

MALFUNCTION IN MEDIA:
UNINTENDED CONSTRAINT AND THE DURABLE AESTHETIC

By

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To Angela,
for typing, for editing, for everything

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By

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I examine the role of unintended technical and procedural constraints in the emergence of new media forms. Asserting that constraint is an under-examined catalyst for the creation of novel aesthetics, my project locates and describes effects of these constraints on exemplary media practices and their objects. Focusing on Japanese anime, American vernacular music (specifically rock 'n roll and hip hop) and visual art created with the American Standard Code for Information Interchange (ASCII), I show that effective constraints can be technological, economic, or located within limitations of human agents. Working across these media, I show that constraint is consistently expressed in characteristic aesthetics of a medium, and that these aesthetics persist even when the originating constraint is removed.

CHAPTER 1 INTRODUCTION

This project begins with the proposition that constraint is a valuable and often under-examined aspect of historical media studies. When the producers of music, film, and visual art set out to do their work, the end product can be shaped by the skills and tools they *lack* as much as by the ones they possess. This is not an easy idea to accept. Our narratives of creation tend to focus on individual ability and fortuitous combinations of talented people with hospitable circumstances. The Romantic myth of solitary artistic genius can still hold remarkable sway over us: we think of great art as being produced by great people and if we consider the limitations these people faced, we see them as roadblocks overcome by the power of talent, mere speed bumps on the way to greatness. This project takes an opposing view and asserts that personal, financial, and technological constraints can have powerful and positive effects on the production of media and the birth of novel aesthetics.

There are two main claims here. The first is that constraint matters. As an example, we might look at the Japanese style of animation known as anime. While Japanese animators of the 1960s did have some strong aesthetic ideas about their work, they were also constrained by a world-wide economic recession affecting the animation industry. At the same time, there was a high demand for daily animated television programming. As a result, there was a strong incentive to produce animation with sharply reduced budgets (at least compared to the funding that had previously been considered sufficient in the industry). Animation produced under these constraints featured a greatly reduced frame rate that made notions of “traditional” cinematic smoothness impossible. The resulting animated films tended to favor static poses,

explosive transitions, and an emphasis on camera motion over character motion—all of which subsequently became the aesthetic hallmarks of a new animation genre, anime. In this case, economic constraint was instrumental in forging a new aesthetic. None of this is to suggest that the animators themselves did not have agency in developing the distinctive look and feel of their work, but it is highly unlikely that the aesthetics of anime could ever have arisen without the constrained economic environment of 1960s Japan, and the effects of that environment on day-to-day production of anime programming.

The second major claim of this project is that the aesthetics formed in conditions of constrained production are often durable; that is, they tend to persist even after the constraints that formed them have been removed. In the case of anime, the aesthetics of the genre have gained world-wide popularity and the anime industry is today quite lucrative. Despite the financial success of the genre, the aesthetics that arose from constrained circumstances are still evident in modern anime films. Animation made under the banner of anime still tends to be highly stylized and forsake traditional smooth character motion for explosive transitions and long static poses. The anime aesthetic is durable and, as I will demonstrate, this aesthetic durability is also found in many other media forms typified by constraint.

This project is about constraint in a broad sense, but I limit my discussion to constraints that can be specifically located. In general, I focus on three types of constraint: economic, technological, and constraint located within the media practitioner. The economic constraint is in play in situations like anime, as I discussed above. The technological constraint is a situation where a given piece of technology is broken, ill-suited to its purpose, or simply too new to be well-adapted to its function. I will discuss

these constraints in reference to musical instruments like the electric guitar and vacuum tube amplifier. My discussion will demonstrate that vacuum tube technology was insufficient for producing the volume (that is, the loudness of sound) demanded by professional performers. As a result, amplifiers were pushed beyond their intended limits, thus creating distorted timbres that have become closely associated with electric guitar music. We can also consider constraints located *within* the media producer (whom I also refer to as the “agent”). These constraints are expressed as deficits in the training, knowledge, or abilities that person possesses. In general, these constraints are defined by the abilities that are considered commonplace and necessary to perform a given function. So, we might say that the inability of many vernacular musicians to read standard musical notation is a constraint within the agent. Of course, these constraints are highly context-dependent; the agent’s own goals and her own conception of the skills and knowledge she needs are often decisive in forming the constraint.

