness. Turkle comments:

> Many of the people I've interviewed claimed that virtual gender-swapping enabled them to understand what it's like to be a person of the other gender, and I have no doubt that this is true, at least in part. But as I listened to this boast, my mind often traveled to my own experiences of living in a woman's body. These include worry about physical vulnerability, fears of unwanted pregnancy and of infertility, fine-tuned decisions about how much make-up to wear to a job interview, and the difficulty of giving a professional seminar while doubled over with monthly cramps. To a certain extent, knowledge is inherently experiential, based on a physicality that we each experience differently.[10]

Shapeshifting through digital technologies may provide some sense of alterity, but as the above examples illustrate, our mediated experiences fail to capture the complex phenomenology of the other. The other remains beyond our reach.

### 5.1.3 Alterity as a New Form of Regulation

Some shapeshifting experiments are not only limited by anthropocentric mediation but also enable new forms of regulation. *Animal Superpowers*, a project created by Chris Woebken and Kenichi Okada, is primarily a whimsical exploration of altered phenomenology. But one piece in their project unexpectedly provides an opportunity to control unwanted behavior.

*Animal Superpowers* is a collection of wearables designed for children. The wearables allow children to experience life from an ant's, bird's or giraffe's view. The ant wearable is best experienced by crawling on the ground. Two cameras attached to the hands send images to a display worn on a child's head. As the child moves around on all fours, he sees the world from an ant's perspective: a low camera angle, close to the ground. The video image is also significantly scaled up, making even small objects appear very large. Blades of grass become arboreal. The giraffe view adds height by mounting a periscope extension to the top of a child's head. The diminutive wearer can now see eye-to-eye with adults. Her voice is also modified, lowered in pitch to match an adult's voice. And the bird wearable consists of headband that vibrates when a child points her body in a particular direction. It becomes a haptic compass, providing feedback to orient her to a particular path. The device mimics a bird's ability to navigate by geomagnetic fields; with the headband a child can find her way home using GPS technology and haptic feedback.[11] These wearable devices are all inspired by animal perceptions. When worn by humans, they suggest alternative ways of understanding the world. The creators hope to create empathy for an animal's behavioral and perceptual experience.

At the same time, the expansive promise of this project paradoxically creates new restrictions. Woebken and Okada's ant wearable not only provides a new intimacy with the details of the ground beneath us, but also regulates our movement. The head-mounted device increases the scale of visual input to such a degree that imagery blurs and nausea occurs if the wearer moves her body too quickly. To avoid this discomfort, the wearer resorts to slow, micro-movements. The creators note: “Even a hyperactive kid moves very slow because the new 50x scale makes you feel sick if you would move at normal speed.” [12] The creators’ comment suggests an alternative use for the wearable. A device designed to enlarge sensory perception could easily be re-purposed to discipline unruly children. A playful experiment is modified to serve disciplinary needs.

Whether video game, Crittercam, virtual world or wearable, mediated shapeshifting creates ambivalent results. Our efforts to inhabit an animal’s world provide new insights and misconceptions, new freedoms and regulations, new intimacies and detachments. When we take on animal attributes, we may better understand an animal’s perceptions and behavior but also fail to grasp the complexities of animal embodiment and cognition. Our attempts to imagine the other’s point of view may also reveal the impossibility of fully understanding *any* other’s perspective. We can observe and examine but ultimately our insights are clouded by our speculations and projections and our particular embodied and situated knowledge. This doesn’t mean the attempt to transform into the animal other is a wasted effort. It does suggest, though, that gaps remain in our knowledge; a meager understanding of the animal other quickly grows into epistemological arrogance. We know simply what we know; we merely guess at what the other knows.

### 5.2 Autonomy & Integration

Unfamiliar animal perspectives simulated by art and media projects have the potential to simultaneously elevate and degrade the animal. We’re suddenly aware of the animal’s unique capabilities—his extra-human sensory perceptions—but the animal’s exceptional abilities surprisingly validate the human’s sense of superiority. This double logic sees the animal as physically and sometimes morally superior but linguistically, cognitively and socially inferior. This paradoxical stance places the animal as above and below the human. Animal violence is measured while human violence is excessive. Animals are sensitive to their environment while humans disrupt and destroy their surroundings. The animal is incapable of pretense while the human is full of deceit. Yet these superior animal qualities become evidence of animal weakness, and human flaws become indicators of remarkable intelligence and adaptability. The human's unscrupulous nature allows him to shape and control; the animal's innocence requires him to react and submit.

### 5.2.1 The Animals' New Status

This assumption of human superiority is challenged in the work of ethologists Jane Goodall, Diane Fossey and Birute Galdikas. The work of these three biologists altered the approach of field researchers studying wild animals. They brought a new level of perseverance and empathy to their work; spending years observing, documenting and adapting to the communities and cultures of chimpanzees, gorillas and orangutans. Their pioneering work was motivated by a belief that apes were worthy of careful examination and also respect. Through their work they became shapeshifters: living between human and ape cultures; learning from and sometimes adopting ape-like behavior; and developing unconventional intimacies between humans and wild animals.

Before Goodall, Fossey and Galdikas, our understanding of apes was quite limited. Most studies were short-term and many researchers were unable to make close contact with wild primates—the apes simply avoided their human observers.[13] Sy Montgomery argues that the three biologists succeeded where others failed in part because of their gender. Male researchers thought of themselves as adventurers; they made quick discoveries and then sought new research terrain. Galdikas described the male naturalist's approach as: "You conquer, and move onto the next conquest." These female biologists, however, stayed in the field for years, carefully observing the wild apes.[14] Montgomery argues that Goodall, Fossey and Galdikas' approach was to be open to their experience in the field—rather than collect data to validate an existing theory, they entered the field with few preconceptions. Researchers who focused on proving a particular theory frequently missed insights that fell outside their overarching framework. Montgomery, writing about Goodall, argues that her method engaged with the complexities of animal behavior:

> Hers was the approach that women typically take in configuring the world: emphasizing relationships rather than rules, individuals rather than generalities, receptivity rather than control.[15]

Whether we agree or disagree with Montgomery's generalities about gender, the work of the three researchers seems to reject the conventions of mid-century ethology. Montgomery argues that Goodall and Fossey's qualitative approach ran counter to the quantitative methods being promoted in ethology during the early 1960s. The field sought to prove its scientific merit by foregrounding the "theoretical, impersonal, experimental, and statistical."[16] These "objective" methods were rejected by Goodall who emphasized context and narrative in her accounts of chimpanzee behavior. Fossey too preferred words and story to quantifiable data; she avoided checklists of animal behavior or stopwatch-timed data samples of gorilla activity.[17] Both biologists wrote accounts of group dynamics and particular chimpanzee behavior. They focused on the specificity and difference of individual apes.[18]

Beyond issues of methodology and gender, most accounts of Goodall's success emphasize the importance of perseverance. In what is now an almost mythic ethological tale, Goodall's extreme patience is illustrated by an account of young Jane's interest in egg-laying chickens. As a child, Goodall waited in the corner of a chicken coop until a hen braved her presence and deposited an egg. Goodall's early experiment in ethology required her to quietly crouch in the coop for five hours—a remarkably long time for a young child to wait in order to satisfy her curiosity.[19] This kind of patience served her well in her primate research. At first, she found the chimpanzees avoided human contact. Pursuing the animals only made them nervous. Eventually Jane found a lookout station, a hilltop where she was clearly visible to the animals, and she waited for them to come to her.[20] Montgomery describes her research mantra as: "I am here. I am harmless. I wait. To you [the chimpanzee]…I give the choice: to flee or approach or ignore."[21]

Waiting for the chimpanzees rather than chasing them proved to be an effective strategy. The chimps soon realized that Goodall posed no threat and would pass by her lookout station as they foraged for food. After some time Goodall was able to follow the chimpanzees without frightening them. And eventually she could interact with the apes, touching and grooming them like a member of their tribe.[22]

Goodall's approach yielded new insights. Aspects of ape culture are now common knowledge, but before Goodall's work, there were many misconceptions about chimpanzees. The ape was thought be vegetarian, but Goodall soon witnessed them hunting other animals and eating their prey.[23] Chimp colonies were thought to be peaceful communities, but Goodall witnessed territorial tribal warfare. Goodall also observed infanticide and cannibalism among chimpanzees.[24] And one of her earliest observations—an ape selecting a twig, stripping it of leaves and using the long thin instrument to fish termites out of their mound—disproved the idea that humans were the only creatures who created and used tools.[25] The chimpanzee emerged as a much more complex animal than previously thought.

Goodall's general approach was repeated in the work of Fossey and Galdikas. All three women persevered through long-term research projects in difficult living situations. And each sought in different ways to approach the animal on the animal's terms. Fossey's openness to the animal other manifests itself in her imitations of gorilla behavior. She greeted a troupe of gorillas by grunting and “knuckle walking”; attempting to communicate through posture and sound her non-aggressive intentions. She also sang with gorillas and groomed them, mimicking their communal activities.[26] Galdikas found her life enmeshed in the lives of orangutans when she became stepmother to orphaned orangutans. After giving birth to a son, her child was raised alongside the infant orangutans. When Galdikas’ marriage fell apart, her son returned with his father to Canada in part because he was beginning to exhibit orangutan behavior learned from his substitute siblings.[27] And Goodall’s parenting skills were influenced by the mothering techniques of a chimpanzee named Flo. Flo was a particularly affectionate and attentive mother who raised her offspring using positive reinforcement. After the birth of her son Hugo, Goodall pulled back from her research efforts in order to spend more time with her son. Goodall credits Flo’s example of motherly devotion as the reason for her decision to re-focus her energy.[28] Each biologist’s perspective was altered by her encounter with ape communities.

The legacy of these researchers’ approach is seen in the work of contemporary primatologists. A recent *Nature* program documenting mountain gorillas provides a striking image of a young researcher, Veronica Vecellio, accommodating the cultural habits of a gorilla tribe. Vecellio is filmed glancing downward, avoiding direct eye contact with a dominant male gorilla. Her head bobs back and forth as she steals glances at the giant ape without looking him in the eye. To look directly at the ape could be perceived as an aggressive gesture. Vecellio enhances her non-threatening posture with gentle grunts—a form of vocalization used by gorillas to indicate deference. Vecellio submits to gorilla hierarchies through gesture, posture and vocalization.[29] The silverback tolerates her presence as long as she acknowledges his status. These human-animal interactions indicate new respect for animal culture. The human acquiesces to the social expectations of the troupe.

### 5.2.2 Complications of Anthropomorphism

Despite new ways of framing animal research, a strong anthropocentric streak remains in much of ethology. We tend to study animals to understand ourselves. Even the empathetic work of Goodall, Fossey and Galdikas was at first motivated by an interest in human evolution. Paleoanthropologist Louis Leakey managed the early primate studies conducted by the three biologists. Leakey speculated that humans originated in Africa and spent many years looking for fossils to back up his theory. But unearthing a fossil record of human ancestors was only part of Leakey's vision. He was also interested in early forms of human culture. It was Leakey's idea to set up long-term primate studies to uncover the roots of human behavior. He described the critical questions of his career as: "Who am I? What was it that made me what I am?"[30] These anthropocentric questions often drive primate research.

Primatologist Frans De Waal's book *Our Inner Ape* illustrates the close ties of primatology and anthropology. His book blends anthropocentric and zoocentric perspectives. With chapter titles the include "Power", "Sex", "Violence", and "Kindness," De Waal surveys the complexities of ape behavior while also commenting on U.S. economics, politics and culture. De Waal moves easily from ape culture to American culture, using ape relations as way to explain human behavior. He sees the human practice of scapegoating in the behavior of chimpanzees living in a zoo who shout at nearby lions and leopards as a way to release tribal tension. De Waal relates this primate behavior to the invasion of Iraq after the 9/11 attacks—the war becomes an outward act of violence designed to diminish domestic anger.[31] De Waal discusses outrage over CEO compensation packages as a way to transition into an account of his research into chimpanzees' sense of fairness.[32] In another example, De Waal compares the strict hierarchies of ape tribes to the human obsession with hierarchy. He refers to research that suggests humans adjust their vocal frequencies to match the timbre of the highest-status person participating in a conversation. Both humans and apes take social status very seriously.[33]

Making comparisons between human and ape culture—mapping the behavior of one species onto another—can be beneficial. Anthropomorphism draws us closer to the animal other. Most forms of relating require varying degrees of projection and identification. Our most empathic responses are often framed by the question: “How would I feel if I was in his/her situation?” We invariably filter our sense of the other’s perception through our own subjective experience. And we label and categorize the other’s experience using language familiar to us. Without anthropomorphism we might find ourselves unable to relate to the animal other.

At the same time, viewing the other as no different than ourselves, may blind us to the other’s distinction. De Waal, despite his conflation of human and ape behavior, recognizes the differences between animal and human culture. Throughout his text there are moments that reveal the complications of cross-species comparisons. When he writes about bonobos, De Waal argues that anthropomorphic assumptions cause humans to misread the apes. Bonobos sexuality includes frequent heterosexual, homosexual and intergenerational sexual relations.[34] Because bonobo sexual practice deviates from our cultural expectations, De Waal notes that it’s difficult for us not to label these sexual acts as “promiscuous” or “hedonic.” Yet such labels reflect human bias and miss the advantages of bonobo sexuality: “Bonobos do what they do because it provides optimal survival and reproduction in the environment in which they live.”[35] The bonobos sexuality reduces tribal tension and makes male parentage of newborn bonobos less certain. As a result, a male bonobo is less likely to attack an infant who may be his offspring. Applying our own cultural norms to bonobo communities ignores the social and biological advantages of a different kind of sexuality.

De Waal's account of bonobo sexuality illustrates anthropomorphism's limitations. Though anthropomorphism may draw us near to the animal, it also erases the very real differences between and within primate species. And frequently when human values frame the animal's behavior, the animal becomes a minor to our major. Human behavior remains the standard and animal behavior falls short of that standard. From this perspective the animal is like us but always below us; he remains a degraded copy of ourselves. Anthropomorphism's benefit and bias can be seen in Goodall's unconventional practice of naming the chimpanzees at Gombe. When Goodall began her work, animals were generally numbered in the research reports of ethologists.[36] Goodall decided to name rather than number the chimps to emphasize each animal's individuality; a name provides the animal with a presence that a number denies him. Yet the names Goodall bestowed on her chimpanzees—names like Flo, Frodo, Freud, Fifi, Mr. McGregor[37]—reflect a particular cultural perspective. These are Western European names that hold specific historical, literary and personal associations for Goodall. The names are without meaning for the animals. In the garden of Eden, God brings the animals to Adam so that he can name them. The act of naming validates Adam's special status and ensures his dominion over the animals. Goodall unexpectedly continues this tradition. The human names, categorizes, and differentiates; the animal is required to accept the human labels. In this process, the animal is incorporated into human culture and falls under human control.

The anthropocentric tendencies of ethology extend beyond the practice of human-imposed names. Many animal research projects, particularly primate projects, are used to reflect on the origins of man. When animal behavior is studied to understand human evolution, we implicitly suggest the animal is less evolved. The human becomes evolution's teleological aim; the animal is left behind in evolution's march forward. This view is illustrated by a recent radio interview with primatologist Marina Davilla Ross.

Davilla Ross studies the vocalizations of apes being tickled by human caretakers. She describes the ape's response to tickling as a form of laughter. An ape laughing during play strongly connects with our human experience of amusement. Laughter represents a behavior we tend to think of as primarily human—we associate it with high-level cognitive processes. Davila Ross analyzed the acoustic structure of chimpanzee, bonobos, gorillas, orangutans and human-infant laughter. Each species' laugh was different, but the closer the genetic connection between species the closer the laugh. This alignment of vocalization and "phylogenetic tree" suggests laughter is a shared expression between human and ape—a capability inherited from a common ancestor.[38] The radio program's host, Ira Flato, played a recording of an orangutan's laugh. The ape's laughter had a grunt-like quality, less "melodic" than human laughter. One caller to the radio program suggested the orangutan's laugh sounded close to her own snorting laugh. Flato then posited that snorting might be a legacy of our primitive past:

> Flato: Would the most primitive laughter then going way back be more like snorting, since it's a simple thing?
>
> Davilla Ross: Yeah, more grunt-like.
>
> Flato: And so over the years it would evolve into a more complex kind of laugh until you get what we have?
>
> Davilla Ross: There is more structure…there is more variability within the laugh series.[39]

Flato's leading questions are colored by anthropocentric assumptions. I suspect a laugh's degree of sophistication depends on the specifics of context and phenomenology more than how structured it sounds to the human ear. The interactions of guest scientist, caller and host portrayed the complicated discourse that surrounds animal behavior. At one moment, animals are capable of social and cognitive capabilities that seem quite human. At the next moment, animal capabilities are represented as somehow less than human, and the animal's behavior becomes a precursor to present-day human behavior. We are closely connected to the animal other but always remain securely detached. The animal's evolution can never keep up with human development, and animal behavior is denied the possibility of being an equally sophisticated alterative to human behavior. We are the evolved animals; the animal other is always something we once were, never something we may become. We assume animal cognition and culture to be something subhuman, an inferior image of our own intelligence and ingenuity.

### 5.2.3 The Animal's Diminished World

The shapeshifter's symbolic resonance stems in part from these strict divisions between humans and animals. In ancient myths shapeshifting occurred between humans, gods and animals: Zeus transforms into a swan, bull or eagle to seduce mortals; Lucius' inept magic turns him into an ass; and in Asian folklore, the fox takes on human form to help or hinder the people she encounters. Since the Enlightenment, an array of philosophers has denied the animal the ability to shape-shift. The animal lacks the necessary language, cognition, morality or phenomenology to apprehend the other. The shapeshifter's ability to see as the other sees or exist as the other exists is available only to the human; only she can comprehend another's being. Derrida examines this division between human and nonhuman as he analyzes the texts of Lacan and Heidegger and questions the underlying assumption of human exceptionalism embedded in these texts.

The Enlightenment's animal lacks the shapeshifter's cunning or trickery. The animal becomes innocent; she is unable to deceive and consequently lives outside human law. The human's skill at prevarication maybe a moral flaw, yet this failing is recast as strength. The human's ability to deceive serves as proof of her superior intelligence. Lacan describes the animal's innocence as her inability to rise above instinctual reactions to the symbolic realm of language. He considers the communication strategies of bees to be a “code, or system of signaling” but denies these animal interactions the status of language. Derrida summarizes Lacan’s distinction between animal and human communication: “When bees appear to ‘respond’ to a ‘message,’ they do not *respond* but *react*; they merely obey a fixed program, whereas the human subject responds to the other, to the question from or of the other.”[40] Lacan distinguishes language from fixed code by emphasizing language’s fluid, interrelated mix of signs. In Lacan’s view only the human is able to participate in this higher level of discourse.

The animal’s lack of language, according to Lacan, leads to a kind of moral integrity—the animal is incapable of deception. The animal may be able to make a display of strength or sexual prowess—to pretend in “physical combat or sexual display”—but he cannot without speech, “pretend to pretend.” “He does not make tracks whose deception lie in the fact that they will be taken as false, while being in fact true ones, ones, that is, that indicate his true trail. Nor does an animal cover up its tracks, which would be tantamount to making itself the subject of the signifier.” Derrida argues that the Lacanian animal’s inability to “pretend to pretend” gives the animal his innocence; he lives “anterior to the difference between good and evil.”[41] Through a filter of shapeshifting, this innocence prevents the animal from grasping the other’s world; the animal cannot feign being the other or imagine what the other is thinking/perceiving. She is always herself, never something else, locked in her instinctual role. And this integrity or innocence results in the animal being denied subjectivity. The human, however, gains subjectivity through his artifice. In a twist of logic, the human’s insincerity provides him a form of mastery that eludes the animal. Living in the symbolic realm, subjected to the restraints of convention and morality yet able to transgress these restraints, the human acquires an exclusive status:

> The subject of the signifier is subject(ed) to the signifier. Lacan never stops insisting on the 'dominance' of 'the signifier over the subject' and over 'the symbolic order which is constitutive for the subject.' The 'subject' does not have mastery over it. Entry into the human order of the law presupposes this passive finitude, this infirmity, this lack from which the animal does not suffer. The animal does not know evil, lying, deceit. What it lacks is precisely the lack of virtue of which the human becomes subject of the signifier, subject subjected to the signifier. But to be subject of the signifier is also to be a subjecting subject, a subject as *master*, an active and deciding subject of the signifier, having in any case sufficient mastery to be capable of pretending to pretend and hence of being able to put into effect one's power to destroy the trace. This mastery is the superiority of man over the *animot*, even if it gains its assurance from the privilege constituted by a defect, a lack, or a fault, a failing that derives as much from the generic prematurity of birth as from the castration complex, which Lacan designates…as the Freudian and scientific (or at least nonmythological) version of original sin or the Adamic fall.[42]

Derrida sees Lacan's division between human and animal as a continuation of Cartesian logic. Descartes famously views the animal as a biological machine. And like Lacan, Descartes foregrounds the critical role of language in human identity. The animal, according to Descartes, is incapable of differential language: "For it is very noticeable that there are no human beings so unintelligent and stupid, including even mad people, who are incapable of arranging different words and composing from them an utterance by which they make their thoughts understood; whereas there is no other animal, no matter how perfectly or favorably born it may be, which acts similarly." Descartes goes on to note that an animal's linguistic inferiority is not the result of biological lack—an animal has organs that are similar to human organs. Rather, the animal's silence is a result of cognitive deficiency. And this linguistic failing stands out for Descartes against the ability of animals to outperform humans in certain activities:

> Thus whatever they do better than us does not prove that they have a mind because, on this assumption, they would have more intelligence than any of us and would be better at everything. It proves, rather, that they have no intelligence at all, and that it is nature which acts in them in accordance with the disposition of their organs, just as we see that a clock, which made only of wheels and springs, can count the hours and measure time more accurately than we can with all our efforts.[43]

Here again we have the double logic of animality. The animal's superiority in one arena proves his inferiority in general.

Contemporary philosopher Christine Korsgaard echoes the sentiment of Lacan and Descartes, this time through the filter of Kantian philosophy. Korsgaard argues that only humans can ask if a course of action conforms to universal ethical standards. Only humans can achieve this higher level of intentionality regarding our actions. "We have the capacity for normative self-government, or, as Kant called it, 'autonomy.'"[44] Korsgaard sees this self-governance as a distinguishing feature of human morality, something that separates us from other primates:

> A form of life governed by principles and values is a very different thing from a form a life governed by instinct, desire, and emotion—even a very intelligent and sociable form of life governed by instinct, desire, and emotion…
>
> My point is not that human beings live lives of principle and value and so are very noble, while the other animals don't and so are ignoble. The distinctiveness of human action is as much a source of our capacity for evil as of our capacity for good. An animal cannot be judged or held responsible for following its strongest impulse. Animals are not ignoble; they are beyond moral judgment.[45]

The animal has no choice but to do what he does and this lack of choice implies defect. Yet this defect ensures the animal remains in a state of innocence. The human's superior cognitive ability provides him a greater range of choice and higher level of moral responsibility. This complex moral terrain leads to humanity's imperfection; the human acts in ways that are good *and* evil. The human's superior status makes available to him new levels of divine and debased behavior. Korsgaard repeats Lacan's distinction between human response and animal reaction; human morality permits the human to respond rather than react. The ability to respond is key to the shapeshifter's talent; to become the other means identifying and even transforming into the other. The process requires inhabiting the other's perspective. Without the benefits of language, cognition or morality, according to Lacan, Descartes and Korsgaard, the animal is unable to relate to the other, unable to perceive and respond to the other's situation; unable to imagine being the other.

Heidegger aligns himself with these philosophers when he creates the following taxonomies: the stone is without world; the animal is deprived of the world; and the human is world forming.[46] Heidegger, however, is not concerned with the divisions of language or subjectivity; instead his focus is *Dasein*—he emphasizes being and being-in-the-world. Heidegger reserves *Dasein* for the human; the animal never achieves that particular kind of being. The animal is defined for Heidegger by his "captivation," his instinctual drive that opens him up to his environment but also blinds or cuts him off from the larger world. Heidegger argues that this blindness or deprivation is not simply a diminished perception of the world—a narrow channel of sensuality, expression or cognition—nor it is it the animal's alterity—his difference in perspective relative to the human. Rather Heidegger posits that the animal is unable to comprehend the being-ness of the world. "For it is *not* simply a question of a *qualitative otherness* of the animal world as compared with the human world, and especially not a question of quantitative distinction in range, depth and breadth—not a question of whether or how the animal takes what is given to it in a different way, but rather of whether the animal can apprehend something *as* something, something *as* a being, at all."[47]

Heidegger describes the animal's instinctual drive as a "disinhibiting ring" that surrounds him; a ring that opens him to particular action but denies him the ability see himself or the other with whom he interacts as a being. The animal's drive—"its being taken" in by stimuli—"never involves an attending to beings, not even to itself as such."[48] "More precisely, we must say that life *is* nothing but the animal's encircling itself and struggling with its encircling ring, a ring by way of which the animal is absorbed without its ever being with itself in the proper sense."[49] Here Heidegger denies the animal a subjectivity that would permit him to be "world-forming." Instead the animal lacks a sense of selfhood; he is unable see beyond his instinctual drives. Heidegger illustrates the animal's drivenness at the expense of selfhood through a lab experiment conducted by biologist Uexkull. The first part of the experiment presents a bee with a bowl of honey. The bee eats the honey until satiated and then flies off. In a second phase of the experiment, a bee is again given honey, but this time as she eats, her abdomen is removed. Despite this violence, the bee continues to gorge on honey, unable to satiate her appetite and seemingly unaware of her injury. Honey flows from her wound as she continues to feast. Heidegger concludes:

> …it continues with its driven activity regardless precisely because it does not recognize that plenty of honey is still present. Rather, the bee is simply taken by its food. This *being taken* is only possible where there is an *instinctual* 'toward….' Yet such a driven being taken also excludes the possibility of any recognition of presence. It is precisely being taken by its food that prevents the animal from taking up a position over and against this food.[50]

The bee is caught in her “disinhibiting ring,” unable to satisfy her drive to feed. She cannot exit her world, cannot recognize the injury done to her, can never understand the cruel experiment in which she participates. She is isolated in her particular environment, detached from the world that surrounds her.

Yet it remains to be seen if this experiment confirms Heidegger’s argument for a world-deprived animal. In his example, the bee stands in for the entire animal kingdom; her behavior becomes emblematic of all animal behavior. How representative is the bee’s drive to devour honey? How many mammals would continue to lap up water or eat food if they were eviscerated? Uexkull’s violent experiment seems to speak as much about the difference between animals as it does about the effects of a “disinhibiting ring.” Heidegger’s sense of animal deprivation is based on a universal animal, one that resides above the diversity within and between animal species. By contrast, Derrida in his writing about animals, seeks out a specific, non-universal animal. He foregrounds the differences between species by substituting the neologism *animot* for the generic term “the animal.” *Animot* is a particular and unique animal. She does not represent a phylum, species or even a pack or tribe. *Animot* avoids the difference-erasing qualities of the category animal and proposes instead an individuated animal.