This project is explicitly about ways that technology can constrain media production, but it is also about the specific affordances¹ that are presented (or limited) by different elements of the application of a technology. For instance, I explore how the modern turntable offered early hip-hop deejays a tactile surface that could be manipulated by hand, thus turning an appliance meant for reproducing music into an instrument capable of *creating* music. Vinyl LPs, with their large surface, visible grooves, and prominent labels also afforded the deejay an essential set of visual

¹ For a brief survey of affordance theory (an important element of contemporary usability studies), see Norman, Donald A. “Affordance, Conventions, and Design.” *interactions* 6.3 (1999): 38–43.

references that made it possible to place the turntable stylus with great precision, and thus master the kind of timing and rhythmic control audiences expect from musicians.

To take this idea of technology's potential role in the production of new media genres even further, this project also examines the ways that technology can itself reveal the solutions to the problems caused by constraint. In particular, I look at the animation apparatus, which has been at times hobbled by the constraint of too little money. In its diverse assemblage of technologies and its long history of different techniques for representing motion, the animation apparatus actually contains all of the solutions to composing animated film with a low frame-rate. Early animation techniques like repeating cycles of drawings and sacrificing motion for detailed character design provided even the earliest animators with viable alternatives to traditional smoothness of motion. Even further, the surprising functionality of primitive "pencil tests" showed animators that convincing action was possible with a greatly reduced frame-rate. In this way, technology has a habit of revealing possibilities unknown to agents. Throughout, technology has a surprising agency in conditions of media production.

In order to articulate my thesis about the agency of technology and the creative agency of media producers, this project charts a course between two extremes of technology studies and theory. On one side, *technological determinism* correctly assigns great agency to technology, but also goes so far as to suggest that certain inventions might inevitably determine the course of history. On the other side, the *social constructivist* position holds that user groups (rather than inventors or manufacturers) ultimately determine the uses and functions of technology. The constructivist viewpoint articulates the essential concept of user groups and their tendency to create the

contexts within which technology is defined. This concept is central to my project because I consider objects like the sampler from the perspective of both “traditional” musicians, who saw it largely in terms of costs savings in the recording studio, and hip-hop deejays, who saw the sampler as a creative tool for snipping and sequencing phrases of pre-recorded material, and therefore a device in support of artistic innovation.

Ultimately, both the determinist and the constructivist viewpoints are, I find, too limited to explain the functions of technology observed in this project. The determinist view tends to ignore the power of social groups to define and reshape the uses of technology, while the constructivist view gives insufficient agency to technology itself and fails to recognize technology’s place as an equal participant in its relations with users. To navigate between these views, I borrow Thomas Lamarre’s formulation of “technological determination,” which both constrains the uses of technology and also makes certain uses possible. Taking this view as a starting point, this project demonstrates how technology can simultaneously be a constraining force and a revealer of strategies to circumvent constraint.

This project is an intersection point between formal analysis, aesthetics, and technology studies. Many theorists in the field of media studies address questions similar to those with which I am concerned. These authors tend to restrict their conclusions to a single media form or genre. Theodor Gracyk accounts for the aesthetic novelty of rock music via aesthetics and a discussion of technology. Thomas Lamarre makes similar moves with anime via his materialist critique of the anime “machine.” Joseph Schloss conducts an ethnographic study of hip hop producers and in the

process makes claims about how culture influences the artistic production of an emerging aesthetic. All three of these authors mix discussion of aesthetics with discussion of technology. All of them draw compelling conclusions within their specific genres. What I am proposing is that constraint, broadly defined, allows me to draw some conclusions about media production without tying my analysis to a single genre or media form. Rather than being a mere object of curiosity, I propose that constraint is an axis that runs through multiple media forms that allows for conclusions about media production in general. My aim is to show how media forms at their inception share certain characteristics and follow similar paths on the way toward developing novel aesthetics.