Hiedegger’s investigation of the animal’s deprivation may gloss over the differences between animals, but his examination of the animal does explore new terrain beyond linguistic and cognitive concerns. In general, Heidegger foregrounds the whole organism (as opposed to a mechanized or atomized animal) and emphasizes the importance of ground or environment to the organism’s capacity. This is an animal that remains irreducible and also an animal that draws into focus the surrounding world that shapes both human and nonhuman. Steve Baker argues that Heidegger’s divisions are not entirely dismissive of the animal other. Baker sees Heidegger struggling to imagine the animal’s world without resorting to the well-worn tropes of anthropomorphism.[51] And indeed, Heidegger's hierarchies are not entirely certain. He suggests that the animal's impoverishment may be accompanied by a "wealth" unavailable to the human: "..this does not mean that [animal] life represents something inferior or some kind of lower level in comparison with human Dasein. On the contrary, life is a domain which possesses a wealth of openness with which the human world may have nothing to compare."[52]

Yet despite Heidegger's emphasis on being and being-in-the-world, his new ontology ultimately leads him to the same conclusion as the philosophers who foreground language, cognition or ethics. In the end, he denies the animal a critical shapeshifting capacity—the ability to "transpose." Heidegger argues that "transposing" or "going along with" the other is an essential human activity. "Transposing oneself into this being means going along with *what* it is and *how* it is. Such going-along-with means directly learning how it is with this being, discovering what it is like to be this being *with* which we are going along *in this way."*[53] This is a phenomenological "transposing"—a "going along with" that privileges "being with" rather than an empathic "feel our way into" or a cognitive meeting of the minds.[54] This form of shapeshifting becomes a defining human trait—"the Da-sein in man means, not exclusively but amongst other things, being transposed into other human beings…the being-there of Da-sein means *being with others*."[55] Heidegger's understanding of human subjectivity, an intersubjectivity grounded in a particular context and shaped through social interaction, makes the ability to transpose a key element of being. Heidegger argues transposing is so fundamental to our existence that we are often unaware of the degree to which our subjectivity is formed through this "going along with." If Descartes promotes an isolated subject shaped by her consciousness, then Heidegger highlights interdependent beings who emerge in the interactions of environment and social circumstances. [56]

But the animal is always denied this type of existence. The Heideggarian human sees beyond the limits of her individuation, but the animal remains enclosed in her “disinhibiting ring.” This is the animal’s deprivation in the world. Contemporary nonhuman primate research suggests that Heidegger’s transposing may not be such an elemental human characteristic. Goodall documents transpecies interactions the require some degree of “going along with.” She witnesses an elderly baboon who frequents a chimpanzee feeding station, sits calmly among the tribe and often solicits grooming from the younger apes in the group. The chimpanzees understand his gestural requests and often accommodate his demands.[57] In another example, Gilka, an isolated, young female chimpanzee embraces, tickles and plays with Goblina, a young female baboon. Goodall records the unusual nature of their relationship:

> It is fairly common for young chimpanzee and young baboons to play together, but the games usually consist of wild chasing around, either on the ground or through the trees, or sparring when each hits out quickly toward the other and then draws away. Often too, such games end with aggressive behavior from one or the other. Gilka’s friendship with Goblina was quite different: the contact between the two youngsters was nearly always gentle, and they often deliberately sought each other’s company…I watched Gilka and Goblina playing for ten minutes, and all the time they were amazingly gentle.[58]

Both examples suggest chimpanzees and baboons interpret each other’s desires and intentions. The “discommunicating worlds” of chimp and baboon intersect in playful and affectionate ways.

Primatologist De Waal also argues that nonhuman primates are able to “transpose;” he describes this phenomenon as “theory-of-mind.” Theory-of-mind is the ability to infer another organism’s perspective—“the ability to recognize the mental states of others.” De Waal highlights 1970s experiments that show chimpanzees going along with the human or ape other:

> Offered a choice among pictures, a chimp named Sarah would select a picture of a key if she saw a person struggle with a locked door or a picture of someone climbing onto a chair if she saw a man jump up and down to reach a banana. It was concluded that Sarah recognized the intentions of other.[59]

Though not all theory-of-mind experiments are conclusive, De Waal notes enough "positive outcomes" to suggest that apes employ some theory-of-mind in their interactions with other apes.[60]

Amy Parish, a caretaker of a bonobo tribe at the San Diego Zoo, recounts another example of animal transposing. Working as a caretaker, Parish developed a tight bond with the matriarchs in a bonobo group. After being away on maternity leave, Parish brought in her newborn son to show to the bonobos. As she held up her child to the glass wall that separated humans and apes, a senior female bonobo rushed off to gather her own child and display him to Parish. Both mothers and offspring shared in a moment of familial pride.[61] The bonobo matriarch seemed to recognize Parish's gesture and reciprocated in kind.

While primatologists challenge human-animal divisions through anecdotal and experimental evidence, Derrida counters the arguments of Heidegger and Lacan by examining the theorists' underlying assumptions. Derrida flips the philosophers' framework on its head. Rather than prove the animal's cognitive, linguistic or phenomenological abilities, Derrida instead asks if "world-shaping" qualities or the ability to "respond" rather than "react" are truly essential human qualities. That is, even if we acknowledge that animals lack certain characteristics—something that remains uncertain—are we sure that humans universally possess the characteristics we deny animals? Derrida's answer is that we cannot easily ascribe essential features to the human. Both the essential animal and the essential human are in doubt.

Derrida first questions Lacan's many distinctions between humans and animals—his oppositions of differential and fixed communication, response and reaction, pretense of pretense and simply pretense—by interrogating these categorical divisions. Can any language be truly fixed? Is any sign system non-relational? Derrida argues that all communication—animal or human—implies employing interrelated signifiers. [62] The divide between response and reaction also becomes less certain in Derrida's hands. He notes "the reactionality in the response."[63] The human's response is often instinctual and automatic, not unlike Lacan's animal reaction. And finally, Derrida notes that the difference between pretending and pretending to pretend is far from clear:

> It seems difficult, in the first place, to identify or determine a limit, that is to say, an indivisible threshold between pretense and pretense of pretense. Moreover, even supposing that that limit were conceptually accessible, something I don't think is so, we would still have to know in the name of what knowledge or what testimony (knowledge is not the same as testimony) one could calmly declare that the animal in general is incapable of pretending pretense. Lacan does not invoke here any ethological knowledge (whose increasing and spectacular refinement is proportional to the refinement of the animot) or any experience, observation, or personal attestation that would be worthy of credence. The status of the affirmation that refuses the pretense of pretense to the animal is that of a simple dogma. But there is no doubt a dissimulated motivation to this humanist or anthropocentric dogmatism, and that is the probably obscure but indisputable feeling that it is indeed difficult, even impossible, to discern between pretense and a pretense of pretense, between an aptitude for pretense and an aptitude for the pretense of pretense. How could one distinguish, for example, in the most elementary sexual mating game, between a feint and a feint of a feint?...[there is]

> the possibility, for every pretense, of being pretense of pretense, and for every pretense of pretense of being a simple pretense.[64]

In a similar fashion, Derrida questions the opposition that Heidegger proposes between understanding the world “as such” or “not as such.”[65] That is, Heidegger’s claim that only the human understands the world “as such”; the animal cannot conceive of a world outside his disinhibiting ring, cannot see beyond his instinctual drive. Only the human, according to Heidegger, recognizes reality—the being of being-in-the-world. Derrida challenges Heidegger’s conception of the human and her world by casting doubt on the human’s ability to comprehend the world “as such”:

> The animal doesn’t know how to ‘let be,’ let the thing be such as it is. It always has a relation to utility, of putting-in-perspective; it doesn’t let the thing be what it is, appear as such without a project guided by a narrow ‘sphere’ of drives, of desires. One of the questions to be raised, therefore, would be to know whether man does that. In other words, in order to indicate the governing principle of the strategy I would like to follow, it would not simply consist in unfolding, multiplying, leafing through the structure of the ‘as such,’ or the opposition between ‘as such’ and ‘not as such,’ no more than it would consist in giving back to what Heidegger says it is deprived of; it would obey the necessity of asking oneself whether man, the human itself, has the ‘as such.’[66]

Derrida goes on to state that to understand something “as such” would mean “one doesn’t approach it or apprehend it from our perspective, from our own design.” This would mean in a sense an end of perspective and an ability to abandon human identity. Derrida is perhaps arguing that no true shapeshifter exists; that no one, not even the most advanced human, can truly transpose herself onto the other. The pure “as such” is lost. In its place there is a plurality of being, a diversity of being that avoids Heidegger’s hierarchies. “Hence the strategy in question would consist in pluralizing and varying the ‘as such,’ and, instead of simply giving speech back to the animal, or giving to the animal what the human deprives it of, as it were, in marking that the human is, in a way, similarly ‘deprived,’ by means of a privation that is not a privation, and that there is no pure and simple ‘as such.’”[67] Neither animal nor human are wholly world-forming; both are open and closed-off from the array of intersecting worlds.

### 5.3 Aura & Abjection

Derrida’s doubt about human superiority does not necessarily improve the animal’s status. Both human and animal subjectivity become uncertain. The shapeshifter, somewhere between human and animal, is a precursor to this type of ambiguous identity. The shapeshifter becomes the symbolic subject of an uncertain age. Contemporary cultural shapeshifters, the werewolves and vampires that inhabit popular imagination, become both auratic and abject emblems as they transgress the divisions between animals and humans. They are physically and sexually superior, yet they are also degraded monsters, perpetual outsiders unable to find a place within human or animal culture.

The walls between humans and animals are difficult to scale. A human who becomes the animal other risks social rejection and communal violence. This division between human and nonhuman is often used for political gain. Mark Roberts traces the tradition of ascribing animalistic traits to a segment of the population in order to exclude them from political-economic-social participation. Roberts argues that the discourses of racism, sexism and xenophobia use the animal as a degraded symbol that is mapped on to marginalized humans. Members of an excluded group are compared to apes, monkeys, dogs, or rodents. The animal is constructed as an absence of humanity—an indolent, oversexed or violent creature:

> In this regard, animality was viewed in its more historically traditional role as *lack,* as what failed to reach the level of the human. It was no longer associated with the ancient myths of animal savagery and instinct, which provided an explanation—and an excuse—for the excesses of madness. Now its various functions and effects served as the basis for inferiority, as a kind of calculus of otherness, separating those who bore strong resemblance to animals from those who were deemed to have fully human characteristics.[68]

And once the connection between minority and animal is secured, the minority can be abused in ways that humans so often abuse the animal.

### 5.3.1 Affirmative Alerity

As noted in the previous section, Derrida counters the animal-as-lack argument by challenging our assumptions of human superiority. His argues that humans may not be as sophisticated as we imagine; humans participate in the animal's lack. Deleuze and Guattari take another approach. They reject an identity that is constructed through lack—a common theme in Freudian and Lacanian psychoanalysis—and instead argue for an identity driven by desire. This type of subjectivity does not see animality as degraded but rather as something to embrace. For a Deleuzian shapeshifter, desire triumphs over fear.

Deleuze and Guattari argue for an alternative subjectivity that seeks perpetual transitions rather than stability. They seek to create a new wildness in the human, a "becoming animal" that is different from evolution and regression. This becoming occurs through "involution"—"*symbioses* that brings into play beings of totally different scales and kingdoms, with no possible filiation." Involution seeks increased diversity beyond the slow moving processes of reproduction and mutation.[69] These becomings emerge through infection and affiliation.[70] Deleuze and Guatarri's becoming animal encourages multiplicity, seeking out alternative subjectivities and tying together disparate parts in a common goal:

> These multiplicities with heterogeneous terms, cofunctioning by contagion, enter certain *assemblages;* it is there that human beings effect their becomings-animal. But we should not confuse these dark assemblages, which stir what is deepest within us, with organizations such as the institution of the family and the State apparatus. We could cite hunting societies, war societies, crime societies, etc. Becomings-animal are proper to them.[71]

For Deleuze and Guatarri, animal packs prove a potent metaphor. The distributed agency of a pack counters the Enlightenment's individuated agency. It also provides an organizational strategy in opposition to state and familial control. These packs extend beyond human and animal classifications. They encompass affiliations that may include organic and inorganic entities; "becoming ties together animals, plants, microorganisms, mad particles, a whole galaxy."[72] Becoming-animal is a call to recognize the importance of existing affiliations and imagine alternative ways of being.

A new subjectivity promises new liberation. Deleuze and Guattari's shapeshifter tests out new identities, sensibilities and perceptions. This is a transformation that sheds a unified, human perspective and seeks out the margin; it celebrates the growing tendrils of multiplicity.

Deleuze and Guattari's affirmation of alerity is echoed in the shapeshifting symbols of contemporary culture. These shapeshifters can be seen in the "coming-out of the coffin" minority vampires of *True Blood,* a costumed Isabella Rossalini who portrays the dramatic conflicts of insect reproduction, or the persona of Dr. Tatiana who gives advice to lovelorn creatures. In each example, the shapeshifter deviates from human expectations and norms.  Dr. Tatiana's role exemplifies this celebration of difference. Oliva Judson is the biologist behind the personality Dr. Tatiana. In her book, she plays the role of a sexpert who responds to letters from sexually frustrated animals.[73] Despite Judson's anthropocentric format, her approach refuses to privilege the conventions of human sexuality. From Judson's view, evolution tries out of number of strategies—human sexuality is simply one of many sexualities. Judson's writes about unfamiliar reproductive strategies that decenter human sexuality. Evolution “solves” the problem of sex in unexpected and varied ways.

### 5.3.2 New Forms of Alienation

Though the shapeshifter represents new perceptions and freedoms, his transformation can also deteriorate into alienation. Deleuze and Guattari's embrace of the animal other inadvertently invents new hierarchies. Their becoming animal privileges the wild and predatory animal at the expense of the domesticated, less adventurous animal. They posit three tiers of animality:

> We must distinguish three kinds of animals. First, individuated animals, family pets, sentimental, Oedipal animals each with its own petty history, ‘my’ cat, ‘my’ dog. These animals invite us to regress, draw us into a narcissistic contemplation, and they are the only kind of animal psychoanalysis understands, the better to discover a daddy, a mommy, a little brother behind them (when psychoanalysis talks about animals, animals learn to laugh); *anyone who likes cats or dogs is a fool.* And then there is a second kind: animals with characteristics or attributes; genus, classification, or State animals; animals as they are treated in the great divine myths, in such a way as to extract from them series or structures, archetypes or models. (Jung is in any event profounder than Freud.) Finally, there are more demonic animals, pack or affect animals that form a multiplicity, a becoming, a population, a tale.[74]

And, perhaps fearing they've become too rigid in their divisions, Deleuze and Guattari temper their categories: "Or once again, cannot any animal be treated in all three ways?" Yet the impact of the divisions remains. Any challenge to the status quo contains the potential to rearrange hierarchies without addressing underlying issues of power. The three tiers of animality create a new hierarchy as a substitute for existing hierarchies. This type of "becoming" replaces one abuser with another and erects a new division in place of the old.

Donna Haraway acknowledges Deleuze and Guattari's innovation—their ability to conjure up "the rich multiplicities and topologies of a heterogeneously and nonteleologically connected world"[75]—yet she argues the theorists' example of exotic alterity misses the everyday world of animality: "we will learn nothing about actual wolves in all this." More disturbing for Haraway than the disregard for the lived experience of animals is the general "scorn for the homely and the ordinary…Leaving behind the traps of singularity and identity is possible without the lubrication of sublime ecstasy bordering on the intensive affect of the1909 Futurist Manifesto."[76] Haraway argues that the new hierarchies Deleuze and Guattari construct tend to exclude the domestic, the feminine, and the emotional. "Little house dogs and the people who love them are the ultimate figure of abjection for D&G, especially if those people are elderly women, the very figure of the sentimental." Haraway continues:

> The old, female, small, dog- and cat-loving: these are who and what must be vomited out by those who will become-animal. Despite the keen competition, I am not sure I can find in philosophy a clearer display of misogyny, fear of aging, incuriosity about animals, and horror at the ordinariness of flesh, here covered by the alibi of an anti-Oedipal and anticapitalist project. It took some nerve for D&G to write about becoming-woman just a few pages later![77]

Indeed Deleuze and Guatarri's becomings are frequently bestowed on men: "Wolf men, bear-men, wildcat-men, men of every animality, secret brotherhoods…"[78] A chance to subvert the divisions of subjectivity manifests our tendency to segregate as we seek to topple tradition.

Other forms of alienation arise when the shapeshifter appears. The shapeshifter breaches a fundamental social contract. She suggests that nonhuman alliances may prove more compelling than human affiliations. The result is often a communal backlash that leads the shapeshifter to new levels of isolation.

Dian Fossey's experience is emblematic of this form of alienation. If Goodall represents the golden girl of ethology—a reserved figure whose tireless effort generates acclaim and support for her research and the chimpanzees she observes—Fossey is portrayed as a loose cannon—a troubled woman whose reactionary excesses lead to violence and death. Fossey disturbs because she unabashedly identifies with the gorilla other, often at the expense of human concerns. Her strong identification with the animal permitted her to become a shapeshifter in perhaps the most literal way. In her interactions with gorillas she often mimicked ape-like behavior; grunting, scratching, chewing, beating her chest, and approaching the animals on all fours.[79] Montgomery describes the way that Fossey acclimated the mountain gorillas to her presence:

> She would knuckle walk to within a hundred feet of them, then eighty feet, then fifty, then thirty. Scratching herself and crunching the bitter wild celery, she would settle down in the foliage, kneeling, sitting, or reclining, harmless and calm. *I am here* she announced with a belch vocalization. *I am harmless* she promised with her posture. But further, crunching celery and scratching herself, she told them *I am one of you*.[80]

Fossey arrived at the Virunga mountains in 1967 hoping to establish a long-term study of mountain gorillas. Her first research site in Kabara had to be abandoned because of civil war in the Congo. Fossey continued her study by crossing the border into Rwanda.[81] The social turmoil of her early days foreshadowed the difficulties to come. Local Rwandans increasingly encroached on the wildlife preserve where the gorillas lived. Many viewed the wild animals and the lush mountainous terrain as a valuable resource available for exploitation. Poachers hunted gorillas to sell to domestic and international markets—Western zoos bought gorilla infants, Western collectors purchased preserved gorilla hands and heads, and locals ate gorilla meat as a source of protein. Fossey spent a significant portion of her time on "active conservation;"[82] destroying the poachers' traps, chasing out cattle who wandered onto park lands, and patrolling the preserve to keep poachers out.[83] Fossey also employed unconventional means to frighten the poachers away—she played on traditional superstitions, performing as if she were a witch and marking trees with occult symbols hoping to scare away poachers from the gorillas' territory.[84] As the conflict between poachers and researcher escalated, Fossey invented perverse methods of retribution: when she caught a poacher, she humiliated him by stripping him naked and whipping him with stinging nettles.[85]

Fossey's battle with the poachers spilled over into her interactions with her graduate students. Students were allowed to study with her as long as they also participated in the patrols to catch poachers and dismantle their traps. She was demanding and prone to fits of anger. She became increasing isolated, avoiding face-to-face contact with her students, preferring instead to communicate by means of terse notes typed on scraps of paper.[86] Her moments of sociability were reserved for the gorillas; with the gorillas she was at ease.

Fossey's determination to protect the gorillas spilled out of the park and into a nearby village. Fossey once rewarded park guards with money when they apprehended a poacher. When she learned that the guards had feigned capturing the poacher and had actually split the reward money with the poacher, Fossey sought revenge. She located the poacher's home, hoping to confiscate his gun. When she couldn't find the weapon, she stripped his hut of its interior matting and set the matting on fire. She took one of the poacher's children and threatened to hurt the child if the gun was not produced. The battle ended a few days later, Fossey was fined and the child was safely returned. The incident portrays Fossey's rage and her vigilante tactics.[87] Her fight for the gorillas left her angry, desperate and isolated.

Fossey heroically tried to assist the struggling gorilla troupes, but her methods reenacted the horrific abuses of white colonizers. Her activism was inflected with Western arrogance; she often ignored African sovereignty and culture.[88] Her battle with Batwa poachers failed to recognize the long hunting traditions of that group. Fossey was unable to accommodate or redirect this tradition and instead relentlessly imposed her own cultural view on the Batwan villagers. At the same time, Fossey remained a rebel, the last protector of gorillas besieged by the greed and violence of humans. Galdikas argues that Fossey's actions were in sync with the traditions of her adopted continent. She states: "Dian was very, very African. That's the only reason she survived as a lone, white women on the mountain for nineteen years. She was doing what an African would have done in the same situation."[89] Fossey's mix of empathic research and hateful revenge remain a curious contradiction. Eventually Fossey's becoming gorilla was stopped short by her death. The day after Christmas, 1985, someone entered Fossey's cabin and killed her with panga knife.[90] Fossey's death reveals the extreme risk that shapeshifters take. Once the shapeshifter denies her human identity in favor of an emerging, unfamiliar identity, the community she leaves behind may try to inhibit her transformation. Her subjectivity is labeled as madness, and she is isolated to prevent her perspective from infecting the larger community. If her metamorphosis continues unchecked, then violence may be employed to halt her transformation.

This scenario is repeated in variety of contexts. Animal Planet's *Living With the Wolfman* tracks the life of Shaun Ellis, a researcher who studies the behavior of a wolf pack he houses in a wildlife park in Devon, UK. Ellis mimics wolf behavior when interacting with the wolves: he copies their physical and vocal habits and submits to the alpha wolf's authority. The television show follows the integration of Ellis' fiancé, Helen Jeffs, into the wolf pack. Jeff's becoming-wolf requires changing her diet and hygiene: she switches to a high-protein, no sugar diet and lives without fragranced soaps or perfume to accommodate the wolves' olfactory sensitivities.[91] Jeffs also endures a series of difficult pack initiation rituals. In her attempts to conform to wolf culture and the demands of her fiancé, Jeffs suffers physical injury and psychological discomfort. In one episode, Jeffs breaks down and cries after a particularly frightening encounter with the pack; she also suffers cuts and bruises in her interactions with the wolves. Her attempts at metamorphosis cannot keep up with her finance's shapeshifting desires. The pressure to become wolf exhausts Jeffs, and in the show's final episode, she leaves Ellis and the wolf pack to return to the familiar comforts of human life. Ellis remains with the wolves, caught in the gap between human and animal culture, no longer integrated into society but also not fully wolf. Like Fossey, Ellis' shapeshifting contributes to his isolation. Ellis reflects on the dissolution of his relationship with Jeffs:

> It must be so hard for somebody that loves you to not be able to communicate with you for periods of time once you've been living with wolves, and I know it's something that I have to address in order to become part of human society again…I think her problem came from the fact that the person that she loved was more in tune with the wolf pack and more accustomed to being with them that he ever was living alongside her.[92]

In literature, the touchstone of shapeshifting alienation is Kafka's tale of Gregor Samsa. Samsa is a frustrated salesman who inexplicably wakes up one morning as a large dung beetle. Samsa's metamorphosis is liberating at first. As an insect he is no longer required to support his father, mother and sister and is freed from the demands of a controlling boss and stressful job. Yet this momentary liberation quickly returns to abjection. Samsa is trapped by his family a second time—they are ashamed of his monstrous "becoming" and lock him away in his bedroom. Without Samsa's income, his family is forced seek employment, and they resent his inability to contribute to family finances. His insect behavior and features coupled with his inability to communicate turns Samsa into a sub-species other. Within a short amount of time, his family sees him as unworthy of care and shows little interest in his material or emotional wellbeing. He becomes a burden, a hideous creature that requires food and shelter but provides them nothing in return.

Samsa's metamorphosis engenders a series of phenomenological changes. He retains his linguistic and cognitive abilities, but when he attempts to speak to his family his words are unintelligible to their ears. He also acquires new tastes and physical traits—he enjoys rotting food and loves to scurry up and down walls and ceiling. Despite these changes, his sensitivity to the world remains; he still thinks and feels as before. And this sensitivity leads him to despondency; his health deteriorates and his appetite declines. One night when his sister plays the violin, Samsa is so moved by the music that he abandons the safety of his room and ventures into the family's parlor. The performance is not for Samsa or his family but rather for three boarders who represent a new source of income for the household. Samsa's appearance disgusts the boarders, and they announce their intention to vacate the unkempt house without paying rent. After this incident, the family decides they can no longer tolerate Samsa's presence. His family's hostility combined with his deteriorating mental and physical health lead Samsa to a final metamorphosis. He dies that night, a lonely, emaciated and defeated shapeshifter.

A conventional interpretation of Kafka's tale might focus on the social and economic desperation of humans—the human drive to exploit and regulate. Deleuze and Guattari emphasize the transformative aspects of the story. They argue that Samsa's abject end is the result of his inability to embark on new transformations, new "becomings."[93] His first metamorphosis liberates him from familial and material constraint. But he remains stuck in an intolerable domestic situation, trapped by his family's fear and pride. Had Samsa continued to transform perhaps he could become one of Deleuze and Guattari's wild, pack animals, released from social repression, free to imagine a new subjectivity. Yet Kafka's story suggests another interpretation, particularly in the context of animality and alterity. As a dung beetle, Samsa remains intelligent and sensitive. He never loses his ability to "go along with" his family: he understands their conversations; he avoids frightening his family; he worries about the household finances; he clings to a long-held dream to help his sister leave home and pursue her musical interests. Yet the family is unable to imagine Samsa's perspective. Samsa's attempt to communicate only disturbs his family. He can talk, but his family refuses to listen. After Samsa disrupts his sister's violin recital, his sister makes clear the family's unsympathetic view:

> He must go, that's the only solution, Father. You must just try to get rid of the idea that this is Gregor. The fact that we've believed it for so long is the root of all our trouble. But how can it be Gregor? If this were Gregor, he would have realized long ago that human beings can't live with such a creature, and he'd have gone away on his own accord. Then we wouldn't have a brother, but we'd be able to go on living and keep his memory in honor. As it is, this creature persecutes us, drives away our lodgers, obviously wants the whole apartment to himself, and would have us all sleep in the gutter.[94]

Samsa's sister sees only her own pain. She cannot perceive Samsa's situation. Kafka's tale may be less about "becoming" other and more about the human's inability to transpose. For us, the human is the center, and all other beings are secondary. Our anthropocentric view infects most aspects of our world. Perhaps Samsa's situation illustrates the animal's abject state: he knows and feels more than humans can imagine yet is treated as a subspecies without voice or reason.

### 5.4 Conclusion

Shapeshifting from ancient to contemporary times is a perilous act. Each metamorphosis has the potential to liberate as well as degrade. In ancient myth, the gods often punished humans by changing them into animals. But the gods also transformed themselves into animals as a way to conceal their identity and pursue forbidden pleasures. This is the shapeshifter's ambiguous status; his transformation limits and expands his social and phenomenological worlds.

Heidegger argues the ability to "transpose" is an essential human trait—only humans are permitted to shape-shift. Derrida counters Heidegger's exceptionalism by questioning our ability to perceive the other's world; we are remarkably unaccomplished transposers. Limiting the ability to "go along with" to the human becomes another example of human arrogance, particularly when human understanding of the animal other remains quite elementary. Decades after Heidegger's theory of transposing, Goodall discovered that chimpanzees used tools, ate meat and waged war—these seem rudimentary aspects of an ape's world yet they were unknown to biologists and philosophers until the 1960s. Derrida is perhaps contemplating a post-human identity when he questions Heidegger's essential human. If the human no longer needs to be separated from the animal—the human is no longer defined by the nonhuman—then an animal "going along with" the "other" becomes a possibility. Like ancient mythical characters, contemporary humans and animals reclaim their ability to shape-shift.

Animal strength and sensory acuity often exceed human abilities. Some wild animals continue to live above the alienations and restrictions of human culture. Yet these detachments and differences serve as proof of the animal's impoverished cognition and culture. This double logic of animality maintains the human's central position—we resist even momentary dislocation. Our world and subjectivity must always reside above and beyond the animal's world. Yet doubts about a privileged human subjectivity persist. Uexkull hints at the richness and diversity of unknown worlds that surround us. We are just beginning to explore the nonhuman worlds that intersect our own. And ethologists are becoming adept at documenting animal interactions with the human’s symbolic world. The divisions between worlds appear less certain.

As world boundaries fray, a decentered human emerges. We often react with alarm when human superiority is challenged; alterity can be confusing and frightening. But as we give up a coherent, unified, anthropocentric perspective, we are able to perceive the many worlds that surround us. The shapeshifter affirms this kind of subjectivity. She mingles human and nonhuman experience and her alterity subverts the hierarchies and divisions of species. She acknowledges that species inhabit different worlds, but they need not be irreconcilably divided. This shapeshifter is able to tolerate uncertainty and ambivalence as she bridges the gap between human and nonhuman worlds.

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[1] In 1970s and 80s Peter and Rosemary Grant documented the effects of a changing environment and increased competition for food on the natural selection of Galapagos finches.

Matt Ridely, “Modern Darwins,” *National Geographic*, February 2009, 59, 64.

Recent research into genetic variation in skin color argues that early humans adapted to their climate by shifting from dark-to-light or light-to-dark skin within as little as 50 generations. This is a far faster rate of change than previously assumed.

Robert Krulwich, “Your Family May Once Have Been a Different Color,” *NPR, Morning Edition*, February 2, 2009 (http://www.npr.org/templates/text/s.php?sId=100057939&m=1).

[2] RoseLee Goldberg, *Performance Art: From Futurism to the Present*, (London, UK: Thames & Hudson, 2001), 175-6.

[3] Laura Napier, “Icarus Redeemed.” *Article* (http://www.articlejournel.net/issue_04/rebecca_horn.html).

[4] Foundazione Bevilacqua La Masa, Exhibit of Horn’s work, June-September 2009, (http://www.bevilacqualamasa.it/english/archivio/2009_San%20Marco_1264/pagina.html).

[5] Giorgio Agamben, *The Open: Man and Animal,* trans. Keven Atell (Stanford, CA: Stanford University Press, 2004), 40.

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[8] “Elephant TV.” *Animal Planet/Discovery Communications*, director, Clifford Bestall; producer, Tracey Harding. 2008.

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[15] Montgomery, 102.

[16] Montgomery, 102.

[17] Montgomery, 147.

[18] Montgomery, 104.

[19] Jennifer Linsey, *Jane Goodall: 40 Years at Gombe* (New York: Stewart, Tabori & Chang, 1999), 18.

[20] Jane Goodall, *In the Shadow of Man* (New York: Houghton Mifflin Company, 2000, revised edition), 25-27.

[21] Montgomery, 96.

[22] Montgomery, 106-108.

[23] Goodall, 34.

[24] Goodall, 270.

[25] Goodall, 35-7.

[26] Montgomery, 138, 146-7.

[27] Montgomery, 9.

[28] Montgomery, 34-39, Goodall, 237-8.

[29] "The Gorilla King." *Nature,* executive producer, Fred Kaufman, 2008.

[30] Montgomery, 74.

[31] Frans De Waal, *Our Inner Ape: A Leading Primatologist Explains Why We Are Who We Are* (New York: Penguin Group, 2005), 167-171.

[32] De Waal, 215-8.

[33] De Waal, 59-60.

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[35] De Waal, 130.

[36] Montgomery, 105.

[37] Linsey, 40-41; Montgomery, 96.

[38] Lizzie Buchen, "Human Laughter Echoes Chimp Chuckles." *Wired Science*, June 4, 2009 (http://www.wired.com/wiredscience/2009/06/evolutionlaughter/).

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[53] Heidegger, 202.

[54] Heidegger, 203.

[55] Heidegger, 205.

[56] Heidegger, 208.

[57] Goodall, 211.

[58] Goodall,163-4.

[59] De Waal, 188.

[60] De Waal, 189.

[61] De Waal, 164.

[62] Derrida, 123-4.

[63] Derrida, 126.

[64] Derrida, 133.

[65] Derrida, 156.

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[71] Deleuze and Guattari, 242.

[72] Deleuze and Guattari, 250.

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[77] Haraway, 30.

[78] Deleuze and Guattari, 243.

[79] Montgomery, 136.

[80] Montgomery, 138.

[81] Montgomery, 130-8.

[82] Montgomery, 151.

[83] Montgomery, 215.

[84] Montgomery, 221.

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[86] Montgomery,156-9, 224-5.

[87] Montgomery, 153.

[88] Montgomery, 217.

[89] Montgomery, 217.

[90] Montgomery, 162.

[91] Healthy Shana, "New Show Alert: Living with the Wolfman," *Science On TV,* October 16, 2008 (http://www.scienceontv.com/2008/10/16/new-show-alert-living-with-the-wolfman/)

[92] Shaun Ellis, *Living with the Wolfman*, *Animal Planet,* Episode Eight.

[93] Steve Baker comments on Deleuze and Guattari's interpretation of Kafka's *The Metamorphosis*:

> Deleuze and Guattari choose to read what they call his [Gregor Samsa's] becoming beetle as his (only briefly successful) line of flight from the stifling effects of his Oedipalizing family and job. His metamorphosis turns out to be 'the story of a re-Oedipalization that leads him into death, that turns his becoming-animal into a becoming-dead'. They are very clear that it is on finding himself re-Oedipalized 'by his family' that Gregor 'goes to his death.' But this is not the result of Oedipal guilt. As they write earlier, and in more general terms: 'One allows oneself to be re-Oedipalized not by guilt but by fatigue, by a lack of invention.'

Baker, *The Postmodern Animal*, 119.

[94] Franz Kafka, *Franz Kafka: The Complete Stories* (New York: Schocken Books, 1971), 136.

# CHAPTER 6

# THEORY & PRACTICE

This chapter explores the interactions of theory and practice. I'll be drawing on my own experience of multi-modal research as well as the writings of postmodern theorist Jean-Francois Lyotard. My approach to theory and practice is within a particular context. I am writing from the viewpoint of an artist and thinking through my own specific engagement with writing and making. I am limiting theory to texts that foreground social relations and are inflected with economic, cultural, political, historical and technological concerns. I'm also limiting practice to creative action that leads to cultural concepts, artifacts and experiences.

I'll be employing a familiar organizational structure as I discuss the divisions and alignments of theory and practice. The three dialectics provide the framework for this essay. The dialectic of irreducibility and procedurality foregrounds epistemological concerns; autonomy and integration examine ontological issues; and aura and abjection investigate presence and materiality. This structure provides continuity with the previous chapters and brings into focus disciplinary context, subjectivity and corporeality.

Just as I highlighted paradox and contradiction in my discussion of the ambivalent animal, I am looking for irresolvable tensions that occur when theory and practice are engaged. I'm examining the false starts and insights that emerge through the process of thinking, writing and making. This continues the ambivalent aesthetic that runs throughout the entire thesis. I am foregrounding the connections and disconnections, interactions and isolations of theory and practice. This is a perspective that privileges oscillation rather than stability and resolution; a perspective the highlights the important push and pull of theory and practice.

## 6.1 Writing & Making

The interactions of making and writing play an important part in the ambivalent animal project. Most of my time and effort was focused on thinking through, reading about and writing about the animal other, but even in this analytical mode, the process of making influenced and shaped the writing. In particular, I incorporated artistic methods into my writing approach. This included developing an aesthetic that guides the interpretative framework as well as looking for connections and disconnections in a wide range of cultural and scientific sources that examine the animal. This approach mimics my artistic practice, a practice that fuses together aspects of society, culture and technology. And just as the writing was influenced by my creative practice, the making was altered by the methods of philosophy. The creative projects became a form of speculative research—they are conceptual and symbolic projects that re-work the three dialectics in the material realm.

### 6.1.1 Methods

During the process of writing and making, I encouraged a dialogue between the particular and the universal. I looked for commonalities and differences as I navigated between personal and cultural perspectives. I also created a framework with a particular viewpoint that grounded the research. This framework became the three dialectics coupled with the ambivalent aesthetic—a framework that was refined over time and altered as it encountered a variety of texts and contexts. Personal perspective, eclecticism, an aesthetic framework and repetition became four key components in my approach to writing and making.

#### 6.1.1.1 Personal Perspective

If some methods of research erase the personal, the ambivalent animal project embraces personal experience and history. Artistic methods that promote subjective rather than objective methods influence my approach. The personal does not, however, stand above culture nor are personal motivations left unexamined, but rather individual perceptions are viewed as a valid starting point for research. This approach is comfortable with nonobjective beginnings.

Within the personal there is an element of contingency. Each new project may develop in unexpected ways. Such an approach requires a tolerance for failure and also a certain degree of optimism that something interesting will emerge from idiosyncratic pursuits. Personal perceptions create alternative views that are unavailable to more formulaic methods. Contingency also suggests that one person's methods may not be easily adapted by a different person or applied to a different context. We gain insights from the methods of other researchers, but we may not be able to replicate their process in our own research.

In the early stages of research, the topic of ambivalent animal emerged through a convergence of interests: my experiences growing up with household pets; exposure to the issue of animal activists; an interest in health, environment and progressive politics; and a desire to better understand the biological manipulations experienced by many animals enlisted in the research of biotechnology and genetics. All of these interests led me to study the interactions of animals, humans and technology.

#### 6.1.1.2 Eclecticism

My process not only embraces the personal but also seeks inspiration from the culture at large. The research looks for common ties and intractable differences in a variety of texts and artifacts that examine the animal. It seeks out juxtapositions, synthesizes disparate perspectives and attempts to navigate a variety of knowledge domains. For the ambivalent animal project I reviewed both cultural and scientific texts—art mingled with philosophy, design intersected with technology. Analyzing a wide range of texts disrupts personal perceptions, provides a sense of historical and cultural context, and expands our sense of creative practice.

Eclecticism may also encourage impure methods and experiments in materials and media. In the ambivalent animal project, eclecticism is evident in the variety of texts employed in the writing, in the mix of media in the creative practice, and in the intersections of theory and practice.

#### 6.1.1.3 Aesthetic Framework

If eclecticism requires us to assess and integrate a variety of perspectives, developing an aesthetic framework creates a structure that is able to house this diversity of ideas. This framework emerges in the interactions of the individual and community, in the exchanges between culture and science, and in the tension between affinities and differences. The aesthetic framework focuses the writing and making. I use the term “aesthetic” because it suggests an approach that is particular to a person, group or specific time. My aesthetic for the ambivalent animal project is particular to this research project—it does not seek to create Grand Theory (though it may be employed in a variety of contexts), but instead creates a temporary framework with a particular point of view.

The dialectics that examine issues of epistemology, ontology and corporality became the framework for the ambivalent animal. This is a structure that underpins both the writing and making. An ambivalent aesthetic keeps the dialectics in play, they oscillate between the particular and general, subject and object, elevation and degradation. Humor is also an important part of this aesthetic in the creative practice—the critique of anthropocentrism is tempered by playful experimentation.

#### 6.1.1.4 Repetition

Repetition in one sense is the refinement of methods and perceptions. This is the re-working and re-thinking of ideas and procedures. It seeks clarity, coherence and sophistication. Repetition can also be seen as way to generate new insights. Each instantiation of an idea creates complications and exposes unresolved issues. This is repetition’s expansive potential—it challenges us to continually examine our habits and assumptions.

In the ambivalent animal project repetition can be seen in the series of experiments and prototypes that led up to the final creative pieces. It is also in the re-writing and editing of the dissertation and the refinement of the aesthetic framework over time. Repetition is also in the mix of writing and making and the mixing of media—I test out an idea using different media and materials as one way to gain new perspectives and generate new questions. And repetition occurs in the organization of the dissertation chapters—the three dialectics are applied to each animal role; they frame the cyborg, clone, chimera and shapeshifter and propose related yet different insights about each role.

These four components of research may appear to be sequential—we develop a topic through personal interest and examine that topic through a variety of texts, then through a mixture of personal perspective and analysis we create an overarching framework, and finally we explore that framework through writing and making—yet the actual process moves back and forth between the different stages of research. There are frequent interactions between the personal and communal, the specific and general, and theory and practice. And through these expansions and contractions the project slowly emerges.

### 6.1.2 Speculative Creative Research

This chapter introduces the creative practice that accompanies the writing portion of the ambivalent animal project. I developed two creative projects, *Zoocentrix: Purrplex* and *Petite Charm.* Both projects engage with the three dialectics; they explore issues of epistemology, ontology and corporeality. The projects' artifacts and experiences are speculative works—they propose alternative perspectives, bring up new questions, and suggest possible avenues of further research.

*Zoocentrix: Purrplex* is a series of artifacts and experiences designed for an individuated cat. The project employs tangible media and physical computing and includes the following prototypes: *Customized CatTV,* television programming tailored to an individual cat's preferences; *Outside-In,* a virtual cat-and-mouse game that includes an interface that tracks cat movement and projects twitching images just out of reach of a cat's paws; *SunSeeker,* a moving 'bot that seeks out sunlight in the house—a cat naps on top of the 'bot assured he'll be moved to the warmest place in the house; *Meat Mobile,* a mobile adorned with dried fish that slowly rotates as a cat approaches; *Tail-Twitcher,* stuffed-animal mice tails that twitch, triggering a cat's hunting instinct. My colleague and collaborator, Brain Schrank, also created *Mama Nipples*, a bed/kneading pillow/milk dispenser, and *Love Bytes,* a device that lets a guardian send messages to his cat and dispense treats from a remote location. These prototypes were promoted as the latest innovation in cat toys and entertainment.

The second project*, Petite Charm,* imagines a new kind of pet—a pet who is genetically modified to be small and docile enough to live on a human's arm. Petite takes nourishment by drawing blood from his guardian's arm and removes waste through his guardian's digestive tract. *Petite Charm's* genetic modification permits him to be integrated into the guardian's body, making *Petite* the ultimate "emotional-support" companion. The human host to the parasitic dog encounters corporeal risks and caretaking responsibilities. The guardian's blood could become contaminated resulting in illness and *Petite* requires a steady supply of fresh human blood when he is detached from the guardian's arm. These complications suggest that a solution to one problem—creating a miniature dog who can accompany his guardian anywhere—generates complications—close animal-human integration may sicken the guardian and requires the guardian to accommodate new pet-care routines.

*Zoocentrix* and *Petite Charm* create an opportunity to think about anthropocentrism within a culture of techno-science. *Zoocentrix* questions the human-focus of many tangible media/ubicomp projects; it argues that other species might also enjoy the benefits of mediated environments. *Petite Charm* examines anthropocentrism through a recapitulation and exaggeration of the long history of human and canine interaction. *Petite* ask us to review our complicated relationship with dogs and consider the ways we regulate and are regulated by animals.

Both projects engage with issues of anthropocentrism and animality through the framework of the three dialectics. *Zoocentrix* explores issues of epistemology and materiality as it tries to determine a cat's interests and sense of aesthetics. Observation of cat behavior and a review of commercial cat toys inform the design process, yet attempting to understand a cat's needs quickly reveals the difficulty of grasping a cat's desires given our limited knowledge of feline phenomenology. The project also foregrounds a cat's subjectivity—the cat is seen as subject worthy of research and a subject whose life might be improved through the techniques of tangible media. At the same time the project comments on the utopian rhetoric of techno-science—it questions the assumption that animal (or human) lives are inevitably enhanced through technological innovation. It parodies the uncritical faith in technology as a savior to both animals and humans.

*Petite Charm* is inspired by epistemological questions like: What is a dog?; What is a pet?; and if a dog is rendered immobile and his metabolism and diet drastically altered, is he still a dog or even a pet? The project also examines the ways that pets are the seen as the property of humans; the ways in which humans modify and regulate animals to meet human needs and desires. At the same time, the corporeal complications of *Petite Charm*—the potential health risks to a human host—suggest that human desires are often countered by pet demands. Human and pet enter into a relationship that requires accommodations from both parties, and this in turn alters the subjectivity and corporeality of both human and animal. Issues of mediation and materiality are also explored in the artifacts that accompany the project. Vinyl-skinned stuffed animals, a promotional web site, and mementos for the audience—all become a series of experiments inspired by *Petite Charm's* central concept and realized in a variety of material formats.

The projects were designed for the context and community of Georgia Tech's School of Literature, Communication & Culture (LCC) Demo Day. Demo Day is a three-to-four hour event at the end of each semester that creates a forum for LCC graduate students and faculty to present their research projects. The audience is a mix of Georgia Tech students and faculty as well as people who work in the media, entertainment and high-tech industries. Demo Day provides a moment for students to explain their research as well as an opportunity to make professional contacts. For the audience, the event introduces them to LCC’s research initiatives—this is a chance to meet with and be inspired by a community of digital-media researchers. Research projects are exhibited in LCC classrooms and many projects are often presented side by side in a single space. This creates a lively environment—students, posters, artifacts and media all compete for the attention of LCC visitors. Demo Day encourages a type of salesmanship—it is a moment to promote your research to a receptive audience. As part of the ambivalent animal project, I was interested in challenging some of the assumptions of Demo Day. I wanted to exaggerate the performance of salesmanship and also question the technological enthusiasm that often accompanies the demonstration of digital projects. To do this, Brian Schrank and I posed as entrepreneurs who were eager to sell the latest in animal games and genetically modified pets.

Audience reaction at Demo Day suggests that many saw the ambivalent animal project as unusual and a little out of step with their expectations of new media projects. The juxtaposition between ambivalent animal and other digital media projects was enhanced by the space we choose for the works. While most projects are presented side by side in large classrooms, we were able to present the ambivalent animal project in what was once a telephone room—a narrow, closet-like space, a little more than six feet by seventeen feet in dimension. This gave us a semi-autonomous space, one that could be disconnected from other Demo Day projects yet still part of the flow of visitor traffic. The room was also filled with the smell of dried fish and cat food and the sight of stuffed animals and new media artifacts—this was a closet populated with unusual smells and objects. Audience members reacted in mostly positive ways. One person stated, “This is weird!” but then brought several other people to see the work. Many people found the projects amusing. *Zoocentrix* tended to be an easier project to translate into the interests of a media-focused audience. Many participants made connections between ubicomp projects designed for humans and *Zoocentrix's* offerings aimed at cats. On participant stated, "This is like a smart home for cats." *Petite Charm* generated stronger reactions. One participant stated, “PETA would be fine with all of these [pointing to *Zoocentrix* projects], but not this [pointing to *Petite Charm*].” Still, for some, *Petite Charm* was not completely repellant; one audience member said, “I would be interested in that if it was a cat instead of a dog.”

Humor was a critical element of the presentation of this work. I saw humor as part of the ambivalent aesthetic—a way to ask questions without slipping into a sanctimonious critique. Humor provides one way to create a "weak response" to both anthropocentrism and the culture of techno-science. Leonard Lawlor, following after Derrida, describes a weak response to speciesism as "ratcheting down" the violence inflicted on animals without creating coercive mechanisms that regulate human behavior. By clearly exaggerating my salesmanship of *Zoocentrix* and *Petite Charm*, I invited audience members to participate in my performance. This was a playful way to engage people in difficult issues. To preach or attack directly could easily make people defensive, shut down debate and generate hostile reactions. A humorous approach eases people into the discussion and has the potential to challenge assumptions without being didactic. This approach examines the divisions between animals and humans without creating divisive rhetoric. It is a soft form of opposition that hopes to begin a discussion about anthropocentrism.

This sense of play was reinforced by the projects' design. My formal approach included stuffed animals and cartoon characters. When *Petite Charm* is presented as a cute, stuffed animal that can be strapped to your arm, the monstrous side of *Petite* is diminished, and he can be seen less as a parasite and more as comforting companion. *Zoocentrix*'s critique of anthropocentrism and techno-utopia was tempered by the toy-like quality of the artifacts animated by motors, media and sound. And mementos like coloring books, badges and stickers referenced the whimsical appeal of childhood trinkets and collectibles. This playful sensibility is part of the ambivalent aesthetic—the pieces are a mix of strange and familiar, critical and affirmative, dark and light.

## 6.2 Irreducibility & Procedurality

### 6.2.1 Language Games

An examination of the interactions of theory and practice offers an opportunity to explore the divisions between different modes of research. Jean-Francois Lyotard following after Ludwig Wittgenstein examines the language games that are naturalized within a particular disciplinary discourse. Each domain of knowledge has its own “game rules”—established methods of explicating data, proving competence, and declaring success. Lyotard discusses the differences between cultural narratives and scientific discourse:

> Both are composed of sets of statements; the statements are 'moves' made by the players within the framework of generally applicable rules; these rules are specific to each particular kind of knowledge, and the 'moves' judged to be 'good' in one cannot be of the same type as those judged 'good' in another, unless it happens that way by chance.[1]

Lyotard argues that the “game rules” of science have changed in a postmodern epoch. No longer is performance or efficiency the primary goal of science. Performance in this context could be interpreted as rigorously employing and exploiting existing “game rules.” Contemporary science is less sure of its grasp of a system’s mechanisms and “variables”—that is, a system is seen as less stable, not fully “calculable” or knowable. Instead of improving the performativity of game rules, postmodern science embraces paralogy—it seeks out new “moves” in the language game of science.[2] “Science is a model of an ‘open system,’ in which a statement becomes relevant if it ‘generates ideas’ that is, if it generates other statements and game rules.”[3]

This desire for alternative “moves” blurs the boundaries of disciplinary fields. The metanarratives of the Enlightenment are unable to contain the diversity of language games.[4] No single narrative can shape the underlying logic of all language games. And without an overarching narrative to guide and restrain knowledge, disciplinary fields become less fixed and start to employ new methods of discourse. Postmodernity’s lack of consensus permits multiple ways of examining and expressing ideas—no one method is able to dominate all others. In this shifting epistemological context, combining theory and practice becomes a possibility. Navigating across different modes of inquiry inspires new “moves.”

Moving back and forth between theory and practice creates a unique opportunity. Crossing the divide between two language games not only promises the possibility of innovation but also makes apparent the differences between the two domains of knowledge. We become conscious of what can be articulated within a language game; we recognize the strengths and insights as well as tools, methods and traditions of a particular mode of action. We are also conscious of what cannot be easily articulated within a domain of knowledge—the types of action and analysis that are excluded or forbidden. Switching between language games brings into the focus the advantages and limitations of each mode of research.

Assessing and employing different game rules requires navigating unfamiliar terrain. No longer tied to just theory or practice, the practitioner-theorist is forced to discover alternative methods of action. Steve Baker describes this “inexpert” action as a mode of research commonly employed in an era of paralogy:

> Invention, Lyotard writes, “is always born of dissension,” and this idea is at the heart of “postmodern knowledge,” whose principle “is not the expert’s homology, but the inventor’s paralogy.” It is a kind of partisan knowledge, in other words, which refuses to conform to rules and which may even embrace the apparently fallacious, *not knowing what will follow from that.*[5]

Baker notes that this type of “inexpert” action is more likely to create questions than provide answers.[6] The process of working through different language games requires embracing unfamiliar identities and evolving procedures. The theorist-practitioner transgresses traditional epistemological borders and engages with a range of ideas, materials, communities, and protocols. This may leave the practitioner-theorist in an uncomfortable position—he lacks the expert's epistemological confidence. But the contingency of his environment may also invigorate well-worn perspectives, communication strategies and cognitive processes.

### 6.2.2 Ways of Knowing

Practice and theory create different kinds of knowledge. The two modes of research are often divided by differences in method, medium, expression, and validation. Language, rhetoric, history, and economics also play a role in maintaining this division. This gap between theory and practice sometimes leads to epistemological inequalities. Theory's capacity to invent knowledge is rarely questioned; practice's knowledge-producing ability in the context of art-making, however, remains less sure.

Epistemological concerns of theory and practice are explored in a listserv hosted by iDC (Distributed Creativity)—an academic forum that discusses issues of research and pedagogy. One thread examined the emergence of theory-practice Ph.D. programs in university new media departments. I use this thread to provide a snapshot of particular kind of discourse happening in the early 21$^{st}$ century in a mostly American, humanities-oriented, academic context. Margaret Morse, professor at UC Santa Cruz, Film & Digital Media, moderated the discussion. In her introductory post, Morse highlighted practice's knowledge-producing capacity. She noted that her department holds a "positive belief in (media) art as a mode for creating knowledge that should have access to a broader or deeper foundation of studies."[7]

Creating a theory-practice Ph.D. as a method to explore a "broader" range of knowledge was taken up in a post by Mary Anne Staniszewski who teaches in Rensselaer Polytechnic Institute's Art Department. Staniszewski wrote that RIT developed a practice-theory Ph.D. degree in part to allow students more time to gain knowledge outside the domain of art. In her program, art students not only study art theory and practice but also explore fields like "communication technologies, biology, and gaming"—domains of knowledge that tend to exist outside art-school instruction. Staniszweski noted that RPI's MFA—a two-year terminal degree—does not allow enough time for artists to adequately explore interdisciplinary approaches. Providing a

Ph.D. degree permits more expansive research methods. Using Lyotard's framework, the Ph.D. program gives students time to learn about alternative language games.

When Morse writes about art as a "mode for creating knowledge," though, she moves beyond the idea of interdisciplinary study. Practice as a way of knowing and generating knowledge is a more radical notion of art and media production than Staniszewski's idea of supplementing practice by exploring other disciplines. Practice as a method of producing knowledge challenges the traditional divisions between theory and practice. Both theory and practice become modes of understanding, assessing and developing insight. In a post following Morse's, David Hakken proposed that practice creates knowledge in a couple of ways. The first way, "a relatively weak claim," argues that in the process of making we recognize what we do not know and return to theory to fill in the gaps. The second way, "a stronger claim," argues "that making (media) art is itself its own way of knowing."[8] Morse concurs with Hakken's claim by relating her own theoretical work to art practice:

> I am not an artist, so I can only guess that making an art piece is like writing, in that the act of formulating language itself brings out unanticipated insight and utterly new perceptions. This reminds me of the essay by Kleist on "the gradual completion of thoughts while speaking." I only know what I really think when I write about it.[9]

Morse raises practice to the epistemological level of theory. In this framework, practice is neither the servant nor object of theory. And theory-practice moves beyond an attempt to push practitioners into theory or compel theorists to engage with practice. Staniszewski's argument that a Ph.D. degree allows artists to expand their repertoire of knowledge maintains theory's dominance and extends its influence to interdisciplinary study. This perpetuates a Cartesian bias that relegates practice to a subservient status—the act of making is tainted by its association with sensuality and bodily labor;

theory-writing is elevated through its connection to language, reason and mind. Morse and Hakken suggest, however, that practice, just like theory, is a legitimate method of producing knowledge.

A similar debate emerges between art and science. A recent conference for the Society for Literature, Science and the Arts (SLSA) organized a roundtable to discuss art's ability to create knowledge and science's capacity to generate art. The panel included a visual artist, literary expert, art historian and physicist. Physicist Sidney Perkowitz of Emory University referenced the light-inspired works of James Turrell to describe art's knowledge-making capacity. Perkowitz describes Turrell's light as "granular": "It's almost as if you were able to take each individual photon and blow it up to a point where we could see it." Perkowitz views Turrell's way of working with light as unique. "Turrell has found a piece of knowledge about human visual cognition which perhaps he alone knows how to express. If he were a scientist he would rush into publication and tell us about his important new discovery." Perkowitz goes on to describe key differences in the language games of art and science:

> Here are things that go on in scientific knowledge:
>
> You express your result in detail. You publish it. It's meant to be read and understood by other scientists in the field to the point where the process can be replicated. That's really, really important. What you publish, it better either be consistent with known knowledge or it has to provide a new improved level of explanation, a better theory. And finally, at some level, it's affirmed by the community of relevant scientists as being *the* correct description of what's going on in nature for this particular piece of nature.
>
> What does an artist do? Artists also have knowledge, but it's expressed in artistic terms but not necessarily in any other kind of detail. Turrell did not write a paper about the lighting conditions that makes light look granular. It's meant to be

> conveyed not to a whole community of other artists, in parallel to what scientists do, but to the viewer—there's a channel between the artist and viewer. It is not exposed to community standards which have attached to them words such as "consistent with known knowledge" or "reproducibility." Again which is what the scientist looks for. In general…in art there is no communal mechanism to stamp a piece of artistic knowledge as the one correct description of reality or even the correct solution to an artistic problem. So maybe the idea of rightness or correctness doesn't apply very well to artistic knowledge at all because it's more individual, it's between the artist and the viewer; it's more experiential…in Turrell's thing you actually have to be in the room to understand what he's saying about the granularity of light. And finally it's more opaque than scientific knowledge because it's not expressed in these detailed forms. But I think the opaqueness is a good thing because according to George Braque, the best thing about art is that part that you can't explain.[10]

Of course, there are communities that evaluate art practice. Though perhaps Perkowitz is expressing a sense that these art communities are less systematic than scientific communities in their methods of assessment. They may be more fragmented or isolated, less global in their reach, and less willing or able to impose universal standards.