My argument is developed over four chapters. In Chapter 1, “Locating Limitations,” I focus on defining the type of constraint at work in each of the media forms. In each case, the form in question is known for having a particular limitation that I term the “signature constraint.” For each form, my goal is to examine the signature constraint, decide if the popular reputation is accurate, and if necessary replace this constraint with one better reflected by the evidence. Beginning with anime, I discuss the role of financial constraints in the definition of an entire industry and its characteristic media practice. In perhaps my clearest example of unintended constraint, anime is an instance where an industry was undeniably shaped by lack of funding for its early development. Although financial constraint is far from being the only factor responsible for anime’s distinctive aesthetics, limited funds forced animators to compose with the “reduced” frame rate and related techniques that have become synonymous with anime. Although

the extent to which such constraint *produced* the aesthetic qualities of anime is somewhat open to discussion, few animators would dispute that it played a vital role.

Moving on to rock 'n roll, I examine the popular myth that rock musicians are, generally, technically unskilled, lack knowledge of theory and harmony, and cannot read music. All of these assertions are true, depending on one's perspective. From the view of a classical musician, rock musicians are, with a few exceptions, not skilled instrumentalists. But since rock, like all forms of music, operates according to its own logic, most rock instrumentalists probably do not feel hobbled by their style of playing. Similarly, many of them may not regard reading music—which classical musicians consider a desideratum—as a necessary skill. Nevertheless, rock musicians since at least the 1950s have often found themselves in the position of needing to transmit complex musical ideas without the use of a language of musical transcription. Because most rock and blues musicians learn their instrument in an apprentice-based system focusing on example and repetition, many of them are unable to communicate complex ideas about their art outside of that system. In a fascinating development, technology actually provides the answer to this dilemma. In rock and other modern, vernacular idioms, recording technology serves as a highly functional medium of storage and transmission. Not only can a musician record complex ideas, she can also displace herself in time by adding to a performance over and over again. In this way, musicians without recourse to a formal alphabet can still preserve and communicate all manner of intricate musical ideas, either to other musicians or directly to the listener.

In my discussion of visual art made with the American Standard Code for Information Interchange (ASCII), I explore the medium's obvious constraint: it is difficult

to make representational visual art with only alphanumeric characters on a highly structured digital grid. This popular conception of ASCII art is mostly accurate, but the story still has several interesting wrinkles. For one thing, ASCII has a long history that predates the modern computer. Beginning with early typewriter art and then the military communication apparatus known as “teletype,” alphanumeric visual art has existed since at least the late 1890s. In direct opposition to popular narratives concerning technology, that it makes all things better and easier as it advances, the introduction of the teletype machine and then the computer actually makes alphanumeric art *more* constrained and less flexible. Depending on the context, the actual function of the alphanumeric interface is different. In its earliest iteration, making art via typewriter requires adhering to the deliberate constraint of a restrictive environment of production and distribution. At the same time, certain artists with physical disabilities have chosen the typewriter as a piece of adaptive technology, and its particular constraints allow them to overcome their limitations with regard to their art. In the purely alpha-numeric environment of early computers, ASCII functions as something of a “generative” constraint, suggesting aesthetic possibilities to a set of practitioners who may not have even set out to make visual art in the first place.

Finally, I consider hip hop, a form widely considered to be an expression of the economic deprivation of its earliest innovators. The popular narrative is that these musicians would have made "real" (i.e., not hip-hop) music if only they had had access to traditional instruments and instruction. A brief survey of historical facts and interviews shows this view to be almost entirely false. In fact, the turntable, sound system, and sampler that typify hip-hop creation during the period of its emergence are far more

expensive than most musical instruments. Poverty does not seem to be a genuine driver of aesthetic innovation in this case. Instead, the distinctive constraints of hip-hop are environmental and technological, and hip-hop innovators displayed considerable ingenuity in working through and around them.

Chapter 1 hints at the role of technology in my analysis of constraint. In Chapter 2, "Technology and Art," I take up the question of how material aspects of a technology can mediate or be the source of a productive constraint for artistic innovation. I begin with the question of *nascence* and explore the ways that the very newness of a piece of technology can generate constraints. First, the creative possibilities of any technological device tend to be poorly understood at the outset. Users form a much larger user group than the designers and manufacturers of a technology, and users are the ones who explore the full potential of new technologies. The initial lack of knowledge concerning what a technology can do may form a powerful constraint to effectively applying it in new conditions of use. Second, technologies have a tendency to hint at some desirable function while withholding the fulfillment of this new possibility. As an example, early music samplers suggested the possibility for extended phrase sampling, where long sections of music could be sampled and looped to create the underlying framework for new compositions. At the same time, the short internal memory of these machines meant that they were only capable of storing and manipulating relatively short samples. The possibilities suggested by technology were withheld by the constraints of the technology's immaturity. The third aspect of *nascence* is that new technologies are often inferior in a particular condition of use with regard to technologies they replace. New devices generally offer a decisive improvement in only a few areas of application.

Other functions are either unchanged or actually *diminished* by the emergence of a new technology; artists must reconsider the circumstances of use in order to envisage the new potentialities of these devices. In the second half of Chapter 2, I explore the web of technological constraints in two complex and highly rationalized systems: the recording apparatus and the animation apparatus. In my discussion of the recording apparatus, I examine the ways that the development of mechanical and magnetic recording over the last century have consistently established recording as a compositional tool rather than simply a mechanism for transcription. In my discussion of the animation apparatus, I demonstrate that the system of “cel” animation that long dominated the industry during its emergence, because it is extremely labor intensive, makes animation highly sensitive to financial concerns. Limitations in funding almost always—if cel animation is the medium used—equal reductions in frame-rate and a look that is less smooth or consistent than the realist style promoted by, for example, the Disney tradition. However, the animation apparatus also embeds within its machinery techniques and alternatives that allow expressly limited animation to emerge as a functional alternative to the ideal of “smoothness.”

In Chapter 3, I take up the question of aesthetics in situations of constraint. My first proposition is that the media forms under discussion are *aesthetically* marked by the conditions of constraint that determine them. All of these forms share the common trait of being “clipped” in some respect and bearing traces of missing information. We can observe this tendency in the ostentatiously truncated edges of hip-hop samples, the “jaggy” edges of ASCII art, and the tendency toward distortion in amplified or recorded sound. My second main argument is that these aesthetics are likely to persist even

when the initial constraint is removed. For instance, anime is now a highly influential and worldwide aesthetic in the animation industry. Many films produced under the banner of anime are well-funded and able to produce films with a high frame-rate. Nevertheless, these films are still aesthetically similar to early anime productions that we now refer to as “limited animation.” The stylized stillness and explosive transitions of early anime have achieved an aesthetic currency totally apart from the constraints that were in part responsible for their emergence. This persistence of the aesthetic of constraint holds across all the media forms under discussion.

Since this project focuses on media forms as they are practiced near the period of their inception, it makes sense to close with a discussion of how constraint functions when resources and support are plentiful. Chapter 4 is titled “Constraint and the ‘Break’” and in it, I take up the question of how commercial support and wide distribution introduce other and distinctive constraints that may be equally as determinate of artistic practice as the formal and technical constraints on which I focus in earlier chapters. I begin by dissecting our common conception of how artists get their “big break” or get the support that allows them to “break” to wide popularity. I show that popular conceptions of the artist’s or the genre’s “big break” is in most cases a myth. “Big breaks” do sometimes occur, but they are more like to be retroactively recognized moments of selection by the culture industry rather than some organic explosion of popularity as a response to a latent audience demand. In the second half of this chapter, I look at the way the physical media, networks of transmission, and the ideologies of the media business all generate additional, productive constraints. For example, this section proposes that the recording capacity of the vinyl LP, the

dimensions of a television screen, and the economics of media distribution all determine real constraints that shape the character of work that is played back and distributed by these mechanisms, and that this further shapes a feedback into conditions of production.