Steven J. Oscherwitz, a visual artist and professor at Emory University, was also on the SLSA panel. He describes art's influence on the sciences as follows:

> I feel that artists have access to different levels or frequencies of knowledge. And these knowledge forms, these forms are actually part of the physical world, just like we are, just like animals are, insects are. But we do not yet conceive of ways to extrapolate their reality. And I think that as time goes on, art that hangs in museums will have a different reality in our minds—will develop new concepts about form, abstract form that allows it not to be this impotent, passive, bourgeois

> thing that hangs in museums….these forms are really, really part of the physical world. They have a reality in the world…. In order to really capture certain physical laws to understand even diseases like cancer. These forms are going to help us solve problems and riddles of nature that our conceptual form in physics or biology at this point, they're not there.

Oscherwitz's statement celebrates art's ability to create knowledge, but he also returns the final judgment of knowledge to the sciences. The scientist produces knowledge after being influenced by art's innovation. This leaves art's knowledge in a subordinate role: art's knowledge is only valuable when it inspires insights in the domain of science. Surprisingly, physicist Perkowitz's view of art is more radical. He respects the difference between science and art without rushing to create value judgments. He sees in Turrell a type of knowledge that stands on its own merit. Turrell's light remains a revelation that cannot be fully explicated through the language games of science.

### 6.2.3 Interactions of Theory and Practice

When practice and theory engage in a dialogue, new forms of interaction between the two domains of knowledge may emerge. In my own practice, these interactions occur in a variety of ways. Before developing the framework of the three dialectics, I created some initial sketches and prototypes for a project entitled *Lovely Monste*r. I was imagining a series of networked, wearable extensions that looked like animal parts and responded to individual, communal and environmental data inputs. For example, mechanical wings worn on the back might expand and contract based on the wearer's breathing patterns or animate to the breathing patterns of a member of the "flock" or respond to air temperature—flapping to cool you when it's hot and retracting to keep you warm when it's cold. In the process of conceptualizing these animal augmentations, issues of art making, subjectivity, materiality, and corporeality came to the fore. These issues highlighted by the *Lovely Monster* project became the basis for the three dialectics. Specifically, the tension between using off-the-shelf, generalized hardware-software to construct one-of-a-kind artworks led to the dialectic of irreducibility and procedurality. General-purpose components require procedural innovation, yet the artwork employs these components in ways that are specific to particular person and context. Quantifying bodily processes to animate the wearables also challenged me to consider the irreduciblity of corporeal perceptions—how do we quantify a person's level of stress, contentment or excitement? Such measurements can easily ignore the complex physiology and emotions of an individual. Looking to animals for formal, social and phenomenological inspiration led to questions of subjectivity and anthropocentric arrogance. The division between humans and nonhumans and the complexities of pack behavior led to the dialectic of autonomy and integration. And the tension between technology that enhances and technology that invades our lives led to the dialectic of aura and abjection. To put on an animal wearable gives you access to a new kind of phenomenology as well as initiates you into a pack of augmented human-animal hybrids. At the same time, wearing the animal apparatus makes you an absurd spectacle and transmits bodily data that you may wish to conceal. The *Lovely Monster* project remains in its embryonic stage—it waits for a chance to emerge as a fully developed artifact—but its legacy is evident in the structure of the thesis. Thinking through the complexities of a physical computing media-art project led to a theoretical framework.


6.1 Illustration for the *Lovely Monster* project

In another example, theory influenced the creation of an art project. *Petite Charm,* a conceptual project that imagines a parasitic pet who is attached to your arm, is inspired by the subjective and corporeal transformations proposed by posthuman theorists. The project is also inspired by the design research of Royal College of Art professors, Anthony Dunne and Fiona Raby. Dunne-and-Raby projects investigate about-to-happen technological scenarios and develop objects and experiences that engage with the interactions of culture and technology. They combine theory's speculative style with industrial and experience design. The work of Dunne and Raby and the methods of theory gave me the creative license to explore a project I could not physically construct—I was free to engage with issues of biotechnology without becoming a bioengineer. *Petite Charm* houses a variety of symbolic artifacts (stuffed-animal puppies that are strapped to the arm, survival-chambers designed to protect and nourish the dog when he is detached from a human arm, media artifacts that promote the project as well as hint at the complications of hosting a parasitic dog), but the project remains at its core a conceptual exploration that tries to comprehend the pleasure and pain of animal-human interdependence.

6.2 Illustration for *Petite Charm* project

A final example draws on Lyotard's idea of language games. My training in the language game of art—a postmodern pedagogical approach popular in art schools at the turn of the 21st century—encourages hybrids of high and low culture. Inspiration was sought in eclectic mixtures. This approach to art practice influences my theoretical methods. This dissertation navigates across the domains of poststructuralist theory, animal studies, ethology, biotechnology, fine art and popular culture. Seeking out a variety of sources is everyday practice for many contemporary artists and synthesis becomes a part of the artist's craft. I have employed this sensibility to my theoretical work by negotiating between different language games.

A postmodern mix of language games and media is also evident in my approach to *Petite Charm*. Brian Schrank and I presented the project at LCC's Demo Day as if it were the latest innovation in pet companions. We became salesmen for the *Petite Charm* product and enhanced this performance with a series of artifacts. I created several vinyl-skinned stuffed animals that could be attached to your arm and strapped the animal to my arm while explaining the project. In addition, I made *Petite Charm* coloring books, *Puff Petite* rings, badges, posters and stickers—these items served as mementos that participants in the performance could keep. Creating paraphernalia continued the parody of corporate salesmanship, but it also allowed me to explore the ideas of *Petite Charm* across a range of media. This mix of motivations and artifacts was designed to add to the ambivalence of the project. The experience shifted between student showcase, entrepreneurial promotion and art performance, and the concept moved from one instantiation of the *Petite Charm* idea to another. This impurity was essential to the presentation of *Petite Charm*—the experience was simultaneously critical and oppositional, serious and playful, formal and conceptual.


6.3 *Petite Charm* coloring books, *Puff Petite* rings, and badge

All the above projects are influenced by the oscillations of theory and practice. My epistemological methods—my ways of knowing—borrow from the traditions of both research modes. Writing and making for the ambivalent animal helped to engage practice and theory.

### 6.3 Autonomy & Integration: Transgressed Divisions

The dialectic of irreducibility and procedurality and Lyotard's language games foreground epistemological issues. The dialectic of autonomy and integration emphasizes ontological concerns. When we move beyond specific game rules and start to trace the boundaries of a domain of knowledge, epistemological concerns shift into ontological considerations. Why are things divided into categories? How do these boundaries of knowledge construct my sense of the world? Are there other domains of knowledge, off-limit disciplines or unchallenged assumptions that might enhance or alter my methods of research? And how do existing boundaries support the status quo?

Matei Calinescu notes a shift from epistemology to ontology in literary culture. He argues that modernity highlights epistemological uncertainty and postmodernity emphasizes ontological confusion. In the modernist age, a protagonist questions what he knows. In the post-modern age, he questions what exists in his world. Calinescu quotes Brian McHale to support his view:

> The dominant Modernist writing is *epistemological.* That is, Modernist writing is designed to raise such questions as: what is there to be known? who knows it? How do they know it and with what degree of certainty? how is knowledge transmitted from one knower to another and with what degree of reliability?
>
> The dominant of Postmodernist writing is *ontological.* That is, Postmodernist writing is designed to raise such questions as: what is a world? what kinds of world are there, how are they constituted, and how do they differ?...what is the mode of existence of a text, and what is the mode of existence of the world (or worlds) it projects?[11]

The distinctions between epistemology and ontology should not be seen as entirely incommensurate. The two filters are affiliated. Calinescu argues for a strong link between epistemological and ontological questions. He states that "when the inner logic of modernist questioning is pushed to the extreme, it brings about postmodernist questioning and vice versa."[12] When we investigate a language game, we trace the epistemological framework of a particular domain of knowledge. When we compare language games, issues of epistemology merge into ontology. We examine the interactions between worlds—the differences between language games—and analyze the way we inhabit and engage with others within a world.

An ontological emphasis highlights issues of difference, power and justice. Lyotard examines the tension between language games through his concept of the differend. A differend reveals the heterogeneity of "phrase regimens"—it highlights the differences in address, explication, argument, understanding, ethics and assessment between different communities that inhabit different language games. "[A] differend would be a case of conflict, between (at least) two parties, that cannot be equitably resolved for lack of a rule of judgment applicable to both arguments." A differend highlights the variety of "phrase regimens" that operate in different domains of knowledge and the injustice that occurs when one domain of knowledge imposes its language game on another domain. Lyotard argues that "a universal rule of judgment between heterogeneous genres [of discourse] is lacking in general."[13]

"Phrase regimens" are situated within and specific to a community and domain of knowledge. Phrases are linked in particular ways within "genres of discourse." Lyotard describes the disconnections between phrase regimens as follows:

> For every phrase regimen, there corresponds a mode of presenting a universe. A genre of discourse inspires a mode of linking phrases together, and these phrases can be from different regimens. The universe presented by a cognitive

> and the universe presented by an exclamative are heterogeneous. The stakes implied in the tragical genre, its intended success (shall we say, the feelings of fear and pity on the part of its addressees), and the stakes implied in the technical genre, its own success (shall we say, the availability of the referent for the addressor's wants) are, for their part, incommensurable, and they induce heterogeneous linkings, be they on the basis of the same phrase.[14]

A genre shapes the way that phrases are combined and expressed: "We believe that we want to persuade, to seduce, to convince, to be upright, to cause to believe, or to cause to question, but this is because a genre of discourse, whether dialectical, erotic, didactic, ethical, rhetorical, or 'ironic,' imposes its mode of linking onto 'our' phrase and onto 'us.'"[15] Lyotard's concept of a differend emphasizes the gap between discourse genres and the uncertain process of linking one phrase to another. In the context of this chapter, we could say a differend exists between the domains of theory and practice. A sensibility of ambivalence highlights the tension between language games; it embraces difference while attempting to prevent one phrase regimen from dominating another. At the same time, it seeks out new "moves" by engaging both theory and practice. This mix of methods hopes to expand the possibilities of both domains by working through this differend. And this sensibility is crucial to my own understanding of the integration and autonomy of theory and practice. Both "genres of discourse" have their particular "phrase regimens"; we could describe this as a certain amount of autonomy. For example, one possible generic model of a theoretical phrase regimen could be: a general thesis is proposed; arguments and counter arguments are presented; arguments move in a logical manner, build on previous arguments and create a trail of supporting evidence; resolution is reached when arguments are exhausted and a conclusion can be stated; success is achieved when the original thesis is validate or disproved. A phrase regimen for art practice might follow a different kind of model: a body of work explores a specific idea, often personal or social; a particular aesthetic or perspective frames the work; a series of artifacts or experiences explore different aspects of the idea; success is achieved through aesthetic innovation, perceptual disruption or political insight. Different genres solicit different phrase regimens. In the previous examples, phrases are linked in a theoretical argument or in aesthetic expression.

Lyotard argues that innovation emerges when different language games interact and existing idioms fail:

> In the differend, something "asks" to be put in phrases, and suffers from the wrong of not being able to be put into phrases right away. This is when the human beings who thought they could use language as an instrument of communication learn through the feeling of pain which accompanies silence (and of pleasure which accompanies the invention of a new idiom), that they are summoned by language, not to augment to their profit the quantity of information communicable through existing idioms, but to recognize that what remains to be phrased exceeds what they can presently phrase, and that they must be allowed to institute idioms which do not exist.[16]

Attempts to combine theory *and* practice cause vibrations between two genres. These undulations provide a moment of danger and opportunity. One discourse may quickly dominate the other; one genre could determine the operating rules of another. There may be irresolvable differences, gross miscommunications and disconnections. But at the same time, the interactions of genres may also invent new moves. The ambivalent animal project walks a tenuous line—it recognizes the distinctions of theory and practice yet proposes that the process of traversing these different domains engenders alternative methods of thinking-through, assessing and making. Theory and practice never completely merge but rather the tension between the two domains remains in play. And this tension, this lack of consensus, may lead to unexpected insights. These interactions of theory and practice have altered both the writing and making of this dissertation. The writing's argument is shaped by an ambivalent aesthetic; the making incorporates conceptual approaches and is influenced by philosophical debates.

### 6.3.1 Complicity and Critique

The dialectic of autonomy and integration is not only engaged by the interactions of theory and practice, it also appears in an ambivalent aesthetic that mingles oppositional and complicit modes of artistic address. *Zoocentrix* and *Petite Charm* oscillate between affirmation and critique. They engage two sides of contemporary art discourse—one side promotes art's autonomy, the other acknowledges art's connection to culture and markets. Claire Bishop's writing about relational aesthetics is emblematic of an oppositional stance. Joanne Drucker's assessment of contemporary art highlights a complicit approach to creative practice. An ambivalent aesthetic recognizes the importance of both positions—it imagines theoretical and creative research that is both autonomous and integrated.

Bishop examines the mechanisms and reception of relational-aesthetic artworks. These artworks tend to create participatory experiences rather than traditional artifacts—the artist invites participants to form a community and shape an aesthetic experience. Issues of debate, democracy and political engagement are central to Bishop's investigation of relational aesthetics. Bishop characterizes democracy as a political space of continuous challenge: "a fully functioning democratic society is not one in which all antagonisms have disappeared, but one in which new political frontiers are constantly being drawn and brought into debate…Without antagonism there is only the imposed consensus of authoritarian order—a total suppression of debate and discussion, which is inimical to democracy."[17] Bishop notes that the rhetoric of relational artworks often emphasizes the importance of non-authoritarian social interactions, but she proposes that many of these relational artworks lack the push and pull of democracy; they are instead designed for and experienced by a closed-community of like minded cultural connoisseurs.

One artist that Bishop examines in her critique of relational artworks is Rirkit Tiravanija. Tiravanija is perhaps best known for an art performance in which he cooks a Thai meal in a gallery space and in the process turns an exhibition space into dining room. Tiravanija describes his approach as: “it is not what you see that is important but what takes place between people.” Tiravanija’s work questions the divide “between institutional and social space” as well as “artist and viewer.”[18] The gallery is transformed into a communal space instead of a promotional/administrative space; the artist creates an experience rather than artifact and the participants’ interaction determines that experience. Bishop describes relational artworks as lab-like environments that encourage multi-participant performances that are “open ended, interactive, and resistant to closure.”[19] “Relational art works seek to establish intersubjective encounters (be those literal or potential) in which meaning is elaborated collectively rather than in a privatized space of individual consumption.”[20] The social experience trumps the aesthetic or formal experience.

Bishop’s critique of Tiravanija’s social performances is determined by her definition of democracy. Tiravanija creates what relational theorist and booster Nicola Bourriaud calls a “microutopian” environment. Bishop argues that “there is no inherent friction” in this social situation. Tiravanija creates a feel-good art experience that simply gathers a group of like-minded art enthusiasts.[21] Tiravanija’s work, according to Bishop, lacks the antagonism that is at the core of democracy. And this type of democracy guides Bishop’s assessment of relational aesthetics: the best work generates social tension.

As a counter example to Tiravanija’s work, Bishop showcases the art of Santiago Sierra. According to Bishop, Sierra’s politically charged events employ a more challenging form of relational aesthetics. Sierra pays participants to engage in preplanned activities that comment on economic and social injustice. In one event, Sierra hires people to stand side by side while a continuous line is tattooed across their backs. In another event, he pays people to masturbate. At the Venice Biennale, Sierra paid illegal street vendors to dye their hair blonde and transformed his exhibition space into a temporary street vendor market. Marginalized street workers suddenly became visible, and art patrons found knock-off handbags for sale within a prestigious art venue. Bishop summarizes the experience: “Sierra’s action disrupted the art audience’s sense of identity, which is founded precisely on unspoken racial and class exclusions, as well as veiling blatant commerce.”[22]

Bishop’s analytical framework makes little room for affirmative artworks. Her methodology relies on a particular interpretive mode of negation and opposition. As such it represents a particular mode of contemporary art critique—art must remain autonomous to create a valid aesthetic experience and activist art is privileged over complicit art.

Joanna Drucker proposes a very different mode of address. She privileges affirmation and argues that art embedded within the culture provides an opportunity for invention:

> To say that the art world is a long way from revolutionary politics is to make a pronouncement so naïve-sounding as to be painful. And yet, the persistence of mythology requires such bald assertions. Fine art should be relieved of the requirement that it function as a so-called ‘political’ instrument of opposition. Recast fine art as a cultural practice of complicity—and its imaginative possibilities expand. Such a reoriented aesthetics escapes the predictability and formulaic repetitions that obtain within the coercive agendas of an academic avant-garde rhetoric of radical opposition.[23]

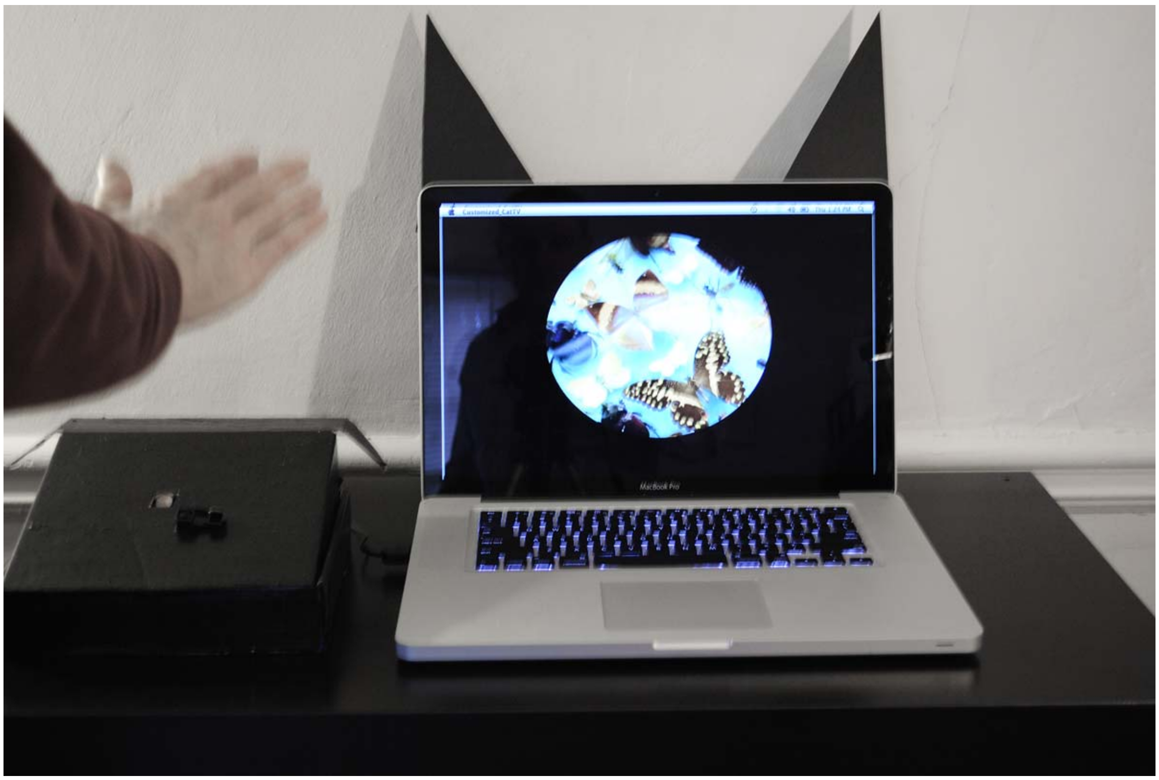
Drucker argues that affirmative art is often excluded from fine-art discourse because it does not conform to a culture of negation. “Is the tendentiousness of affirmation any less constrictive than that of formulaic opposition?”[24] Drucker sees affirmative art as providing a welcome alternative to the activist framework of contemporary fine art.[25] She sees complicit art as opportunity to challenge the “orthodoxy” of art theory that promotes difficult and detached artworks:[26]

> The tenacious core of outmoded discourse is that art exists to serve some utopian agenda of social transformation through intervention in the symbolic orders of cultural life. Its dreadful, reified rhetoric of elitist posturing passes itself off as the spirit of political heroism. Far from the fray of real politics, from grass roots community organizing or lobbying agencies, this has become the managed, bureaucratic discourse of new academicism, as repressively formulaic as any of the nineteenth century salon or atelier styles it disdains. The unthinking position continually replicates itself in elite institutions and esoteric, policed languages of high criticism. Entrenched and unchallenged, this academic discourse largely serves careeristic or professional interests, while claiming a revolutionary, even proletarian (can we really even still write that word?!?) agenda. Getting free of the grip of habits of thought engrained in this critical legacy is essential if we are to reimagine our relation to the world of aesthetic experience—and of actual politics as well.[27]

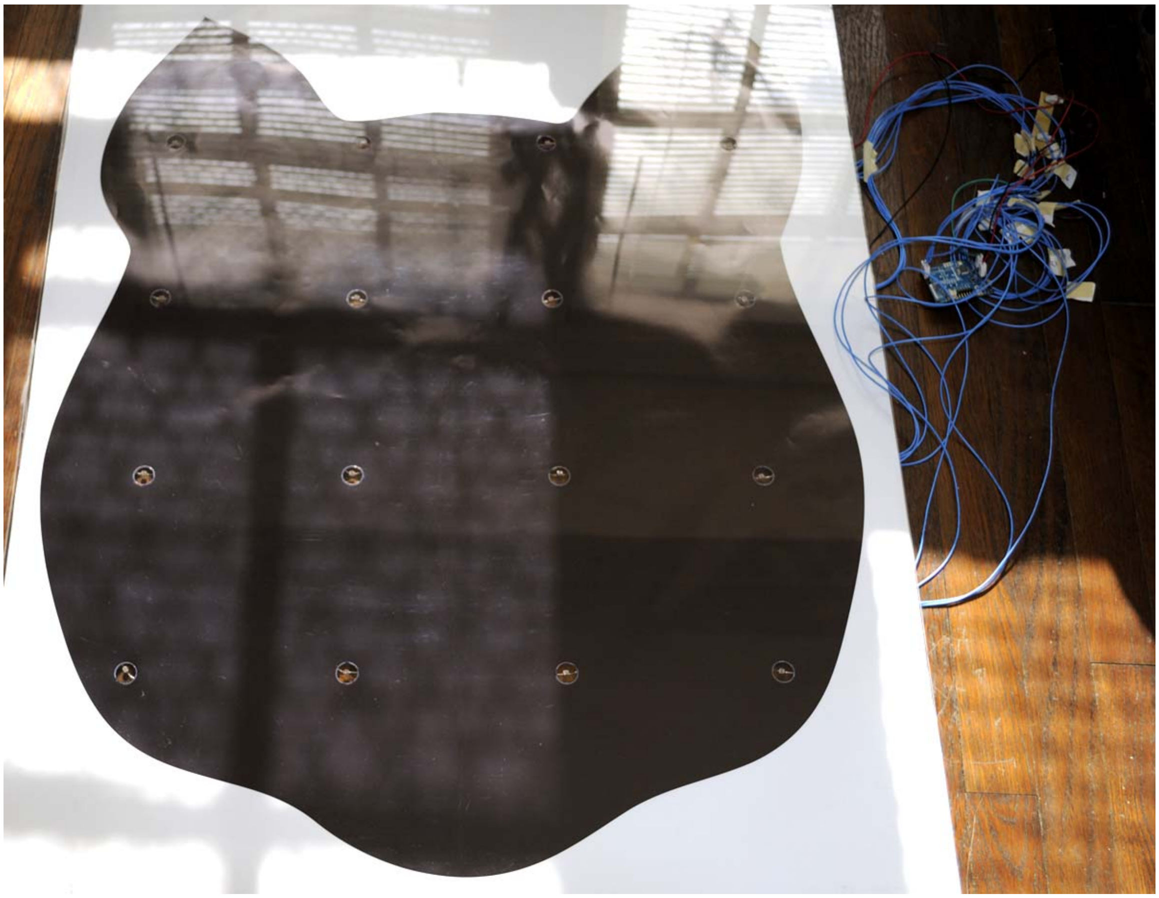
Drucker argues for an interpretative mode that embraces artists who are embedded in the economic-cultural landscape. This is in direct contrast to Bishop’s interpretative mode that employs oppositional strategies of critique. Bishop foregrounds opposition and autonomy; Drucker privileges complicity and integration. The critical apparatus of both Bishop and Drucker open and close avenues of creative and analytical research. Both function to one degree or another as gatekeepers of a particular interpretive model.

Seen through a filter of ambivalence, both models have strengths and weakness and reveal and conceal ways of understanding and thinking-through art practice and theory. An ambivalent framework argues that social criticism need not be fully antagonistic and integration in the market place need not be completely complicit. The interactions of autonomy and integration are often more productive than complete submission to one side or the other.

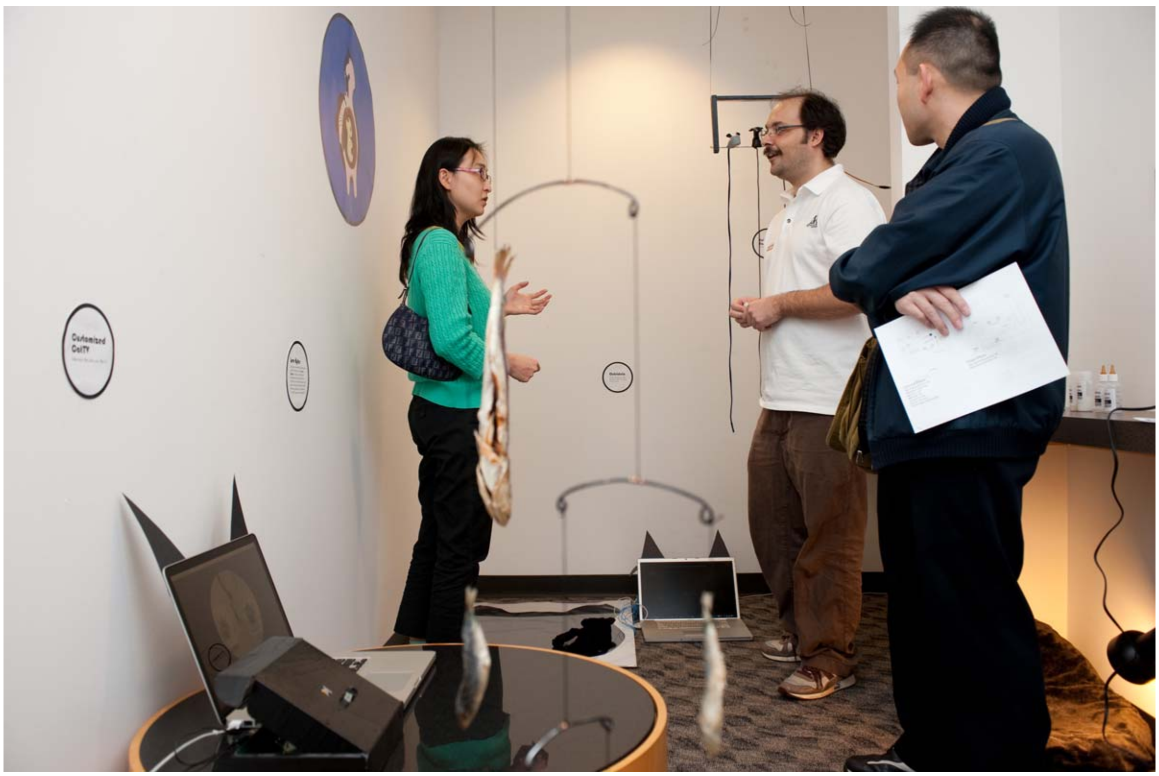
I explore this tension between autonomy and integration in *Zoocentrix: Purrplex*, an art/design project that develops interactive experiences for cats. On the surface, *Zoocentrix* houses a series of artifacts that explore a cat's desire for comfort and entertainment. This is an affirmative proposal that seeks to make a cat's life better through digital media. But the project also has some reservations about technology-driven initiatives. Within a techno-scientific community, technological innovation is often proposed as the solution to a range of problems. *Zoocentrix* simulatanously supports and refutes this view. *Zoocentrix* houses conflicting motives—it tries to enhance a cat's life by integrating technology into cat toys but also questions whether technology alone can accommodate a cat's desire for play. It also parodies the utopian rhetoric that is often used to promote new media projects.



6.4 *Customized Cat-TV*



6.5 *OutsideIn's* interface



6.6 Fall 2009, LCC Demo Day

6.7 *Tail Twitcher:* mice tails that twitch when a cat approaches

*Zoocentrix* proposes that cat concerns trump human concerns: it builds an environment that accommodates feline desire and embodiment. This is a challenge to anthropocentrism, but a challenge tempered by playful affirmation. The project also critiques the utopian drive to solve all problems (and regulate all chaos) through technological innovation. The excesses of techno-culture are parodied by the scale and variety of cat-focused artifacts. But these cat-centered devices also celebrate machine capabilities and the pleasures of automation. Furthermore, the cat's uncertain subjectivity—he is both family member and household commodity—enhances the project's ambiguity. The desires of domestic animals warrant serious research (both in the pet-food and toy industries) and also generate serious revenue, yet pets remain somewhat risible subject-objects of inquiry. This ambivalent status adds to the absurdity of the *Zoocentrix* project. A viewer may ask, “Why would such energy be expended on the needs of a cat?” My hope is that this question leads the viewer to the project’s affirmative and oppositional motivations. *Zoocentrix* promotes the desires of an individuated cat, questions human centrality, comments on techno-culture’s excesses, and plays with the toys of tangible, digital media. The project’s impure motives create its ambivalent aesthetic.

### 6.3.2 The Importance of Difference & Division

This ambivalent aesthetic keeps autonomy and integration in play and aligns with an interpretive sensibility Matei Calinescu calls “weak thought.” Weak thought is an alternative to the “metaphysics” or “strong thought” of modernity. Calinescu describes strong thought as “a thought that is domineering, imposing, universalistic, atemporal, aggressively self-centered, intolerant in regard to whatever appears to contradict it.”[28] Weak thought is open-ended rather than conclusive and embraces contradiction rather than consistency. Calienescu sees weak thought in postmodern interpretative models:

> The most adequate expression of weak thought is the ‘right’ hermeneutical attitude in which…the interpreter practices, as it were, a methodical weakness (made up of attentiveness and compliance to the inner demands of the object of interpretation, respect for its essential fragility, willingness to listen to what it says before questioning it, and renewed efforts not to impose on it one’s own “rationality” or convictions).[29]

Calinescu sees this shift from strong to weak thought as a move from “either/or” logic to “both/and” logic.[30] He describes “weak thought” methods as “dialogic”, “polyphonic” and “carnivalizing.” In a similar vein, I wrote in the Chimera chapter about Leonard

Lawlor's argument for a "weak response" to animal cruelty. This is a response that seeks to "ratchet down" the violence done to animals without creating totalizing solutions.[31] "Weak thought" and "weak response" suggest the possibility of weak theory and weak practice. Drucker's complicit artist could be an example of this form of creative address. The artist is no longer detached—she is no longer an oppositional genius—but instead acknowledges her connection to markets, her debt to history, and the influence of the broader culture on her practice. Bishop's description of relational artworks could also be an example of weak practice—these open-ended projects avoid creating rarefied artifacts and focus instead on creating ephemeral social experiences located in a particular space and time.

Some lament the weakening of theory and practice. Jameson's description of postmodernity's "waning of affect"[32] suggests lost vitality. But weakness need not be a pejorative and the tensions between high modernism's totalizations and postmodernity's lack of consensus can be kept in play. Bruno Latour promotes this mingling of modern and postmodern ontologies. We keep some of modernity's purity but make central postmodernity's hybridity. Latour argues that modernity is able to generate tremendous social and scientific change by separating "nature," "politics" and "discourse."[33] By creating clear divisions between science, society and God, the moderns are able to exploit the productive potential of natural resources and labor. By creating distinct disciplines that bracket out an array of concerns, the moderns expand the scale of industry, culture and government. The premoderns who refuse to cleanly divide between nature and culture cannot keep up:

> By saturating the mixes of divine, human and natural elements with concepts, the premoderns limit the practical expansion of these mixes. Is it the impossibility of changing the social order without modifying the natural order—and vice versa—that has obliged the premoderns to exercise the greatest prudence. Every

monster becomes visible and thinkable and explicitly poses serious problems for the social order, the cosmos, or divine laws.[34]

A rich network of liaisons and hybrids emerge to fill the gap between nature and culture. Postmodernity recognizes the expansion of these networks—"In the middle, where nothing is supposed to be happening, there is almost everything"[35]—and argues that the false divisions of modernity should be abandoned. Latour, however, proposes that we keep in place some of the moderns' divisions while redirecting our focus to the expanding middle ground of hybrids. The divisions maintain modernity's vitality—we keep the modern's "daring, their research, their innovativeness, their tinkering, their youthful excess, the ever-increasing scale of action, their creation of stabilized objects independent of society, the freedom of a society liberated from objects" [36]—but our focus on networks allows us to temper the excesses of modernity—we "reorient and regulate the proliferation of monsters by representing their existence officially."[37] In the process, our subjectivity is altered. We are no longer humans in opposition to nonhumans but instead "passages and relations." [38] "The human is in the delegation itself, in the pass, in the sending, in the continuous exchange of forms."[39]

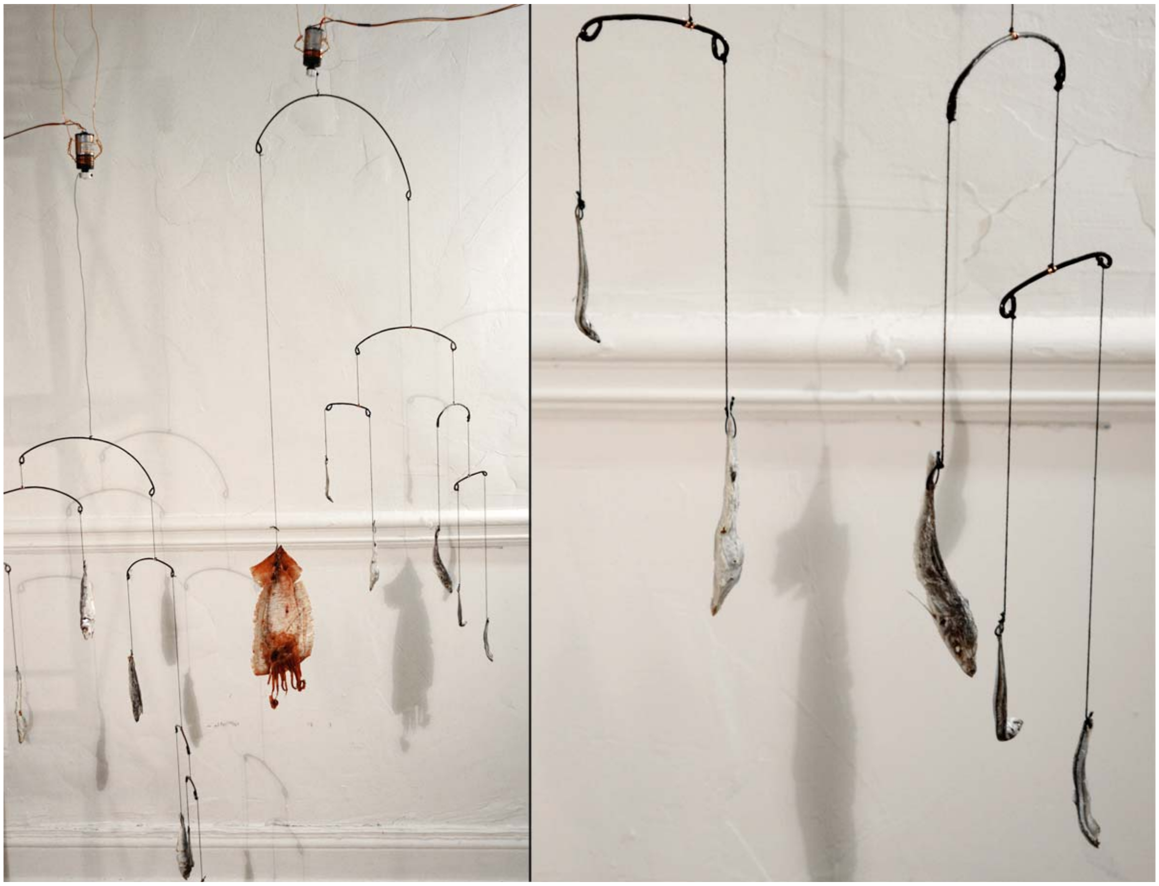
Latour's insights into modernity's dynamic divisions and his emphasis on intermediary networks inspires my conception of theory and practice. Just as Latour highlights the rich middle ground that links nature and culture, we can also emphasize the many negotiations of theory and practice. Art inspires theory just as theory inspires art. Theory and practice retain their distinction but this division is no longer the focus; instead the interactions of the two domains become central; our efforts are neither theory nor practice but rather oscillate between theory and practice and these oscillations become the point of our research. Just as Latour invents "nature-cultures" as a neologism that captures the interdependence and interactions of the two domains, perhaps we can also think of our research as practice-theory or theory-practice.

This dialogue between theory and practice not only influences my epistemological perspective (as discussed in the ‘Interactions of Theory and Practice’ section), it also contributes to my ontological design of the ambivalent animal project. In organizing this thesis, I avoided traditional taxonomies that explore historical, theoretical or formal analysis and created instead the roles of cyborg, clone, chimera and shapeshifter. These roles are designed to inspire creative practice as well as theoretical research. Holistic role-driven taxonomies flow more easily for me into cultural practice—the thematic chapters trigger associations that can be translated into visual and experiential artworks. Using roles also allows me to examine the dialectics in several different contexts. Related but different ideas emerge as I shift from one role to another. The cyborg is liberated and controlled by his cybernetic entanglements. The clone promises perfect replication but each instantiation creates a copy different than the original. The chimera is rebel and conformist—he invents hybrid forms but also submits to the demands of global capital. The shapeshifter gains partial access to the other’s perspective but also encounters the difficulty of inhabiting the other’s world. The roles, united by an ambivalent aesthetic and framed by the three dialectics, generate different insights, contradictions and conclusions.

The negotiations of theory and practice also influence the way that subjectivity is expressed in my creative research. I initially proposed an art project titled *Abandoned Routines*. The project examines the bond that is forged between human and animal in the process of daily pet care. For this project, I proposed a scenario in which a robot takes over of the chores of looking after a dog. The robot performs all pet-care tasks; it washes, grooms, walks and feeds the dog. The robot liberates the human from tedious tasks, but those tasks were a critical component of the relationship between guardian and pet. When a robot becomes the pet’s primary caretaker, does the human-dog relationship decline? Is the dog's affection redirected towards a robot that looks after his needs?

After reading Derrida's writing on animality, *Abandoned Routines* seemed too focused on the human's loss. The dog may not miss the human's retreat; the robot may be a more dedicated and disciplined caretaker—the project suddenly seemed far too anthropocentric. Consequently I decided to develop a different project that placed the animal's needs and desires at the center of the work. The result was *Zoocentrix: Purrplex,* a project that creates mediated experiences for cats. Issues of machine-animal interaction remain, but a cat's concerns rather than human concerns are brought to the fore.

*Zoocentrix* artifacts/experiences often promote cat desires at the expense of human needs. Some pieces may reduce custodial responsibilities—for example, *Tail Twitcher*, an automated twitching device, requires no human presence to engage a cat in play—but other pieces demand considerable human effort to maintain. *Meat Mobile,* a spinning mobile adorned with flesh, requires a steady supply of dried fish and a considerable amount of clean up. And *Meat Mobile's* sensory stimulation may be offensive to contemporary Americans: few people hang decaying meat in their homes, and some people find the smell of dried fish unappetizing. Accustomed to anthropocentric mediated environments, many pet guardians might find *Zoocentrix's* artifacts a burden to maintain. By focusing on a cat's desires, a fairly familiar physical computing project is made strange. And this strangeness may make us more conscious of a cat's alterity.



6.8 *Meat Mobile*

Not only did Derrida's writings inspire *Zoocentrix*, a variety of post-structuralist, post-human and animal-studies texts influenced my work on *Petite Charm*. These writings made me more aware of the human's privileged position and more sensitive to the ways in which animals are routinely disparaged, ridiculed, and abused within human culture. *Petite Charm* tries to encapsulate the animal's equivocal status. Genetically modifying an animal so that he is small and docile enough to live on a human's arm is an exaggeration of anthropocentric cultural, economic and aesthetic demands imposed on animals. [40] The animal is modified to accommodate human desire.

6.9 *Petite Charm* dogs

Human-animal relationships bring out the best and worst of human behavior. Yi-Fu Tuan notes that human-canine interactions in particular are fraught with mixed motivations:

> …in the Western world, at least, the dog is the pet par excellence. It exhibits uniquely a set of relationships we wish to explore: dominance and affection, love and abuse, cruelty and kindness. The dog calls forth, on the one hand, the best that a human person is capable of—self-sacrificing devotion to a weaker and dependent being, and, on the other hand, the temptation to exercise power in a

> willful and arbitrary, even perverse, manner. Both traits exist in the same person.[41]

*Petite Charm* references this long tradition of dysfunctional human-canine association. But it also attempts to create a new relationship dynamic—human dominance is no longer assured and the subjectivity of both human and dog is changed. In their altered subjectivity, human and dog are simultaneously elevated and degraded. A *Petite Charm* dog suffers gross corporeal manipulation—he is miniaturized, immobilized and dependent on human blood for survival. But the dog is also a symbol of biotech innovation; he is flesh made plastic and the ultimate “emotional-support companion.” He is at once parasite and prize. The human is also is an emblem of biological innovation: his body participates in an unfamiliar integration of human and animal. Yet this integration requires risk. The dog’s body may introduce toxins into the human body. And as caretaker/host, the human is required to supply a steady source of blood. Human and animal intimacy requires a series of accommodations by both guardian and pet.

6.10 Fall 2009, LCC Demo Day

Both *Zoocentrix* and *Petite Charm* explore an ambivalent aesthetic. This aesthetic emerges in the interactions of theory and practice. Ambivalence welcomes the complexity that develops in the process of engaging different methods of knowing and being.

### 6.4 Aura & Abjection

*Petite Charm's* fleshly manipulations lead us to the material and corporeal concerns of aura and abjection. In the interactions of theory and practice, practice is often tainted with a Cartesian distrust of sense-based experience and physical labor. Practice is diminished by its association with the body, and theory is elevated through its affiliation with rational thought. My view of embodied knowledge and creative practice discounts these associations. I am interested in the mingling of mind and body and the slipperiness of Cartesian divisions. In this context, practice need not be excluded from cognition and theory need not be detached from materiality.

From this perspective, theory and practice become interdependent. Theory dematerializes and paradoxically lives above and below practice. It oversees the interpretation of practice but also relies on practice's innovation to generate new theories. In this way, theory is simultaneously detached and intimately aligned with practice. Practice may be rendered mute by theory's interpretive framework, but its lively experimentation may also escape theory's grasp—practice's specificity continually challenges theory's generalizations. At the same time, the energy of practice is focused and channeled through theory's framework; it is supported and sustained by the inquiry of theory. Both theory and practice expand and limit each other, neither one need rule or submit to the other. Both modes of research can engage each other without becoming auratic or abject.

When theory dominates or practice overwhelms, I believe that creative research suffers. Theory may coerce, forcing artifacts and events to align with key points in an argument. Practice may overwhelm, exploiting technique and sentiment to become a form of propaganda. In both cases, the ambiguity of experience is denied. My aim in this work is to encourage interactions between theory and practice without exhausting meaning. Theory can focus and inspire practice; practice can temper the generalizing tendencies of theory and point to new areas of inquiry. Neither mode of research need become a totalizing mechanism that destroys nuance or regulates the methods and actions of the other.

Engaging both theory and practice—traversing different language games—may alter the rhetorical stance of both modes of research. UCLA's online journal *Mediascape* provides one example of the kinds of text that emerge when theory and practice are combined. The journal includes visual essays alongside traditional academic writing.

These visual essays re-work academic prose through the medium of film/video. Eric Faden describes these visual texts as "media stylo," a mixed-media approach to critical writing:

> Given the variety of media it incorporates (image, sound, text), the media stylo illustrates ideas and concepts difficult to convey through text alone (and hence its special affinity toward film and media studies). At the very least, the media stylo's most basic advantage is presenting media (let us say a film clip) rather than describing it textually. Moreover, this mixture of media allows for mixing rhetorical modes—from scholarly analysis, to hypothetical scenarios, outright fictions, expository information, narrative storytelling, and even, perhaps most importantly [sic], poetics.[42]

Similar kinds of experiments in new media—developing essays that include image, sound, text as well as digital interaction and simulation—could be a rich area of practice-theory. The academic essay could be translated into a new medium. And the process of translation may alter rhetorical traditions. Faden suggests this is the case with media stylo essays:

> Traditional scholarship aspires to exhaustion, to be the definitive, end-all-be-all, last word on a particular subject. The media stylo, by contrast, suggests possibilities—it is not the end of scholarly inquiry; it is the beginning. It explores and experiments and is designed just as much to inspire as to convince.[43]

This rhetorical shift from argument to question or from conclusion to possibility aligns with my ambivalent aesthetic. In working through the ambivalent animal project, I tried to temper theory's argument with practice's experimentation. I'm less concerned with getting it right and more concerned with discovering irresolvable tensions. The negotiations of theory and practice have the potential to inspire and re-direct creative research. The goal is not to win a debate but to think, see, do and be in different ways.

This kind of rhetoric may be auratic and abject. A weakened argument may be seen as an inadequate argument. But open-ended rhetoric also acknowledges the complexity and contradictions of world and experience. As such it suggests an alternative to the overconfidence of strong but reductive arguments.

### 6.4.1 Identity and Materiality

Auratic and abject oscillations can also be found in the identity of artist-scholar. Becoming a liaison between theory and practice requires new skills and methods that have material consequences. The practitioner-theorist encounters complicated epistemological, social and economic issues. Is the emerging practitioner-theorist better prepared to imagine alternative language games and generate new insights? Or is he simply a reaction to the demands of the academy, techno-culture and commerce? Is he an emblem of flexible labor: a cost-saving academic who can teach both history and production? Or is he able to translate the concerns of theory and practice in new ways?

On the positive side, the artist-scholar experiments with Marx's labor ideal—he can do "one thing today and another tomorrow, to hunt in the morning, fish in the afternoon, rear cattle in the evening, criticize after dinner."[44] Bridging theory and practice makes possible more varied labor and could lead to innovation. The artist-scholar is no longer a specialist; instead she navigates between language games, working in ways that may be inexpert. Steve Baker, writing about creative research that investigates animality, sees "inexpertise" as a way out of the routines imposed by tradition and specialization. He writes of an "inexpert alliance" between human and animal, an alliance that "has no interest in fixed identities" and is "forgetful of such 'expert' categories as the human, the artist and the animal."[45] Baker celebrates this lack of expertise: "It is, in a sense, entirely appropriate that most of the time artists (and writers and philosophers) continue to get it wrong, to botch it and bind the animal inexpertly to their own inexpert lives."[46] The artist-scholar participates in this uncertain identity, his perspective is not tied to the established methods and rewards of either theory or practice and as a result is perhaps free to imagine new methods and invent new artifacts and experiences. This is the auratic scholar-artist.

The artist-scholar who explores new media projects also gains from the aura of aligning herself with cutting-edge, proprietary technologies. Her work and theory ride techno-culture's zeitgeist. At the same time, developing new technologies requires access to capital and technical labor—a requirement that generates new constraints. This is the artist-scholar's abjection: her quest to examine and employ new technologies may require government and corporate sponsorship. In her quest for funding, she may find her research distorted by the values of her patrons. Lyotard warns that even innovative language games often support existing hierarchies. Underlying the liberatory effects of new language games is a strong desire for increased efficiency. A rebellion can enhance the overall "performativity" of the system by inventing improved methods of economic, cultural and social productivity. A critical act or theoretical insight can be co-opted and transformed to serve the needs of power: "The novelty of an unexpected 'move,' with its correlative displacement of a partner or group of partners, can supply the system with that increased performativity it forever demands and consumes."[47]

Is the theorist-practitioner an auratic academic, able to perform in new ways, make new moves, and ask new questions?  Or is her status more abject? Does she simply conform and react to institutional and economic imperatives? And does the process of transforming artists into theorists end up validating the traditional knowledge hierarchies within the academy?

The experience of artists in academic environments may foreshadow the difficulties that artist-scholars might encounter. Christiane Robbins, posting to the iDC listserv referenced above, argues that artists who enter the academy looking for creative freedom sometimes find themselves trapped by institutional demands. She quotes from Judith Adler's 1978 study of CalArts professors, *Artists in Offices*.[48] Adler's text portrays a risible stereotype of art personalities but also reveals the tension between artists and academy:

> A subculture which grows out of highly atomized, "loose" occupational structures and exalts qualities of anarchistic individualism (eccentricity, the apostasy and the advertisement of personality through flamboyant, spontaneous, and outrageous behavior) confronts the culture and imperatives of a bureaucratic work organization with its stress on certified and universalistic credentials, routinized procedure, formally designated domains of authority and expertise, the subordination of the person to the office, and the use of formal and hierarchically significant titles. People who may have been drawn to the arts in the first place because, like Marcel Duchamp, they "did not want to go to the office," now squirm slightly in their university offices.[49]

While Alder highlights the effects of bureaucracy and routine, Tom Sherman, professor in the Department of Transmedia, Syracuse University, posting to the same list, foregrounds the paralyzing potential of over-theorized art practice. Sherman notes: "Artists functioning in a critical academic environment often become so self-conscious and tentative they can hardly go forward with their work (Marcel Duchamp said "art is a disease;" and sometimes university-based art students are cured by the time they get their diplomas)."[50]Additionally the cultural expectations of a particular department can influence practice. These constraints are articulated by Morse as she defends her department from an accusation of serving a "corporate agenda." Morse writes: "I can safely say that I and all my colleagues teach and do their research using critical, not merely formal and definitely not corporate approaches….We eschew commercial purposes in all our efforts—we belong to a research university for a reason."[51] Morse's defense of her department is a reasonable reaction, but her response also reveals departmental homogeneity—all research is framed by criticality. Formal experiments are insufficient and commercial approaches are banned. This academic purity denies the influence and insight of aesthetic explorations and commercial culture. Academic art with its requisite critical voice sometimes becomes a disturbing (or worse, dull) extension of the academy's most didactic, regulating tendencies.

These posts may reduce the complex character and motivations of many academic artists, but they bring into focus the alienation that some artists experience in the academy. The academic artist may lose her creative drive when confronted with the demands of theory and academic labor. Gaining tenure at a university tends to require quantifiable, steady progress and a critical, easily explicated oeuvre. Yet creative research may require abandoning the best or most thoughtful (we could say theoretically sound) methods in favor of experiments that are untested and prone to failure. Sudden reversals or productive-but-difficult-to-justify tangents may diminish an artist's reputation, dilute her brand, or simply fall outside the regulating mechanisms that determine academic merit.

Issues of reputation and output plague most academics, but an artist seems most abject in this situation because we expect her to challenge the status quo rather than support institutional desires. The mythic artist who displays "anarchistic individualism" maybe an outdated stereotype, but artists often have a different sensibility than scientists or scholars. Morse notes her encounters with the artistic mind revealed cognitive approaches unfamiliar to her:

> When I changed my area of academic expertise, I lost a decade to gypsy teaching—but that was a learning experience for me to treasure. It was then that I was exposed to art school students and a very different mind set and way of

> processing information. Every now and then I get a brilliant student at the university who reminds [me] of what the art school brain at its best can be like.[52]

Morse's sensitivity to creative cognition and her previous proposal that practice is a way of knowing, diffuse the Cartesian bias of the academy. (Her argument could also be seen as a continuation of this bias—mind and knowledge persist as the terms that create value.) Yet after a century of philosophy and theory challenging the dominance of mind over body, the mind retains its privileged position in much of the academy. The artist is associated with materiality and alternative ways of knowing and consequently remains a marginal figure.

Whether an artist-scholar will fare better than an academic artist remains to be seen. In an environment where extreme specialization is the norm and turf battles are an everyday occurrence, an artist-scholar's "inexpertise" and cross-disciplinary tendencies may be viewed as suspect—she could be seen as neither artist nor scholar. At the same time, the artist-scholar is at least acquainted with the academy's mind-driven methods. She inhabits a variety of language games and is accustomed to different ways of knowing, writing and making. The artist-scholar can also translate the concerns of creativity while participating in the dialogue and merit mechanisms of theory. In this way, a hybrid identity may be able to counter in part the academy's mind/theory bias.

## 6.5 Conclusion

My approach to theory and practice welcomes the tension between the two modes of research; this tension inspires and shapes my writing and making. This approach acknowledges the differences between theory and practice and avoids a synthesis of the two that might deny these differences. At the same time, it recognizes the common ties of theory and practice—the overlapping concerns, interdependencies and shifting boundaries between the two domains of knowledge.

Both theory and practice have established language games, regulating mechanisms and reward systems. Navigating between these language games reveals what is silenced and what is articulated within a discipline. It also provides the potential for new moves—alternative approaches that do not readily conform to the expectations of a particular domain of knowledge. A practitioner-theorist who grapples with different language games is in a unique position to translate and modify the methods of theory and practice. This hybrid identity, though, is fraught with institutional and material complications. The artist-scholar may invent new methods, artifacts, texts and experiences, but she may also find her research dislocated from review-and-reward mechanisms and constrained by institutional expectations.

In the process of thinking through this thesis, my practice has been influenced by theory and my writing informed by creative practice. Working across mediums and disciplines moved my research in unfamiliar directions. Thinking and working through the ambivalent animal project required a mixture of reading, writing, discussing, conceptualizing, and making. Building bridges between these different modes of research became a critical component of my work. Through this process an ambivalent aesthetic developed. Ambivalence tempers theory and alters practice. Theory need not overreach and practice need not reform. Instead both theory and practice are able to embrace complexity, contradiction and impure motivations.

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[1] Jean-Francois Lyotard, *The Postmodern Condition: A Report on Knowledge,* trans. Geoff Bennington and Brian Massumi (Minneapolis, MN: University of Minnesota Press, 1984), 26.

[2] Lyotard, 53-60.

[3] Lyotard, 64.

[4] Lyotard, 51-52.

[5] Steve Baker, *The Postmodern Animal* (London: UK: Reaktion Books, 2000), 41.

[6] Baker, 73-6.

[7] Margaret Morse, University of California, Santa Cruz, "iDC thread: Praxis-based Ph.D.s," posted January 11, 2007 (https://lists.thing.net/pipermail/idc/2007-January/002081.html).

[8] David Hakken, University of Indiana, "iDC thread: Praxis-based Ph.D.s," posted January 11, 2007(https://lists.thing.net/pipermail/idc/2007-January/002084.html).

[9] Margaret Morse, "iDC thread: Praxis-based Ph.D.s," posted January 13, 2007 (https://lists.thing.net/pipermail/idc/2007-January/002091.html).

[10] Sidney Perkowitz, "Roundtable: Does Art Produce Knowledge? Can Science Produce Art?", Chair: Laura Otis. SLSA 23rd Annual Conference, November 7, 2009, Atlanta, GA.

[11] Matei Calinescu, *Five Face of Modernity: Modernism: Avant-Garde, Decadence, Kitsch, Postmodernism* (Duke University Press, Durham, NC, 1987), 306.

[12] Calinescu, 306.

[13] Jean-Francois Lyotard, *The Differend: Phrases in Dispute,* trans. Georges Van Den Abbeele (Minnesota, MN: University of Minnesota Press, 1988), xi.

[14] Lyotard, *The Differend*, 128.

[15] Lyotard, *The Differend*, 136.

[16] Lyotard, *The Differend*, 13.

[17] Claire Bishop, "Antagonism and Relational Aesthetics," *OCTOBER* 110, fall 2004, 65-6.

[18] Bishop, 56.