My project focuses primarily on historical media which in most cases were produced and reached their degree of artistic and commercial success before the advent of the Internet as a system of widespread cultural production and distribution. I conclude this project with a brief discussion of effects of Internet-based media on the constraints of media production and distribution of media that emerged under prior, in many cases non-digital, conditions of creation and use. I briefly consider the possible democratizing influence of digital production tools and media dissemination on the creation of contemporary and future new media genres. I close by observing the powerful roles that culture and ideology play in generating constraint in the first place, and the role that this plays in media landscapes like the Internet. Media production and dissemination in the digital field, I conclude, are and will be determined by constraints, analogous to and different from those I have detailed for pre-Internet media, and will present to future media historians new challenges and rewards for constraint-based analysis. Ultimately, a practitioner's internal conception of her or his medium is the most influential constraint, but what is felt to be "inside" in this context is indissolubly bound to much that is presumed to be "outside" of pure artistic practice.

CHAPTER 2 LOCATING LIMITATION

There is no use in simply talking about “media generated under constraint.” Constraint is not a general condition of production. We must frame this discussion in terms of “constraints”: specific, situational conditions that affect the production of media. The first priority is to acknowledge that constraints are *located*; they inhabit specific areas of the production process, even if their effects spread beyond their immediate location. Much of this chapter will be dedicated to locating the specific places where constraints are found. In some situations, constraint is located within the characteristics of the agent: a lack of training or ability. In other instances, constraint might be more situational: a lack of resources or an environment that imposes limitations on what is possible. We might also locate constraint within technology, a situation where the machinery itself is broken or only half-functional. In each of these situations, the location of constraint matters. The place where we find limitation inevitably affects the final product.

Let me acknowledge something obvious: there is no such thing as media that is *not* produced under constraint. All media faces some limitation and it would be foolish to assume that I can account for all of it. This project will contain no exhaustive inventory of every kind of limitation. Instead, I will investigate what I consider to be the major areas of production and the ways that they can be globally shaped by specific and identifiable constraints. In short, I will focus on the agent, her resources, her technology, and her environment. For each of these central areas, I will look at the “big” constraints: no money, an obvious lack of training, significantly malfunctioning equipment, severe personal disability. I will also restrict my focus to media forms at or near their inception. I

am most interested in seeing how these forms arise under initial conditions of constraint.

Let me also acknowledge that any media form that is suffering from one constraint is inevitably suffering from several, maybe dozens. Again, I have no intention of inventorying all the myriad tiny roadblocks that affect production. The question then becomes, which constraints do I focus on and how do I select them? I propose that for each media form under consideration, there is what we might call a “signature constraint.” Each media form under consideration has some central limitation that has become synonymous with its production in the public consciousness. This signature constraint might be the most obvious or the most severe, but what matters is that each of the media forms under discussion is *known* for being constrained in a specific way. Hip hop music is perhaps the most extreme example given its long and storied association with urban poverty. Everyone “knows” that hip hop largely exists because poor black youth in the Bronx in the 1980s simply did not have access to “real” instruments. The case of rock music is similar if not so extreme. Rock performers in general are famous for being poor musicians, unable to read sheet music and barely competent on their instruments (especially from the standpoint of Western Classical music). Likewise, audiences who have even a passing familiarity with the history of animation associate anime with the tight animation budgets of 1960s Japan. Supposedly, a lack of funds is responsible for anime’s aesthetic distinctiveness; the choppy motion and low frame-rates of anime supposedly exist specifically because there was not enough money for “full” animation. In each of these cases, I will look at the signature constraint and examine the accuracy of these popular conceptions. Before

I can explore the role of constraint, I must make sure that the constraint under discussion actually exists. In many cases, the media forms under discussion are constrained, but not in the way most audiences assume.

What I plan to do here is something of a continuum, starting with anime, a form where constraint was mostly unintentional and often viewed as negative. I am going to relate a story about artists shepherding a product through constraint and how this process generates a distinctive aesthetic, even if aesthetic distinctiveness is not a goal. I will then move on to popular and vernacular (blues and rock) music traditions where the limitations of the agents themselves would seem to be the most significant barrier to production, but where the real story is much more complex. Next, my discussion of ASCII art, or art made from the American Standard Code for Information Interchange will focus on the multiple ways we can view limitation working on a single media form. I will end with hip hop, a genre of music for which limitation is storied and seemingly essential to the form's development. But the actual conditions of hip hop are far different than the stories make it seem. The limitation here has a very misunderstood role.

Animation and Constrained Technology

Japanese Anime is an excellent example of the effect of limited technology on media production. The 1960s saw a world-wide economic depression in the animation industry (Mortiz 127). At the same time, there was increased demand in Japan for daily animated television. These two factors created a conundrum for Japanese animation producers, namely, there was money to be made in animated programming, but established methods of animation were prohibitively expensive and time-consuming, and were therefore ill-suited to the economic climate of the period.

At the heart of this problem lies the conventional frame-rate established by the Walt Disney Company. Disney's system was based on the projection rate of 24 frames-per-second (fps). Within this 24-frame period, each individual drawing was repeated once, thus presenting 12 unique drawings per second. This system created a smoothness of motion that was judged to be an acceptable approximation of live-action film (Lamarre 331). For Japanese animation producers struggling with limited funding, reducing the frame-rate—and therefore the work required to create a finished animation—was an absolute necessity. Instead of a new drawing every two frames, Japanese animators would hold a drawing for five or six frames, perhaps even longer (Mortiz 127). The resulting animation could sustain the smoothness of motion associated with 24fps animation, but “[saved] time as well as money, and made weekly television animation series possible. It fit the budget of the producers” (Richie 248). I will discuss the exact mechanics of limited animation later on, but for now it is sufficient to understand the effect of these constraints. Economic and technical limitations on the established artistic technique of 24fps “full” animation eventually led to a new aesthetic. The anime style is typified by long, static shots, explosive transitions, and an emphasis on panning and other camera movements over individual character motion. The resulting product looks startlingly different from traditional “full” animation. In the new anime aesthetic, jerky character motion is not perceived to be a failing of the technique because the form privileges presentation over stylized realism (Richie 149).

It would be an over-simplification to say that anime's distinctive style results solely from economic concerns of 1960s Japanese animation; other aesthetic factors certainly

contributed to anime's distinctiveness and success.² At the same time it seems unlikely that specific features of anime would have arisen solely due to deliberate choices made by animators on the basis of aesthetics. Prior to the emergence of the anime style, Japanese animators (along with most of the rest of the world) had been trying, unsuccessfully, to imitate the Disney style (Moritz 127). Although limited animation seems to signal a decisive shift away from the Disney model, there is little evidence to suggest that animators were staking out this new territory solely out of a desire to create a genuinely new animation aesthetic. For one thing, Japanese animators of the period received low wages, suggesting that they had little power over the direction of their industry (Richie 248). In fact, this low pay was one of several elements contributing to Japanese animation of the period actually being *cheaper* to produce than live action. As producer Sato Kenji observes, "Animation offers a means of producing slick, stylish films without spending much money" (Richie 248). Kenji's observation explicitly links the conditions of production and the distinctive aesthetics of anime to money, suggesting that cheapness was a driving force in developing the aesthetic. Additionally, American animation producer Fred Ladd, who had a long career importing Japanese animation and dubbing it into English for the American market, describes limited animation as a "desperate way to try to save some yen" (Ladd and Denneroff 23). Moreover, early Japanese animators tended to express embarrassment at the perceived crudeness of their work, not pride in the creation of a bold new vision (Lamarre 336).³ Seen in this

² For example, see Richie 249 for a discussion of rest and stillness in Japanese classical dance.

³ In his later book, *The Anime Machine*, Lamarre expands this discussion of anime to also include aesthetic considerations like the democratizing effect of a less labor-intensive system of animation, and the rise of a deliberately "modern" style in reaction to the classicism of full animation (188–189). Lamarre is careful to identify limited animation as a confluence of both economics and aesthetic concerns.

light, there can be little doubt that economics played a major role in moving Japanese animation away from a largely unsuccessful imitation of Disney and into new aesthetic territory.