[19] Bishop 52.

[20] Bishop, 54.

[21] Bishop, 67.

[22] Bishop, 73.

[23] Johanna Drucker, *Sweet Dreams: Contemporary Art and Complicity* (Chicago, IL: University of Chicago Press, 2005), 24.

[24] Drucker, 29.

[25] Drucker, 30.

[26] Drucker, 49.

[27] Drucker, 50.

[28] Matei Calinescu, *Five Faces of Modernity: Modernism: Avant-Garde, Decadence, Kitsch, Postmodernism* (Durham, NC: Duke University Press, 1987), 272.

[29] Calinescu, 272-3.

[30] Calinescu, 284.

[31] Leonard Lawlor, *This is Not Sufficient: An Essay on Animality and Human Nature in Derrida* (New York: Columbia Press, 2007), 24-6.

[32] Frederic Jameson, *Postmodernism, or, The Cultural Logic of Late Capitalism* (Durham, NC: Duke University Press), 35, quoting Ernest Mandel, *Late Capitalism*, (London: 1978), 10.

[33] Bruno Latour, *We Have Never Been Modern***,** trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993), 3.

[34] Latour, 46.

[35] Latour, 123.

[36] Latour, 133.

[37] Latour, 12.

[38] Latour continues:

> We do not start from human beings, those late comers, nor from language, a more recent arrival still. The world of meaning and the world of being are one and the same world, that of translation, substitution, delegation, passing.

Latour, 128.

[39] Latour, 139.

[40] Yi-Fu Tuan describes the domestication of contemporary dogs as follows:

> An animal may lose much of its natural vigor and still be serviceable as a pet. It is even desirable that a pet not be endowed with too much vigor and initiative. The pet, if it is to find acceptance in a well-run household, must learn to be immobile—to be as unobtrusive as a piece of furniture. The single most important trick taught a dog is instant obedience to the order 'sit' or 'lie down.' A well-trained dog will lie down for hours at a stretch, upon command, even in a strange place, while its master goes off on business.

Yi-Fu Tuan, "Animal Pets: Cruelty and Affection" in Linda Kalof and Amy Fitzgerald, , eds., *The Animals Readers: The Essential Classic and Contemporary Writing* (New York: Berg, 2007), 148.

[41] Tuan, 145.

[42] Eric Faden, "A Manifesto For Critical Media" Mediascapes, Spring 08 (http://www.tft.ucla.edu/mediascape/Spring08_ManifestoForCriticalMedia.html).

[43] Faden, http://www.tft.ucla.edu/mediascape/Spring08_ManifestoForCriticalMedia.html.

[44] Karl Marx, *The German Ideology*. Part 1: Feuerbach. Opposition of the Materialist and Idealist Outlook in section, "Private Property and Communism" (http://www.marxists.org/archive/marx/works/1845/german-ideology/ch01a.htm).

[45] Steve Baker, *The Postmodern Animal* (London, UK: Reaktion Books, 2000), 183.

[46] Baker, 189.

[47] Lyotard, 15.

[48] Christiane Robbins, "iDC thread: Praxis-based Ph.D.s," January 15, 2007 (https://lists.thing.net/pipermail/idc/2007-January/002114.html).

[49] Judith Adler, *Artists in Offices* (New Brunswick, NJ: Transaction Books, 1979), 17.

[50] Tom Sherman, "iDC thread: Praxis-based Ph.D.s," January 11, 2007 (https://lists.thing.net/pipermail/idc/2007-January/002086.html).

[51] Margaret Morse, "iDC thread: Praxis-based Ph.D.s," January 15, 2007 (https://lists.thing.net/pipermail/idc/2007-January/002115.html).

[52] Margaret Morse, "iDC thread: Praxis-based Ph.D.s," January 15, 2007 (https://lists.thing.net/pipermail/idc/2007-January/002108.html).

# CHAPTER 7

# CONCLUSION

The ambivalent animal project examines the interactions of animals, technology and culture. It does so through a conceptual framework shaped by a particular aesthetic approach. This framework is influenced by the writings of poststructuralist theorists who question established hierarchies, explore issues of power and desire, highlight boundary transgressions, and propose alternative subjectivities. In text and artworks, the project employs an ambivalent aesthetic—an aesthetic that evokes two or more incompatible sensibilities. Ambivalence highlights the complexity of lived experience, philosophical debate and academic inquiry. It foregrounds contradiction and welcomes irresolution.

The project examines the animal through a process of writing and making. I've created two art and design projects, *Zoocentrix: Purrplex* and *Petite Charm,* as a way to think through issues of animality. *Zoocentrix* develops a series of artifacts and experiences that are tailored to the phenomenological interests of an individuated cat. These artifacts are realized through the medium of physical computing and designed to engage a cat's sense of play. *Petite Charm* is a conceptual art project that proposes a symbiotic relationship between human and genetically modified dog. Both projects have an ambivalent aesthetic—they are a mix of affirmation and critique, impure motives and unstable hierarchies. I've also written about the animal using four roles—cyborg, clone, chimera and shapeshifter—and three dialectics—irreducibility and procedurality, autonomy and integration, and aura and abjection. When four animals roles engage three dialectics, connected yet varied themes emerge. Each animal type highlights different aspects of epistemology, ontology and corporeality and asks us to question the anthropocentric assumptions that underpin our sense of knowledge and world.

The ambivalent animal project not only examines issue of animality and questions our anthropocentric assumptions, it also tries to imagine a digital media project that foregrounds culture and content rather than medium and technology. Just as the project proposes an alternative subjectivity for the animal, it also argues that issues of animality or more generally, philosophy, should be privileged over issues of engineering and media. Technology plays an important role in the research, but it is ultimately viewed as the minor to the animal's major. This changes the focus of the research's questions. Rather than think first of pragmatic issues like, How can I solve this problem? or How can I make this?, the ambivalent animal project asks, Why do we have this problem? and Why are we creating this? These are questions that are inspired by philosophy's methods and grounded in the issues of animal experience and subjectivity. This approach raises questions that may inspire the research of engineers. That is, it brings up areas of inquiry that could be expanded through more pragmatic methods, but for the most part, the project remains in a speculative mode, thinking through the animal other by interpreting a variety of cultural texts and making work that questions anthropocentrism as well as the discourse of techno-science.

Several themes emerge in the process of writing and making work about the ambivalent animal. The first is the limitation of language, thought, representation and being. Ideas and representations strain to contain the messiness of life. The dialectics oscillate between two concepts in part because a single concept fails to convey the complexity of a situation. Another theme highlights the shifting subjectivity of animals and humans. Anthropocentrism is a foundation of Western thought but recent philosophical, cultural and biological insights make us less certain of the human's centrality. Divisions between humans and nonhumans may have shaped our identity, but contemporary boundaries appear less distinct and subjectivity less stable. Finally, the ambivalent animal emphasizes alterity. Multiplicity and difference come to the fore. We participate in many worlds, simultaneously connected and detached from the diversity of experience that surrounds us. The ambivalent animal reveals our epistemological limits, anthropocentric arrogance and peculiar phenomenology. And the project encourages us to imagine alternative ways of knowing, perceiving and being.

## 7.1 Combining Theory and Practice

The ambivalent animal project is a mixture of writing and making. Both artwork and text influence each other—the process of creating alters the structure and argument of the writing; the process of thinking through and writing about theoretical issues of animality alters the creative practice. The tension between the two modes is never fully resolved but each influences the other. For example, my creative practice moved toward a more conceptual approach as it engaged with the theoretical issues of animality and alterity. And my writing kept issues of corporeality and materiality front and center and also employed methods borrowed from my creative practice in which I synthesize a range of artifacts, procedures and ideas within an aesthetic framework.

### 7.1.1 Zoocentix & Petite Charm

The making part of the dissertation includes two projects: *Zoocentrix: Purrplex* and *Petite Charm*. *Zoocentrix* develops a series of artifacts and experiences made for cats. These artworks include mobiles strung with fish, stuffed-animal mice that playfully twitch their tails, television programs tailored to a particular cat's viewing interest, a play space that tracks a cat's movement and projects animated images for the cat to chase, and a mobile robot that seeks out sun spots in the house—a cat can sleep on top of the robot's lid assured he'll be kept in warm sunlight as he naps. These artifacts/experiences try to imagine a mediated space oriented to the cat's world and phenomenology. Technology is employed not for human needs but instead for the needs and desires of a cat.

Creating experiences and artifacts for a cat, attempting to design for a cat's desires, reveals a number of complications. Anyone who has ever presented a toy to a cat knows that a cat's reaction can vary from intrigue to disinterest. And even if the cat enjoys playing with the toy at that particular moment, she may soon lose interest in the object altogether. Cat desires appear as fleeting and particular as human desires. Accommodating ephemeral tastes means that no artifact or experience is ever complete. A long-term *Zoocentrix* project would be in perpetual flux; continually responding to the interactions of cat and artifact and adjusting and reinventing the experience with each new insight. This attention to cat behavior also argues for an individuated cat—a cat distinct from all other cats. Derrida coined the term "animot" to describe a particular and specific animal rather than a generic animal. His neologism emphasizes the difference between species and within species. Each animal has unique characteristics, behaviors and desires. Sensitivity to a cat's individualism requires a willingness to adapt each project to a cat's unique preferences. It also suggests that a cat should be included throughout the design process. This kind of close interaction between human, animal and artifact is an avenue of future research I plan to pursue. Such an approach would oscillate between the general and specific: you might develop an experience/artifact along a particular theme, say hunting, and create a general artifact, something that twitches and moves, for example, but then create variations on that theme that attempt to engage a particular cat's interest.

An individuated cat with changing desires highlights the difficulty of grasping the other's world. Our understanding of the other is often filtered through language, cognitive processes and personal phenomenology. Giorgio Agamben, reflecting on the research of biologist Uexkull, emphasizes the "uncommunicating" yet intersecting worlds that surround us.[1] We like to think we stand outside these worlds—that we occupy a space that can comprehend the perceptions and experiences of the other. Yet we are often oblivious to the many worlds that surround us. *Zoocentrix* is an attempt to explore the other's world, but such efforts make us more aware of how little we know about the other. Recognizing these limits reveals that most cat toys are designed to appeal to humans. These toys conform to our expectations of what a toy should be—they mimic the look and feel of children's toys; they're easily picked-up by human hands, incorporate human aesthetics in scale, texture, color and proportion and are designed to be stored away in containers that resemble an infant's toy box. Human culture determines what a cat toy should be. *Zoocentrix* is an effort to move away from this kind of anthropocentric design—it tries to make human concerns secondary and cat concerns primary. Yet this effort leads to the humbling realization that we know very little about the cat's sense of aesthetics, individual desires and phenomenology.

*Zoocentrix* is a serious attempt to imagine experiences that a cat may enjoy, but the project's motives are not completely pure. The project parodies techno- and corporate culture while trying to accommodate the needs of a cat. Most *Zoocentrix* designs incorporate elements of proceduralized interaction—for example, *Meat Mobile* and *Tail Twitcher* start moving when their sensors detect a cat is approaching. *Zoocentrix's* sensor-triggered pieces reference the mediated environments of smart homes and ubicomp projects. Many of these projects propose a utopian future where human needs are met by a variety of responsive devices. *Zoocentrix* plays on the traditions of ubicomp—it proposes, tongue-in-check, that all feline problems can be solved by technological means. The project also parodies corporate salesmanship. When *Zoocentrix* was exhibited at LCC Demo Day, fall semester 2009, Brian Shrank and I presented the work as an entrepreneurial endeavor: *Zoocentrix* "products" were promoted as the next wave of high-tech cat toys and cat-centric experiences. Our performance referenced the excesses of ubicomp and corporate culture. And the animal's ambiguous status also contributed to this parody—if our devices solved human problems the artifacts might seem reasonable, but because the project is focused on animals, there is a sense of absurdity in our level of investment. Human needs belong to the world of serious engineering; animal concerns are viewed as somewhat risible. The ambivalent-animal project, of course, argues against such bias, and the performance that showcased *Zoocentrix* played with this bias. As part parody and part inquiry into a cat's world, *Zoocentrix's* ambivalent aesthetic is simultaneously aimed at different audiences: the individuated cat and the techno-critical and technocentric population of Georgia Tech.

*Petite Charm* also explores the complications of technological solutions. This time the innovations of biotechnology are explored through a conceptual project that imagines a genetically modified dog that is hosted by a human body. The dog is designed to be lightweight and docile so that he can easily attach to a human forearm. *Petite Charm* sustains himself by sucking human blood and removes bodily waste by accessing the human's digestive tract. This tight integration of both human and animal solves and creates problems. *Petite Charm* is the ultimate "emotional-support" pet; he can be with you at all times. He also avoids the complications of less integrated traveling companions: no need to supply food and water or worry about waste removal; no need comply with restrictions on animals in public places; no need to kennel your pet when you travel or cage your dog when you fly together. You and your dog are now one. But this kind of intimacy has its risks and responsibilities. *Petite Charm* may introduce toxins into your body. If you remove your pet from your arm, you need to have on hand a supply of human blood to feed your dog. And when *Petite Charm* dies, the loss may be more acute—you not only lose a pet but also a part of yourself.

*Petite Charm* like *Zoocentrix* employs an ambivalent aesthetic. The animal's uncertain status contributes to this aesthetic. In our culture, some animals enjoy unprecedented care and attention; other animals are routinely exploited, abused and discarded. *Petite*

*Charm* exaggerates both our obsession with and abuse of the animal other. It does this through imagining a new kind of animal-human intimacy. A dog's body is modified to accommodate the human desire for continual companionship. *Petite Charm* participates in the long history of human coercion of animals through domestication, breeding programs and training techniques. Yet this history may be more complex than we imagine. The process of modifying animals often alters human life as much as animal life. Donna Haraway argues that domestication of wolves required the human to accommodate dog desires. Domesticated wolves may have warned of intruders and helped in the hunt, but they required food and shelter and relied on humans to raise their pups. Canines demand continual human attention and support. Humans may mold dogs, but dogs also shape humans. [2] In a similar fashion, *Petite Charm* not only alters a dog's body but also a human's corporeality. Both species are required to adapt to each other. The human's privileged position is less certain.

*Zoocentrix* and *Petite Charm* are simultaneously affirmative and critical. *Zoocentrix* is a serious attempt to imagine mediated experiences that a cat might enjoy. At the same time, the project parodies the utopian drive to solve all problems (and regulate all chaos) through high-tech solutions. A cat's desires are affirmed even as the excesses of techno-culture are questioned. *Petite Charm* has a similar mix of complicity and critique. Genetically modifying a dog to the point that he can survive on human blood and tolerate a life of immobility perpetuates the long tradition of modifying animal behavior and body to suit human needs. Yet in *Petite Charm's* scenario, demands are made on animal *and* human bodies. And the extreme intimacy between pet and host is something to be desired and feared.

## 7.2 Three Dialectics

The writing part of the dissertation is structured by the three dialectics—irreducibility and procedurality, autonomy and integration, aura and abjection. The tension between the dialectic poles is kept in play—these dialectics do not resolve in a stable synthesis. They acknowledge the ambiguity of animal subjectivity and the complexity of animal-human-machine assemblages. Boundary transgression, lack of resolution and contradiction become regular motifs in the ambivalent animal project.

Each dialectic brings into focus certain theoretical issues: irreducibility and procedurality emphasizes epistemology and mediation; autonomy and integration highlights ontology and subjectivity; aura and abjection foregrounds corporeality and materiality. These theoretical boundaries while distinct are also closely related—how we make sense of the world, how we experience and live in the world, and how we are treated and treat others in the world are avenues of research that are interconnected. Each dialectic orients us in a particular way, but their underlying issues are intertwined.

The dialectics provide a framework for examining four animal roles—cyborg, clone, chimera and shapeshifter. The dialectics shape and are also distorted by these changing animal roles. Each animal role generates related but different insights. The dialectics' multi-dimensionality—their mix of epistemology, ontology and corporeality—provide a way to investigate an animal through a range of filters. An animal is at one moment a symbol or sign, then a subject and finally an embodied presence. Navigating the terrain of the animal's mind, body and soul expands our understanding of the animal other. As we consider issues of mediation, subjectivity and materiality we rethink our understanding of the animal—each filter creates new questions and challenges our assumptions of the animal's status. The dialectics also provide a way to investigate a series of artifacts and texts and generate alternative interpretations. Thus Kafka's *Metamorphosis* is not simply about human alienation or Samsa's inability to re-invent himself but is also about human and animal divisions and the diminished status of the animal other. The film *Fly II* is not simply a horror movie that plays on a cultural fear of human-animal hybrids but is also an emblem of global capital's ability to simultaneously embrace alterity while also seeking to commodify otherness. Or Preemptive Media's RFID-enhanced cockroaches are not simply cyborgian animals that disrupt the command-and-control technologies of Walmart's inventory system but are also objects coerced into serving the polemic of art activists. And *Crittercam* not only adds to the knowledge of biologists studying the behavior of wild animals but also alters the behavior of the animals being studied, downplays unfamiliar animal perceptions and embodiment, and foregrounds the viewpoint of the animal carrying the camera at the expense of the social dynamics of the pack or herd. These are viewpoints that emerge when we consider an ambivalent animal through issues of epistemological doubt, corporeal manipulation and ontological complexity.

### 7.2.1 Irreducibility & Procedurality

When the dialectic of irreducibility and procedurality encounters cybernetics we become conscious of the way that our understanding of the world both influences and is influenced by the abstractions of procedurality and mediation. Cybernetic totalism argues that all things can be encoded into the machine. Human consciousness, traffic flows or economic systems are reduced to quantifiable patterns and simulated in cybernetic systems. This perspective privileges procedurality and diminishes materiality. The dialectic of irreduciblity and procedurality recognizes the importance of informational patterns but also acknowledges the messiness of materiality and unquantifiable aspects of life and world. The limitations of cybernetic totalism can be seen in simulations that promise a shapeshifter's ability to see through the eyes of the other but restrict as much as they expand our understanding of the other's world. Every simulation edits data in the process of highlighting important patterns. Our mediated worlds are always partial views—they reduce, abstract, and smooth over even as they assist, focus and inform.

The dialectic of irreducibility and procedurality also tempers the utopian rhetoric of many cyberneticists. Highly mediated environments may free us from tedious labor, expand our social networks, and provide instant, dynamic data flows, but they also carefully track and regulate our day-to-day activities. Attentive robots provide consistent care to Lely's dairy cows, but the same cows are also continually surveilled by the mechanisms that coddle them. And a SNiF dog enjoys an expanded circle of canine playmates, but he also conforms to normative rules that determine appropriate activity levels and sociability.

When irreducibility and procedurality encounter life, they reveal the complex interactions of code and flesh. Just as this dialectic tempers cybernetic totalism it also tempers genetic essentialism—the body's form and function may be guided by genetic code but corporeal experience is always more than base-pair sequences. We are part information but also part irreducible experience. The clone is a genetic copy of an original but also an individual who has his own identity and experiences. He is a reflection and variation on the original. And synthetic biologists propose creating mercurial informational bodies through programmable biological components, yet these biological programmers will most likely be troubled by material, cultural and conceptual restraints that replay the difficulties of software development as described by Jaron Lanier.[3] Our complex corporeality is likely to frustrate the mechanisms of genetics and biotechnology.

Jorge Luis Borges' fictional cartographers who try to create a map so detailed that it covers the territory they hope to chart[4] makes apparent the massive omissions in the most mundane representations. Our procedures to grasp, model, and understand the world always fall short. No matter how elegant our abstractions they remain reductions.

We create models for clarity and focus but should never forget the important details our models elide. Universal claims may motivate us, transcend our present moment, help us connect disparate ideas and processes, but we should temper these claims with the particularities of context, materiality and difference. As we build frameworks we are also conscious of the things we leave out—the unquantifiable and unrepeatable aspects of a specific moment. The dialectic of irreducibility and procedurality reveals our epistemological reductions and highlight the world's complexity.

### 7.2.2 Autonomy & Integration

The dialectic of autonomy and integration explores the ontology and subjectivity of the animal other. Differences between humans and nonhumans are often exploited to human advantage. Indeed human identity is founded on the exclusion of the animal from full autonomy and agency. But the close integration of human, animal and machine make us less certain of human exceptionalism. The cyborg and chimera create new assemblages that combine what was once divided. A mouse who houses human neurons or immunological cells challenges the corporeal boundaries between human and nonhuman. A simian cyborg fitted with a brain interface that permits him to control a robotic arm through his thoughts illustrates the increasingly intimate coupling of animal and machine. This blurring of corporeal boundaries argues for a new kind of subjectivity. Latour notes that the rise of hybrids between the poles of nature and culture shift human subjectivity. We work as liaisons that support the networks of humans and nonhumans. In the process we are decentered, we are "in the pass,"[5] no longer the focal point around which everything else turns but instead weavers of diverse ideas, objects, subjects, and procedures.

Derrida challenges us to imagine "every other (one) as every bit other"[6] and recognize the other that we privilege at the expense of all others. When the hierarchies of otherness collapse, we may be less likely to exploit the animal other. We can no longer justify our abuse through traditional divisions designed to serve human interests. Leonard Lawler inspired by Derrida asks us to imagine a new kind of ontology that recognizes human commonalities with the animal other while also respecting the differences between and within species. He combines “biological continuism” with “transcendental separatism” to propose a human subjectivity that is the same as and different from the animal other.[7]

Scientists also question the divide between humans and nonhumans. Biologists document the affinities of humans and animals. Ethologists record examples of animal culture: animals use tools; animals pass on survival skills to their young; animal packs create social hierarchies and behavioral expectations; animals show signs of empathy and morality; some animals learn linguistic and mathematical skills.[8] And the patient and empathic research of Goodall, Fossey and Galdikas reveals an array of affinities between human and nonhuman primate culture. The field of genetics also challenges the division between animal and human informational bodies—biotech labs routinely combine human, animal and plant cells to create high-tech chimeras.

The dialectic of autonomy and integration argues that we are deeply connected to the other but remain different. It welcomes difference without twisting that difference to human advantage. Our unique human talents are often perversely expressed—we exploit rather than protect or care. Our assumptions of human supremacy cleanly divide the human from the nonhuman. Yet the more we examine the animal other, whether through ethology, genetics or philosophy, the less sure we are of our privileged position. We may be a different kind of animal, but we remain animals nonetheless. We are attached to and separate from the nonhuman animal, connected yet different. But our difference need not result in abuse and violence. Perhaps we can become in Derrida’s words “an animal that didn’t intend to harm the animal.”[9]

### 7.2.3 Aura and Abjection

The dialectic of aura and abjection brings corporeality and materiality into focus. The animal is an ambivalent symbol—at once a sign of freedom and strength and also an emblem of depraved and irrational behavior. Descartes viewed the animal as a soulless machine, driven by instinct, and lacking language, human emotion and rational thought. Heidegger echoes Descartes' sentiment with his hierarchy of human, animal and stone. The stone is worldless, the animal poor in world, and the human world-forming. The human leads and the animal follows. The human shapes his environment and the animal is trapped in his "disinhibiting ring," unable to imagine anything beyond his own instinctual drives.[10]

Derrida questions Heidegger's conception of the animal. Heidegger views the human's ability to transpose—her ability to comprehend the world of the other—as an essential human trait. Derrida disputes the human's ability to transpose—we are often unable to see beyond our own phenomenology. We are surrounded by many animal worlds yet are mostly oblivious to these worlds. We rarely see beyond our world into the other's world.

The animal other is often an abject victim of human violence. Humans who are closely aligned with the animal may also become victims of violence. Mark Roberts notes that animal characteristics are often ascribed to minority groups as a way to separate a particular population from the dominant culture and justify abuse of that group.[11] And a human who privileges animal concerns over human interests may be ostracized from society and vulnerable to attack. Dian Fossey's fierce loyalty to her gorilla tribes led to isolation and eventually her death. Fossey choose the gorillas' world over the human's and in the process became an outcast exposed to the same violence inflicted on the animal other.

At this historical moment, the animal's status is particularly ambiguous. On the one hand, new laws and cultural attitudes promote the welfare of certain animals in ways that are unprecedented in Western culture. At the same time, growing human consumption, environmental degradation and factory farming commodify and annihilate large numbers of domestic and wild animals. Animals embedded in high-tech environments are similarly auratic and abject. A cyborgian animal may be the star of an art installation or represent the bleeding edge of cognitive science, but her body is severely modified by high-tech accoutrements and her desires redirected to meet the needs of art, research and industry. Biotech lab chimeras represent a level of plasticity unavailable to humans, but these knock-out mice and fluorescent rabbits are also products designed for global markets. Animal bodies incorporate the latest of biotech innovation but they do so to accommodate the demands of medical-research industries. Lab animal concerns are subjugated to corporate and institutional imperatives. In a variety of contexts the animal fluctuates between subject and object—she is a prized companion and global commodity, an art star and expendable lab animal, an impressive chimera and regulated cyborg.

### 7.3 Central Themes

Several themes emerge through this investigation of four animal roles framed by the three dialectics. The first is the limits of language, thought, representation, and being. The dialectics oscillate in part because existing categories and taxonomies are unable to capture the complexity of existence. An ambivalent animal is simultaneously subject and object, autonomous and integrated, auratic and abject. Recognizing the restrictions of language and experience opens us up to other ways of seeing, thinking, knowing and being. We question our methods of inquiry and sense of reality. Our epistemological and ontological traditions circumscribe our ability to re-imagine, reconnect and reinvent.

Moving back and forth between practice and theory is one way to explore the limits of making and writing. When we engage different modes of research we are more likely to see the divisions between different methods of inquiry and address. We recognize the rhetoric and reasoning of a particular mode of research—the traditions and assumption of a "language game"—and may also be able to invent new "moves."[12] In the ambivalent animal project, the interactions of theory and practice changed the way I approached writing and making. The writing is influenced by synthetic creative practice—it combines a range of artifacts and ideas from high and low culture as well as techno-culture. The writing also aims to be interdisciplinary—it charts a course through the fields of animal studies, art and design, media and culture studies and philosophy. And my creative practice shifted to the conceptual side of practice—I engaged with ideas as much as materials.

The dissertation's ambivalent aesthetic also foregrounds the limits of language and experience. Ambivalence sees contradiction as a manifestation of our inability to control the complexity of the world through stable identities, theories and taxonomies. Each attempt at description or reason leaves out incompatible details and irreconcilable differences. Each time we speak, write, code, or create we enclose and compartmentalize experience and lose the ambiguity of the moment. Recognizing the limits of language and thought encourages a mode of inquiry that questions traditional boundaries and holds in tension opposing ideas. And this tension is the driving force of the ambivalent aesthetic. This aesthetic attempts to convey the complexity and paradox of animal-culture-machine interactions.

Another theme of the project is the interactions between anthropocentrism and a decentered human subject. Anthropocentrism is deep seated within human culture. Derrida argues that a sense of human superiority underpins much of Western philosophy.[13] We create divisions between humans and nonhumans in a desperate attempt to justify our abuse of the animal other. Animals submit to human needs—they are removed, killed, eaten, and domesticated to satisfy our desires. This dissertation expands the critique of anthropocentrism to the lives of animals mediated and modified by the concepts and practices of cybernetics and biotechnology. Animals solicited by the demands of technology illustrate the ambiguous status of the animal other—they are at the forefront of radical corporeal and subjective shifts but this precursor status is obtained through becoming a research object. Animals precede the human—forecast the human's future—and also submit to the risks and demands of untested theories and procedures.

Despite our culture's ongoing anthropocentrism, a counter trend is also on the rise. The decentered human is no longer limited to the debates of poststructuralist and posthuman theorists. A human who is closely connected to the nonhuman other—whether animal, machine or environment—is part of everyday popular discourse. A decentered human emerges in a convergence of cultural, economic, political and technological changes: the rise of animistic machines; social justice movements that make us more conscious of the abuse of power; research in biology that reveals animal culture and cognition to be more sophisticated than once thought; environmental degradation that highlights poor human stewardship; genetic commonalities between species; globalization that tempers Western economic hegemony and fosters multicultural diversity as it also challenges ethnic identity; and even an increase in single-occupant households that are populated with animals that act as companions and child substitutes. All of these and no doubt many other factors challenge the Enlightenment's idea of human individuality; a coherent, unitary self is harder to maintain. We are less confident that our species is evolution's ultimate biological marvel. We appear to be another experiment among so many biological experiments. And we may not be as world forming as Heidegger imagines—instead we shape and are also shaped by the world. Latour imagines a new kind of human subject that finds his humanity in the role of liaison or delegate. This human develops interfaces between natural and artificial, human and nonhuman, science and culture. He becomes "a weaver of morphisms."[14] This is a humbler human whose purpose and identity is based in part on nonhuman networks of activity.

A final theme is ambivalence's embrace of alterity and multiplicity. The project views multiplicity not as a loss of unitary identity or a form of madness but as a celebration of conflicting desires and alternative "becomings." Each attempt to shapeshift orients us to alternative subjectivities and phenomenologies. And the process of transformation also makes more apparent our own particular alterity.

When we judge the cognitive abilities or cultural sophistication of animals we invariably base our assessments on human talents. Our intelligence and culture become the measure of all intelligence and culture. Alterity challenges our assumptions of superiority. It suggests that our ways are not necessarily the best ways. And it asks us to imagine other methods of thinking, living and being.

We are surrounded by multiple worlds, most of them unseen and unrecognized. The ambivalent animal project acknowledges our limited understanding of the other's world even as it attempts to imagine the other's desires and needs. The world is diverse and complex, and we comprehend so little of it. Heideigger claims the ability to transpose—this "going along with" the other[15]—as a uniquely human characteristic. Such human exceptionalism is paradoxically used to dominate the nonhuman others; because we know more, we are justified in our coercion and abuse. Derrida argues that our species remains rather inept at transposing and understanding the world "as such."[16] We like to think that our world rises above all other worlds and that our views are detached from our cultural and phenomenological bias; we want to believe that we see more clearly than our nonhuman counterparts. But as we consider the possibility of alternative subjectivities and multiple worlds, we begin to realize how little we know of the other and also how rich the other's world appears to be. And this may leads us to a less arrogant and more generous engagement with the animal other.

---

[1] Giorgio Agamben, *The Open: Man and Animal,* trans. Keven Atell (Stanford, CA: Stanford University Press, 2004), 40.

[2] Donna J. Haraway, "Cyborgs to Companion Species: Reconfiguring Kinship in Technoscience" in Linda Kalof, Amy Fitzgerald, eds., *The Animals Reader: The Essential Classic and Contemporary Writings* (New York: Berg, 2007), 365-6.

[3] Jaron Lanier, "One-Half of a Manifesto," *WIRED*, 8:12, December 2000,172, 174.

[4] Jorge Luis Borges, "On Exactitude in Science" in *Collected Fictions* (New York: Penguin Books, 1998), 325.

[5] Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993), 138.

[6] Jacques Derrida, *The Gift of Death*, trans. David Willis (Chicago, IL: University of Chicago Press, 1995), 78.

[7] Leonard Lawlor, *This is Not Sufficient: An Essay on Animality and Human Nature in Derrida* (New York: Columbia Press, 2007), 40.

[8] "Clever Monkey." *Nature*. Mark Fletcher and Angela Sakrison, writers. Public Broadcasting Corporation. 2008.

[9] Jacques Derrida, *The Animal That Therefore I Am* (New York: Fordham University Press, 2008), 64.

[10] Martin Heidegger, *The Fundamental Concepts of Metaphysics: World, Finitude, Solitude,* trans. William McNeil and Nicholas Walker (Bloomington, IN: Indianapolis University Press, 1995), 177, 257, 259.

[11] Mark S. Roberts, *The Mark of the Beast: Animality and Human Oppression* (West Lafayette, IN: Purdue University Press, 2008), 17.

[12] Jean-Francois Lyotard, *The Postmodern Condition: A Report on Knowledge,* trans. Geoff Bennington and Brian Massumi (Minneapolis, MN: University of Minnesota Press), 10, 26.

[13] Derrida, *The Animal That Therefore I Am*, 32.

[14] Latour, 137.

[15] Heidegger, 202.

[16] Derrida, *The Animal That Therefore I Am*, 159-60.

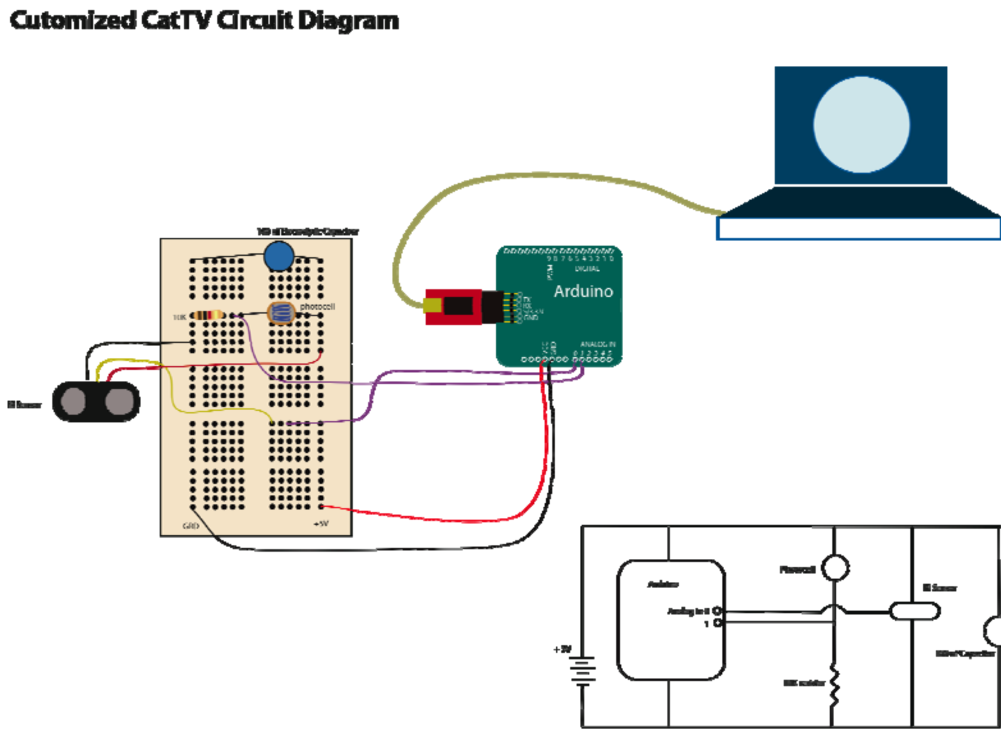
# APPENDIX A

# ZOOCENTRIX & PETITE CHARM DOCUMENTATION

## A.1 Zoocentrix: Purrplex Documentation

### A.1.1 Customized CatTV

A.1 *Customized CatTV*




A.2 *Customized CatTV* Circuit Diagram

<u>A.1.1.1 Customized CatTV Arduino Code</u>

```
// Variables:
char sensorValueToSend = 0;           // Value of the sensor
int actualSensorValue = 0;            // value from the analog input

void setup() {
  //  set the states of the I/O pins:
  Serial.begin(9600);
  Serial.flush();
}

void loop() {
```

```
  //processing calling
  if (Serial.available() > 0) {
    int inByte = Serial.read();
    Serial.flush();
    int i;
    for (i=0; i <2; i++) {
    // read the analog inputs and send the values of the sensors.
     if (i==0) {
        actualSensorValue = analogRead(0);
        sensorValueToSend = scaleValue(actualSensorValue,100, 550, 255);
     } else {
        actualSensorValue = analogRead(1);
        sensorValueToSend = scaleValue(actualSensorValue,250, 550, 100);
     }
            // Serial prints to see in Wiring Serial's Monitor
      //Serial.print(i);
      //Serial.print(" : ");
      //Serial.print(actualSensorValue, DEC);
      //Serial.println(" END ");
      Serial.print(sensorValueToSend,BYTE);
     }
 }
}
}

int scaleValue(int sv, int low, int high, int scaleMax) {
 return (int)constrain(scaleMax * ((float)(sv-low)/(float)(high-low)),0,scaleMax);
}
```

A.1.1.2 Customized CatTV Processing Code

```
/*
 * VideoSpeedGL.
* Press and drag the mouse to change the playback speed. Releasing the
 * mouse will return to normal playback speed.
 */
import jmcvideo.*;
import processing.opengl.*;
import javax.media.opengl.*;
import processing.serial.*;
JMCMovieGL myMovie;
int pvw, pvh;
float maxSpeed = 10f;
float videoSpeed = 0f;
Serial port;                         // The serial port
int[] serialInArray = new int[2];    // Where we'll put what we receive
int serialCount = 0;                 // A count of how many bytes we receive
boolean firstContact = false;        // Whether we've heard from the microcontroller
int currentTime;
int timeLimit = 500;
int previousTime;

void setup() {
  // Setup frame
  size(720, 480, OPENGL);
  frame.setResizable(true);
  background(0);
```

```
  currentTime = millis();
  previousTime = millis();
  myMovie = movieFromDataPath("fishrain.mov");
  myMovie.loop();
   // Print a list of the serial ports, for debugging purposes:
  println(Serial.list());
  // I know that the first port in the serial list on my mac
  // is always my Keyspan adaptor, so I open Serial.list()[0].
  // On Windows machines, this generally opens COM1.
  // Open whatever port is the one you're using.
  port = new Serial(this, Serial.list()[0], 9600);
  port.write(65);    // Send a capital A to start the microcontroller sending
}

void draw()
{
  PGraphicsOpenGL pgl = (PGraphicsOpenGL) g;
  GL gl = pgl.beginGL();
  {
    if (pvw != width || pvh != height)
    {
      background(0);
      gl.glViewport(0, 0, width, height);
      pvw = width;
      pvh = height;
    }
    myMovie.centerImage(gl);
  }
  pgl.endGL();
```

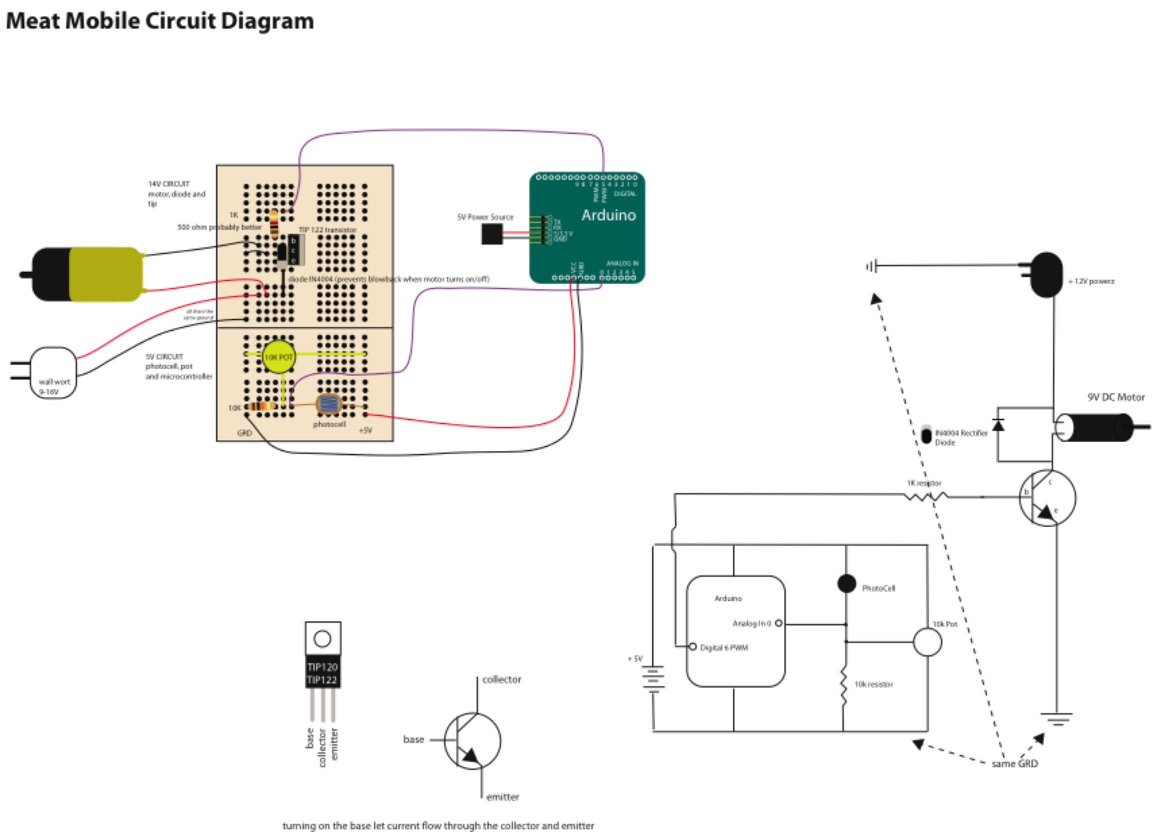
```
  currentTime = millis();

  if (currentTime - previousTime > timeLimit) {
    delay(300);
    println("Sending 65 Time LIMIT EXPIRED");
    port.write(65);
  }

  // If no serial data has beeen received, send again until we get some.
  // (in case you tend to start Processing before you start your
  // external device):
  if (firstContact == false) {
    delay(300);
    println("Sending 65");
    port.write(65);
  }
}

void serialEvent(Serial port) {
  previousTime = millis();
  // if this is the first byte received,
  // take note of that fact:
  if (firstContact == false) {
    firstContact = true;
  }
  // Add the latest byte from the serial port to array:
  serialInArray[serialCount] = port.read();
  //print (serialCount + ":" + serialInArray[serialCount] );
  serialCount++;
```

```
  // print("serialCount " + serialCount);
  // If we have 6bytes:
  if (serialCount >= 2 ) {
    //for (int i=0; i<2; i++) {
        //print(serialInArray[i]);
       //print(" : ");
    //}
   // println(" END");

    // Send a capital A to request new sensor readings:
    // println(xpos + ":" + ypos + ":" + fgcolor);
    port.write(65);
    serialCount = 0;
  }

  println("IR Sensor" + serialInArray[0]);
  println("photocell " + serialInArray[1]);

  videoSpeed = 1f-(float)serialInArray[0]/255f;
  if (videoSpeed < 0.25f || serialInArray[1] < 20) {
    videoSpeed = 0.25f;
  }
  println(videoSpeed);
  myMovie.setRate(videoSpeed);

}

void mouseDragged()
{
```

```
  float num = maxSpeed *((float)mouseX / (float)width);
  println(num);
  myMovie.setRate(maxSpeed * ((float)mouseX / (float)width));
}

void mouseReleased()
{
  myMovie.setRate(1);
}

JMCMovieGL movieFromDataPath(String filename)
{
  return new JMCMovieGL(this, filename, RGB);
}
```

### A.1.2 Meat Mobile

A.3 *Meat Mobile*




A.4 *Meat Mobile* Circuit Diagram

<u>A.1.2.1 Meat Mobile Arduino Code</u>

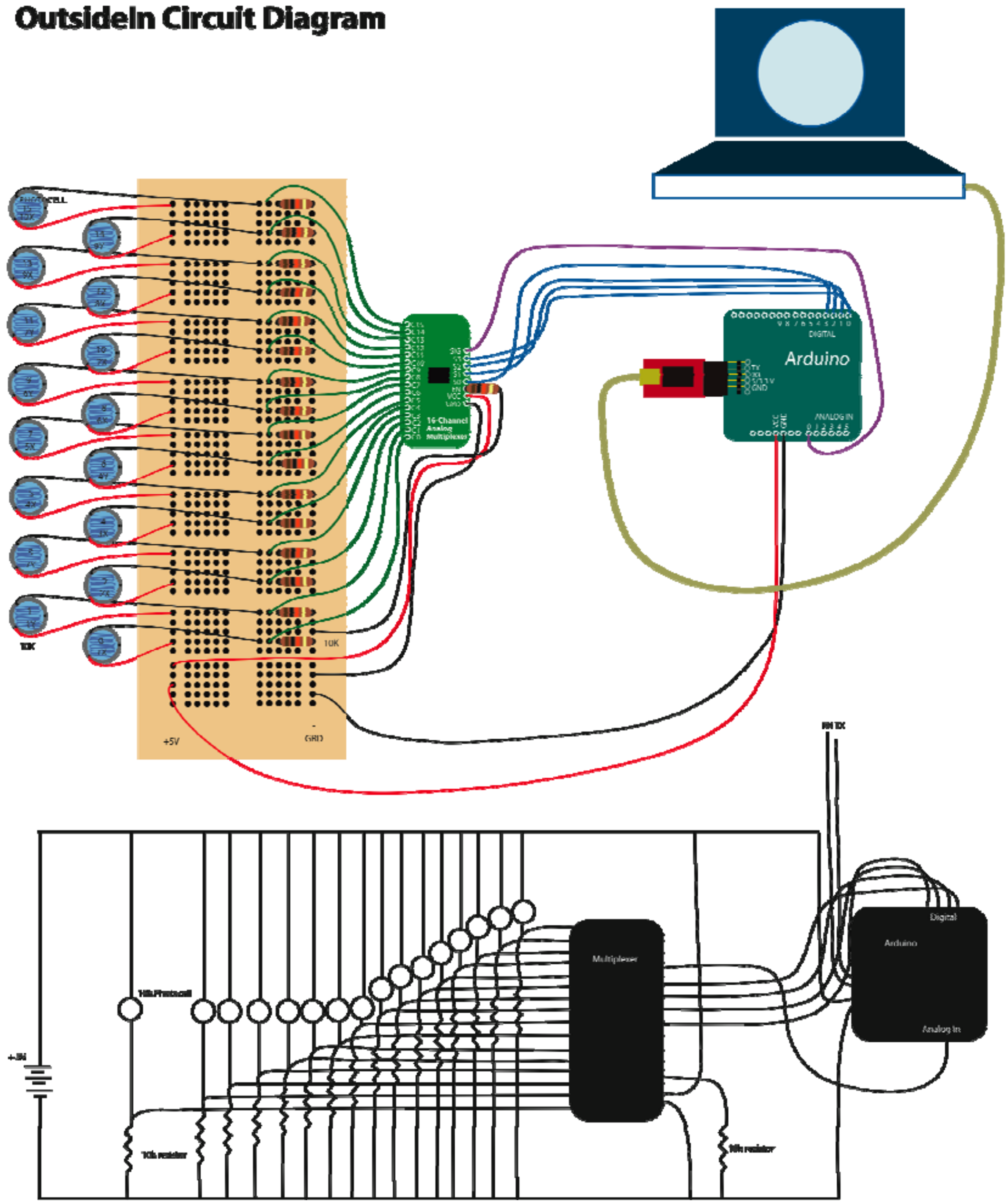
```
int actualSensorValue1 = 0;          // value from the analog input

int actualSensorValue2 = 0;

int motorpin1 = 5;

int motorpin2 = 6; // L293D Pin En1 connected to pin PWM 1 (on-board LED)

int speed1 = 12;

int incSpeed1 = 1;

int speed2 = 12;

int incSpeed2 =1;


void setup() {
```

```
  //  set the states of the I/O pins:
  Serial.begin(9600);
  Serial.flush();
}

void loop() {
  actualSensorValue1 = analogRead(0);
  actualSensorValue2 = analogRead(0);

  Serial.print(actualSensorValue1, DEC);
  Serial.print(" : ");
  Serial.print(actualSensorValue2, DEC);
  Serial.println(" END ");

  if (actualSensorValue1 > 460) {
    if (speed1 < 180) {
      speed1++;
    }

    analogWrite(motorpin1, speed1); // turn ON the Motor
    delay(50); // wait 100ms for next reading
  } else {
    if (speed1 > 12 ) {
       speed1-=2;
       analogWrite(motorpin1, speed1); // turn ON the Motor at medium speed
       delay(50); // wait 100ms for next reading
    }
  }
```

```
  if (actualSensorValue2 > 460) {
    if (speed2 < 180) {
      speed2++;
    }



    analogWrite(motorpin2, speed2); // turn ON the Motor
    delay(50); // wait 100ms for next reading
  } else {
    if (speed2 > 12 ) {
       speed2-=2;
       analogWrite(motorpin2, speed2); // turn ON the Motor at medium speed
       delay(50); // wait 100ms for next reading
    }
  }
}
```

### A.1.3 OutsideIn

A.5 *OutsideIn*




A.6 *OutsideIn* Circuit Diagram

## A.1.3.1 OutsideIn Arduino Code

//set variables to control which pin we are reading from on the multiplxer

```
#define CONTROLpin1 2
#define CONTROLpin2 3
#define CONTROLpin3 4
#define CONTROLpin4 5

// Variables:
char sensorValueToSend = 0;          // Value of the sensor
int actualSensorValue = 0;           // value from the analog input


void setup() {
  //  set the states of the I/O pins:
//  pinMode(LEDpin, OUTPUT);
  pinMode(CONTROLpin1, OUTPUT);
  pinMode(CONTROLpin2, OUTPUT);
  pinMode(CONTROLpin3, OUTPUT);
  pinMode(CONTROLpin4, OUTPUT);

  Serial.begin(9600);
  Serial.flush();
}

void loop() {
  if (Serial.available() > 0) {
    int inByte = Serial.read();
    Serial.flush();
  int i;
  //int j;
  for (i=0; i <16; i++) {
```

```
// set control pins on the multiplexers
digitalWrite(CONTROLpin1, (i&15)>>3);//bit4
digitalWrite(CONTROLpin2, (i&7)>>2);//bit3
digitalWrite(CONTROLpin3, (i&3)>>1);//bit2
digitalWrite(CONTROLpin4, (i&1)   );//bit1

// read the analogue inputs and send the values of the sensors.
// for(j=0; j<4; j++){
  actualSensorValue = analogRead(0);
  // You will have to adjust this line so that can send the
  // sensor value in one byte.
 // Also, adjusting for a photocell--the first one--that range of sensor input is
 //a little different than other photocells
 if (i == 0) {
    sensorValueToSend =  scaleValue(actualSensorValue, 300,600, 100);
 } else {
   sensorValueToSend =  scaleValue(actualSensorValue, 500,800, 100);
 }
  //sensorValueToSend = actualSensorValue;
 //actualSensorValue = scaleValue(actualSensorValue, 500,800, 100);

 Serial.print(sensorValueToSend,BYTE);
 /*
 Serial.print(i);
  Serial.print(" : ");
  Serial.print(actualSensorValue,DEC);
     Serial.print(" ");
```

```
   */


   //}
   // if you uncomment this line you can check the control pins
   // of the multiplexers with your multimeter.
   //delay(5);
  }
  //Serial.println(" END ");
  }
}
int scaleValue(int sv, int low, int high, int scaleMax) {


 return (int)constrain(scaleMax * ((float)(sv-low)/(float)(high-low)),0,scaleMax);
}
```

<u>A.1.3.2 OutsideIn Processing Code</u>

```
import processing.serial.*;
Serial port;
GridSquare[][] myGrid = new GridSquare[4][4];
int[][] onOffGrid = {{0,0,0,0},{0,0,0,0},{0,0,0,0},{0,0,0,0}};
char[][] myKeys = {{'q','w','e','r'},{'a','s','d','f'},{'z','x','c','v'},{'t','y','u','i'}};
int rowCnt= 0;
int colCnt = 0;
int rowTotal = 4;
int colTotal = 4;
int xOffset = 100;
int yOffset = 100;
boolean firstTime = true;
ArrayList myAnims = new ArrayList();
```

```
int[] serialInArray = {100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100,
100, 100, 100};    // Where we'll put what we receive
int serialCount = 0;
int currentTime;
int timeLimit = 500;
int previousTime;
int stageWidth = 800;
int stageHeight = 800;
boolean firstContact = false;

void setup() {
  size(stageWidth,stageHeight);
  frameRate(24);
   // Print a list of the serial ports, for debugging purposes:
  currentTime = millis();
  previousTime = millis();
  println(Serial.list());

  // I know that the first port in the serial list on my mac
  // is always my  Keyspan adaptor, so I open Serial.list()[0].
  // On Windows machines, this generally opens COM1.
  // Open whatever port is the one you're using.
  port = new Serial(this, Serial.list()[0], 19200);
  port.write(65);    // Send a capital A to start the microcontroller sending



  //Create grid squares
  for (int i=0; i< rowTotal; i++) {
    for (int j=0; j<colTotal; j++) {
```

```
      myGrid[i][j] = new GridSquare(j*200, i*200, 200, 200, color(104, 18, 18), color(115,
22, 20), myKeys[i][j]);
    }
  }
}

void draw() {
  background(255, 255, 255);
  currentTime = millis();

  if (currentTime - previousTime > timeLimit) {
    delay(300);
    println("Sending 65 Time LIMIT EXPIRED");
    port.write(65);
  }

  // If no serial data has beeen received, send again until we get some.
  // (in case you tend to start Processing before you start your
  // external device):
  if (firstContact == false) {
    delay(300);
    println("Sending 65");
    port.write(65);
  }

  rowCnt=0;
  colCnt= 0;
  //build an 2D array that shows which cells are on and which are off by contacting each
grid cell
```

```
  for (int i=0; i<rowTotal; i++) {
    for (int j=0; j<colTotal; j++) {
      //20 is the cutoff point for the sensor, values range from 0 tp 100
      if (serialInArray[i*4+j] < 10) {
        myGrid[i][j].rolledOver(true);
      } else {
        myGrid[i][j].rolledOver(false);
      }
      onOffGrid[i][j] = myGrid[i][j].getOnOff();


    }
  }
 /*
  for(int a= 0; a<onOffGrid.length; a++) {
        print(onOffGrid[a][0] + ":" + onOffGrid[a][1] + ":" +onOffGrid[a][2] + ":" +
onOffGrid[a][3]);
        println("END");
  }
 */

  for (int i=0; i<rowTotal; i++) {
    for (int j=0; j<colTotal; j++) {


    //celll is currently on
      if (onOffGrid[i][j] == 1) {


        //see if current cell is attached to an animation
        ArrayList anims = new ArrayList();
        anims = checkACell(i, j);
```

```
    //if the current cell is not attached to any animation, check surrounding cells
    if (anims.size()==0) {
      int[] cellOn = new int[2];
      int upRow = i-1;
      int downRow = i+1;
      int colSideLeft = j-1;
      int colSideRight = j+1;

      //limit the row and cols to ones that exit on the grid
      if (upRow < 0) {
        upRow = i;
      }
      if (downRow >= rowTotal) {
        downRow = i;
      }
      if (colSideLeft <0) {
        colSideLeft = j;
      }
      if (colSideRight >= colTotal) {
        colSideRight = j;
      }

      boolean cellAssigned = false;
      println("upRow  " + upRow  + " downRow " + downRow + " colSideL " +
colSideLeft + " colSideRight " + colSideRight);
      for (int l=upRow; l<=downRow; l++) {
         for (int m=colSideLeft; m<=colSideRight; m++) {
           anims = checkACell(l, m);
```

```
        if (anims.size() > 0) {
         //there are anims attached to a surrounding cell
           cellOn[0] = i;
           cellOn[1] = j;
           int[] XY = myGrid[i][j].getXY();
           println("my anim index " +  " X " + XY[0] + " Y " + XY[1] + " L " + l + " M " +
m + " I " + i + " J " +j);
             /*for (int a=0; a<myAnims.size()-1;a++) {
               Anim tmpAnim = (Anim)myAnims.get(a);
               int[] currentCell = tmpAnim.getCurrentCell();
               if (currentCell[0] == l && currentCell[1] == m){
                 tmpAnim.setCurrentCell(cellOn, XY[0], XY[1]);
               }
             }*/

           for(int o= 0; o<anims.size()-1; o++) {
             ActiveAnim tmpAA = (ActiveAnim)anims.get(o);
             Anim tmpAnim = (Anim)myAnims.get(tmpAA.getAnimIndex());
             tmpAnim.setCurrentCell(cellOn, XY[0], XY[1]);
             cellAssigned = true;
           }
           //break;
         }
      }
    }

    if (!cellAssigned) {
      int[] XY = myGrid[i][j].getXY();
```

```
        int[] cell = {i, j};
        Anim tmpAnim = new Anim("butterfly/LWhite00", "png", 10, XY[0], XY[1],
myGrid[i][j].getMyWidth(), cell, 0, 0, stageWidth, stageHeight);
        myAnims.add(tmpAnim);
        myAnims.add(new Anim("butterfly/MWhite00", "png", 11, XY[0], XY[1],
myGrid[i][j].getMyWidth(), cell, tmpAnim.getXOffset(), tmpAnim.getYOffset(),stageWidth,
stageHeight));
        myAnims.add(new Anim("butterfly/SWhite00", "png", 11, XY[0], XY[1],
myGrid[i][j].getMyWidth(), cell,tmpAnim.getXOffset(), tmpAnim.getYOffset(),stageWidth,
stageHeight));
      }

    }
    //otherwise if current cell is on and attached to an animal, than leave things as they
are
   }
  }
 }
 //clean up anims that cells are off or are out of bounds
 //println("myAnims size before removal " + myAnims.size());

 for (int n=myAnims.size()-1;n>=0;n--) {
  Anim tmpAnim = (Anim)myAnims.get(n);
  tmpAnim.displayAnim();
  boolean outOfBounds = tmpAnim.checkLimits();
  boolean cellOff = tmpAnim.checkCell(onOffGrid);

  if (outOfBounds || cellOff) {
   println("out of bounds " + outOfBounds);
```

```
      myAnims.remove(n);
    }
 }
    //println("myAnims size after removal " + myAnims.size());
}

ArrayList checkACell(int a, int b) {
  //cycle through the animation array to see if any are attached to the grid cell passed in
the parameter
   ArrayList activeAnims = new ArrayList();
   println("anims size before " + activeAnims.size());

  int [] myCell = new int[2];
  for (int k=0;k<myAnims.size(); k++) {
    Anim tmpAnim = (Anim)myAnims.get(k);
    myCell = tmpAnim.getCurrentCell();
    if (myCell[0] == a && myCell[1] == b) {
      activeAnims.add(new ActiveAnim(k));
    }
  }
  println("anims size after " + activeAnims.size());
return activeAnims;
 }

 void serialEvent(Serial port) {
  previousTime = millis();
  // if this is the first byte received,
  // take note of that fact:
  if (firstContact == false) {
```

```
    firstContact = true;
  }
  // Add the latest byte from the serial port to array:
  serialInArray[serialCount] = port.read();
  //print (serialCount + ":" + serialInArray[serialCount] );
  serialCount++;
  // print("serialCount " + serialCount);
  // If we have 6bytes:
  if (serialCount > 15 ) {
    for (int i=0; i<16; i++) {
      //if (i==0 || i==2 || i==4 || i==7 || i==8 || i ==10 || i == 13 || i==15 ) {
        //print(100-serialInArray[i]);
      //} else {
        print(serialInArray[i]);
      //}
      print(" : ");
    }
    println(" END");

    // Send a capital A to request new sensor readings:

    port.write(65);
    // Reset serialCount:
    serialCount = 0;
  }
}

//scale the values from 0 to 1 to send to the machine
  float scaleValue(int x, int low, int high) {
```

```
    /*if (low == 46) {
    println(x);
    }*/
  return (int)constrain(100*(float)(abs((x - low))/(float)(high-low)),0,100);
  }

 void keyPressed() {
    /*
    for (int i=0; i<rowTotal; i++) {
      for (int j=0; j<colTotal; j++) {
       myGrid[i][j].checkKey(key);
      }
   } */
  }

class ActiveAnim {
  int animIndex = 0;
  ActiveAnim(int ai) {
    animIndex = ai;
  }

  int getAnimIndex() {
    return animIndex;
  }
}

class Anim {
  BitmapDisplay myAnimal;
  String fileName,  fileExtension;
```

```
  int fileNum, myX, myY, myOffset, myXOffset, myYOffset, oscillateX, oscillateY,
stageWidth, stageHeight;
  boolean negPos;
  int[] currentCell;

  Anim(String fname, String fext, int fnum, int x, int y, int offset, int[] cc, int xOffset, int
yOffset, int sw, int sh) {
    fileName = fname;
    fileExtension = fext;
    fileNum = fnum;
    myX = x;
    myY = y;
    myOffset = offset;
    currentCell = cc;
    myXOffset = xOffset;
    myYOffset = yOffset;
    oscillateX = int(random(30));
    oscillateY = int(random(30));

    stageWidth = sw;
    stageHeight = sh;
    if (oscillateX>2) {
      negPos = false;
    } else {
      negPos = true;
    }
    setOffset();
    myAnimal = new BitmapDisplay(fileName, fileExtension, fileNum);
  }
```

```
  int[] getCurrentCell() {
    return currentCell;
  }

  void setCurrentCell(int[] cc, int x, int y) {
    currentCell =cc;
    myX = x;
    myY = y;
  }

  boolean checkCell(int[][] oogrid) {

    if (oogrid[currentCell[0]][currentCell[1]] == 0) {
      return true;
    } else {
      return false;
    }
  }

  boolean checkLimits() {
    boolean overLimit = false;
   // println("X " + myX + " Xoffset " +  myXOffset + " Y " + myY + " Yoffset " + myYOffset);
    if (myX + myXOffset  < 0 || myX + myXOffset >= stageWidth || myY + myYOffset < 0 ||
myY + myYOffset >=stageHeight) {
      overLimit = true;
    }
    return overLimit;
  }
```

```
int getXOffset() {
 return myXOffset;
}

int getYOffset() {
 return myYOffset;
}

void setOffset() {

  if (myXOffset == 0 && myYOffset==0) {
   int tmpOffset = myOffset;
   int randNum = int(random(3));
  switch (randNum) {
    case 0:
    myYOffset = tmpOffset;
    break;
    case 1:
    myYOffset = -tmpOffset;
    break;
    case 2:
    myYOffset  = 0;
  }

tmpOffset = myOffset;
randNum = int(random(3));
switch (randNum) {
  case 0:
```

```
  myXOffset = tmpOffset;
  break;
  case 1:
  myXOffset = -tmpOffset;
  break;
  case 2:
  myXOffset = 0;
}

if (myXOffset == 0 && myYOffset == 0) {

  randNum = int(random(2));
  int randNum2;
  if (randNum == 0) {
    randNum2 = int(random(2));
    if (randNum2 == 0) {
        myXOffset = myOffset;;
    } else {
        myXOffset = -myOffset;;
    }
   }else {
     randNum2 = int(random(2));
     if (randNum2 == 0 ) {
       myYOffset = myOffset;;
     } else {
       myYOffset = -myOffset;;
     }
    }
   }
```

```
   }
  }

  void displayAnim() {
    if (negPos) {
      oscillateX = -oscillateX;
      oscillateY = -oscillateY;
      negPos = false;
    } else {
      negPos = true;
    }
myAnimal.displayImage(float(myX + myXOffset + oscillateX), float(myY + myYOffset+
oscillateY));
  }
}

class GridSquare {
  color colorOn, colorOff;
  int myX =0;
  int myY =0;
  int myWidth = 0;
  int myHeight = 0;
  int onOff = 0;
  char myKey;

  GridSquare(int x, int y, int w, int h, color cOn, color cOff, char mk) {
    myX = x;
    myY = y;
    myWidth = w;
```

```
  myHeight = h;
  colorOn = cOn;
  colorOff = cOff;
  showButton(colorOn);
  myKey = mk;
}

void showButton(color clr) {
  smooth();
  noStroke();
  fill(clr);
  //rectMode(CORNER);
  rect(myX, myY, myWidth, myHeight);
}

int getOnOff() {
  return onOff;
}

int[] getXY() {
  int[] XY = {myX, myY};
  return XY;
}

int getMyWidth() {
  return myWidth;
}

//check if the square is rolled over
```

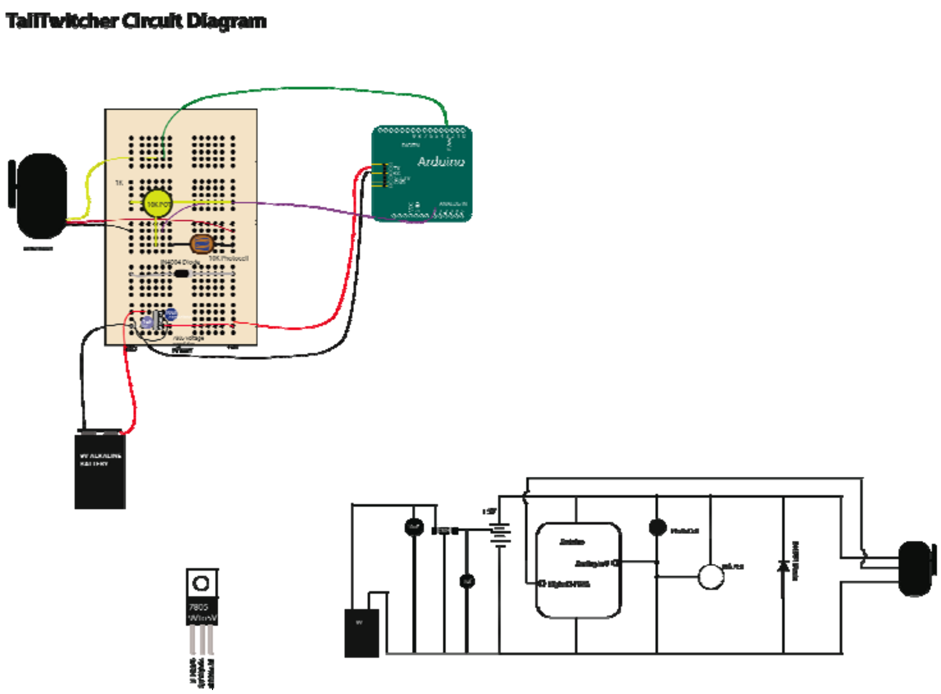
```
 void rolledOver(boolean overCell) {
    //if (mouseX > myX  && mouseX < myX + myWidth && mouseY > myY && mouseY <
myY + myHeight) {
    if (overCell) {
      showButton(colorOn);
      onOff = 1;
    }
    else {
      showButton(colorOff);
      onOff = 0;
    }
  }

  void checkKey(char mk) {
    println ("checkKey " + mk + " " + myKey);
    if (myKey == mk) {
      onOff =1;
    } else {
      onOff =0;
    }
  }
}

//load and display bitmap animation cycles
class BitmapDisplay {
  PImage[] bitmaps;
  int bitmapsIndex = 0;
  String fn;
```

```
BitmapDisplay(String fileName, String fileExtension, int fileNum) {
    fn  = fileName;
    bitmaps = new PImage[fileNum];
    loadBitmaps(fileName, fileExtension);


  }


  void loadBitmaps(String name, String extension) {
    //file names will always start with 01, thus the i=1 initialization in the for loop
    for (int i=1; i<=bitmaps.length; i++) {
      String fileName = name + ((i < 10) ? "0": "") + i + "." + extension;
      //subtract one from the i because the loop started at one instead of zero
      bitmaps[i-1] = loadImage(fileName);
    }
  }
  void displayImageIndex(int index, float xpos, float ypos) {
    image(bitmaps[index], xpos, ypos);
  }



  void displayImage(float xpos, float ypos) {
    //move to the next png image, if at the end of the animation cycle of frames, start back
at the beginning
    bitmapsIndex++;
    if (bitmapsIndex >= bitmaps.length) {
      bitmapsIndex = 0;
    }
    println("fileName " + fn);
```

```
  image(bitmaps[bitmapsIndex], xpos, ypos);
 }
}
```

### A.1.4 Tail Twitcher

A.7 *Tail Twitcher*




A.8 *Tail Twitcher* Circuit Diagram

A.1.4.1 Tail Twitcher Arduino Code

```
int actualSensorValue = 0;            // value from the analog input
int motorpin = 6; // L293D Pin En1 connected to pin PWM 1 (on-board LED)
int speed = 12;
int incSpeed = 1;

void setup() {
  //  set the states of the I/O pins:
```

```
  Serial.begin(9600);
  Serial.flush();
}

void loop() {

  actualSensorValue = analogRead(0);
  Serial.print(actualSensorValue, DEC);
  Serial.println(" END ");

  if (actualSensorValue > 300) {
    if (speed < 180) {
      speed++;
    }

    analogWrite(motorpin, speed); // turn ON the Motor
    delay(100); // wait 100ms for next reading
  } else {
    if (speed > 12 ) {
       speed-=2;
       analogWrite(motorpin, speed); // turn ON the Motor at medium speed
       delay(100); // wait 100ms for next reading
    }
  }
}
```

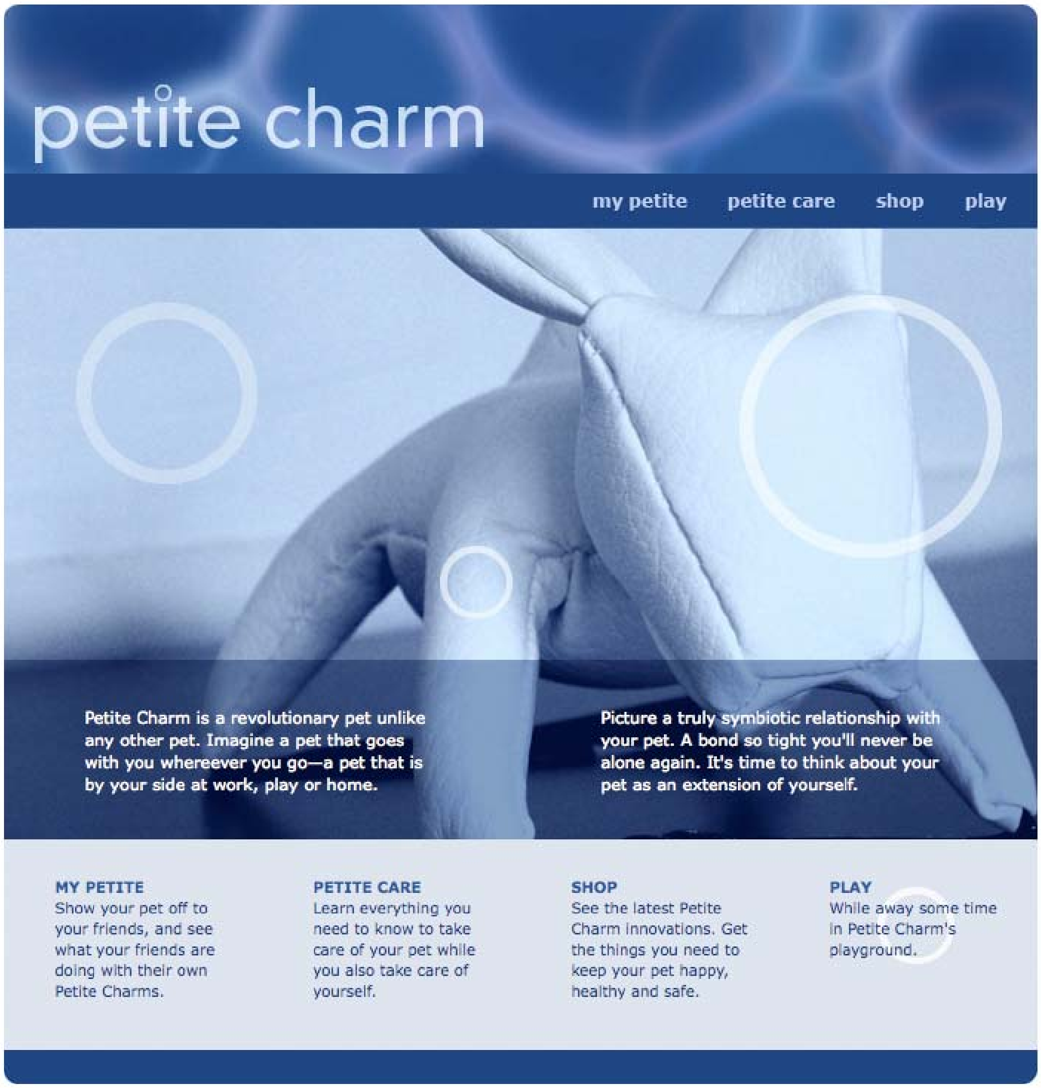
A.9 *Zoocentrix* Poster

## A.2 Petite Charm

### A.2.1 Petite Charm Stuffed Animal Prototypes

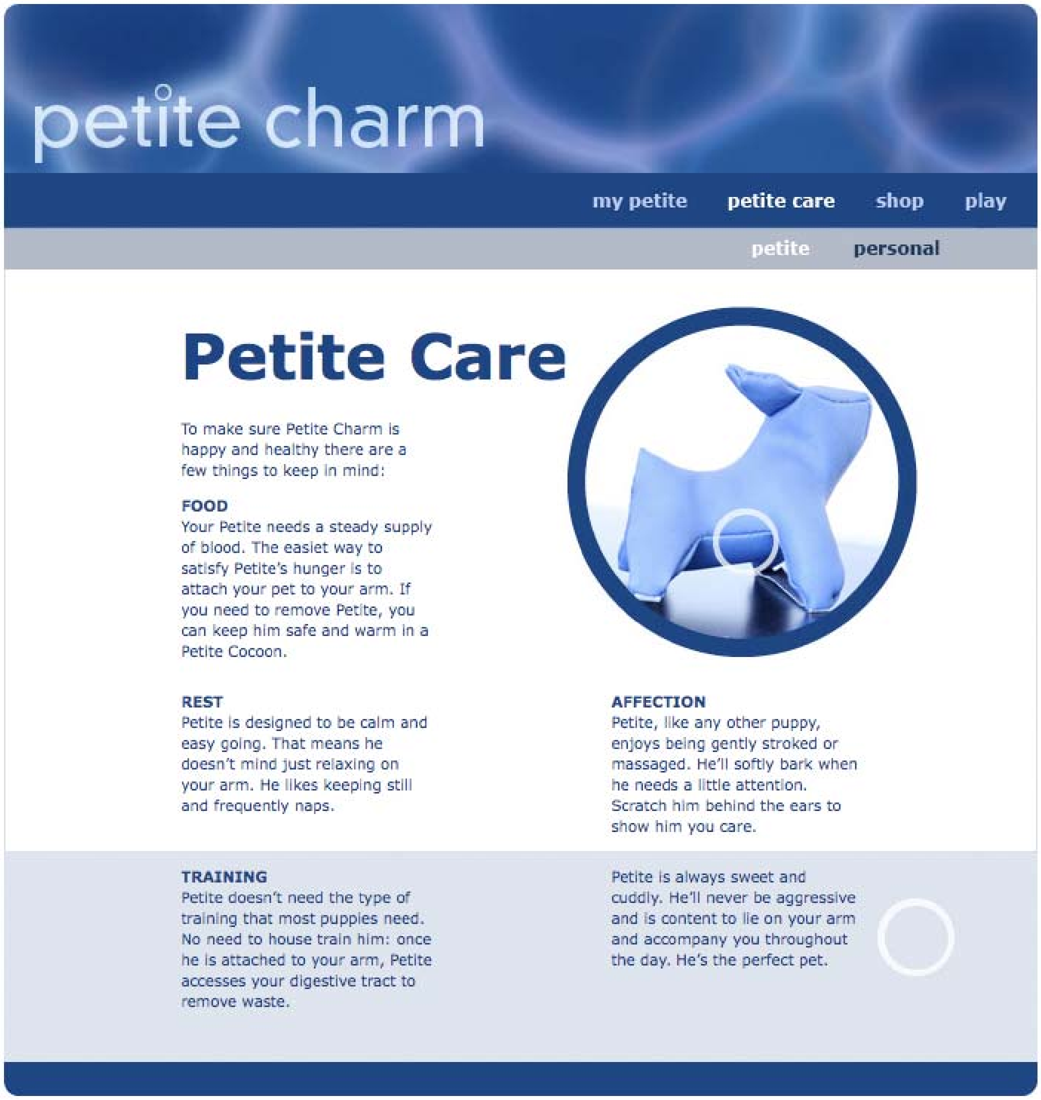
A.10 *Petite Charm* Dogs

A.2.2 Petite Charm Web Site

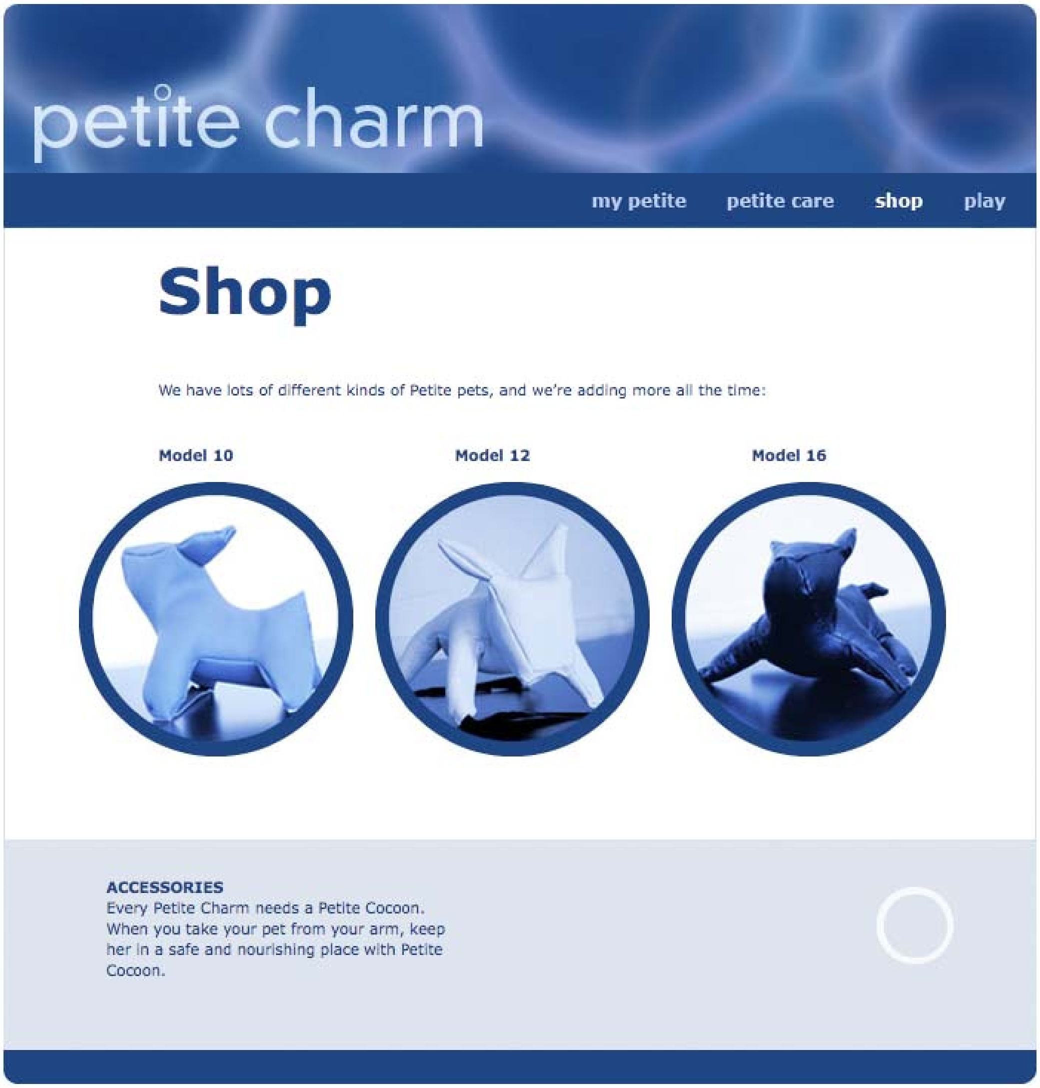



A.11 *Petite Charm* web site: Home page


A.12 *Petite Charm* web site: Profile page




A.13 *Petite Charm* web site: Petite Care page



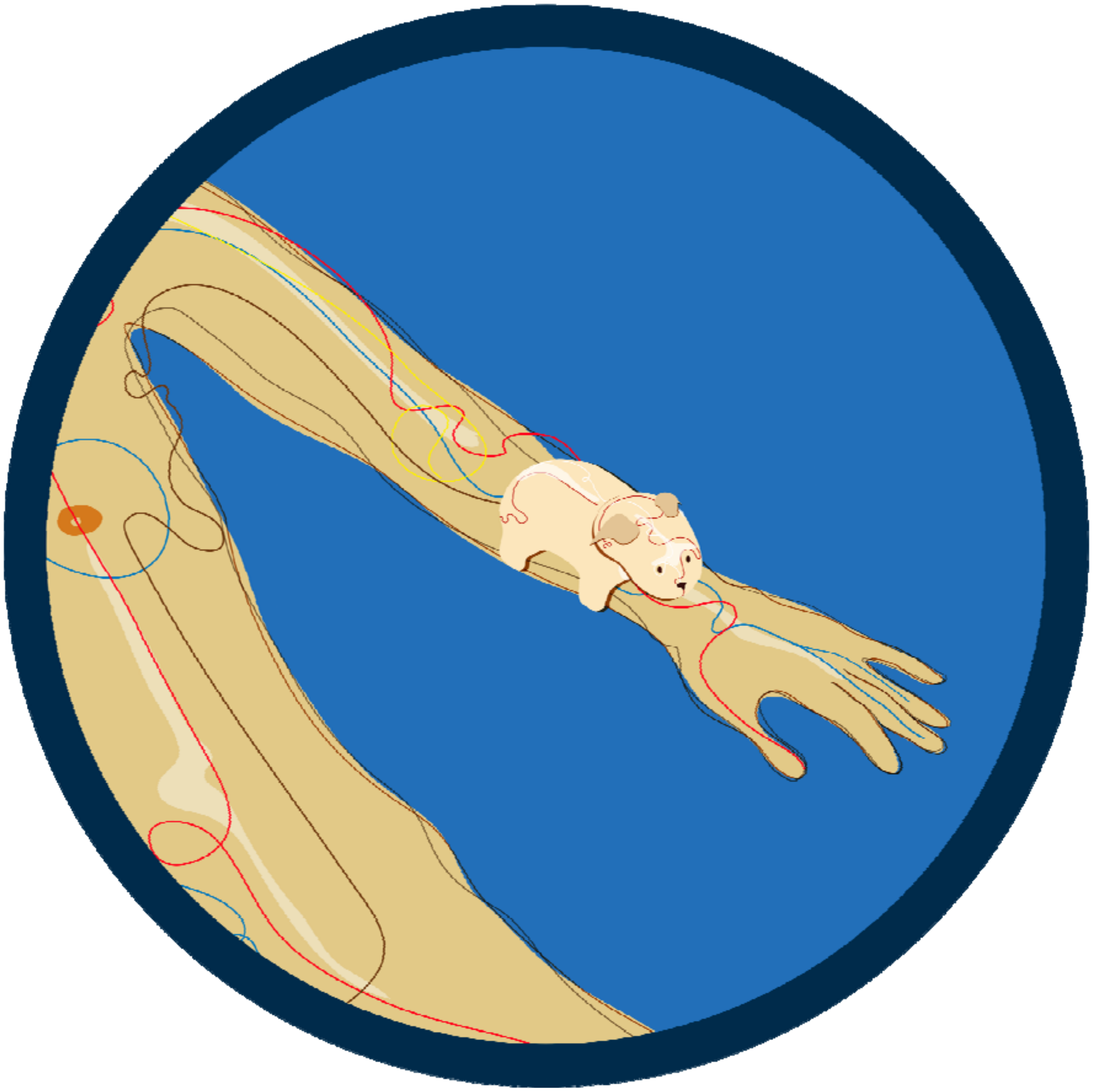

A.14 *Petite Charm* web site: Shop page


A.15 *Petite Charm* web site: Play page

### A.2.3 Petite Charm Parafernalia

A.16 *Petite Charm* Stickers & Badges


A.17 *Petite Charm* Coloring Book



A.18 *Petite Charm* Poster One

A.19 *Petite Charm* Poster Two

A.20 *Petite Charm* Poster Three

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