In the environment from which anime emerged, the tools of full animation were well established and more than adequate to the task of creating smooth motion in the Disney style. At the same time, the tools of animation and their use by skilled artists were expensive to fund, much too expensive for 1960s Japan. This financial limitation essentially left animators with a malfunctioning set of tools, which, *because they were designed for another purpose* would only function at a reduced frame-rate, and even then could be applied only under formidable time constraints. This is the signature constraint of anime, a set of tools that has been essentially crippled by economic constraints and working conditions. But, as I will argue in this dissertation, placing a potentially crippling limitation on a set of tools—tools that may be, it bears repeating, designed for very different conditions of production—does not necessarily halt production. Sometimes this constraint forces work into a different mode in unforeseen and inventive ways. In Chapter 2, I will explore the animation apparatus, specifically the animation stand and the multiplane camera, to describe how these technologies function in conditions of limited funding.

Popular Music and the Imperfect Agent

Popular, vernacular musicians are infamous for their inability to read music and their lack of knowledge of music theory.⁴ In theory, these constraints should prevent complex composition and inhibit musicians from understanding the underlying structure

⁴ An old joke is illustrative here. Question: How do you get a guitarist to stop playing? Answer: Put sheet music in front of him.

of harmony. As we will see, musicians have invented several effective strategies for passing on musical knowledge in the absence of standard notation. However, complex composition presents a different set of challenges. After examining the mechanisms by which non-literate musicians acquire and transmit musical knowledge, I will explore the problems associated with composition and suggest some ways that technology can help overcome these limitations.

The first challenge that any artist must overcome is learning the basic skills of her craft. In this case, even a particular method of apprenticeship might cause significant problems later.⁵ This apprenticeship model of knowledge-transmission is evident in the world of instrumental music. For instance, Paul Oliver's history of blues music describes the apprenticeship model of knowledge transmission that is characteristic of most of American blues. In his discussion of individual musicians, he consistently identifies each player's primary teacher, who was responsible for introducing the player to a distinctive method or style of blues, most often by direct performance and emulation, rather than by teaching the student from written scores. If hard evidence of such influence-by-imitation is not available, Oliver is happy to speculate, and he frequently traces one strain of blues style through multiple generations of teacher and student. This model of knowledge transmission allows for notably efficient transfer of knowledge, while—

⁵ The Russian psychologist L.S. Vygotsky separates the learning of any production process into two phases. First comes the non-cognitive phase, where imitation and social conditioning play the largest role in learning (Langford 3). In this phase, the agent learns only to imitate behaviors and actions of teachers. Crucially, Vygotsky indicates that this non-cognitive phase does not include signs that are in evidence in more complex conditions of learning, such as diagrams and other representational materials (written texts, transcriptions, etc.). These come into play only later, after the student has passed through the phase of imitation. This conception of the apprenticeship model describes some characteristics of vernacular music.

crucially—still leaving room for individual expression after basic skills have been mastered.

Despite the general functionality of the apprenticeship system of musical training, it does have several limitations, the first of these being that it often breaks down. In the 1950s and 1960s, hordes of white teenagers in Britain and the United States discovered blues music and were excited to imitate the form (Oliver 192–193). But a lack of direct access to teachers forced would-be bluesmen to turn to the only resource available: audio recordings. These recordings—most of which had no corresponding printed scores—served as the template for learning the style. Enthusiastic players would often learn whole records note-for-note in their quest to become reputable bluesmen.⁶ This approach might be called the “media model” of learning, where the teacher who can be imitated is replaced by a piece of media from which the student can learn through repetition. The phenomenon was particularly pronounced in Great Britain, where geographic barriers prevented musicians from even approaching the musicians they admired, let alone learning from them. The products of this learning-from-records were sometimes judged harshly—for example, Sonny Boy Williamson II is famously credited with having said in reference to British bands, “Those English guys want to play blues so bad. And they play it so bad” (Trynka 70). But regardless of such criticisms, players such as Eric Clapton who taught themselves the American style of music largely from records would later go on to carve out significant careers as professional musicians

⁶ An early (non-British) example of this phenomenon would be Muddy Waters, who learned to play like Robert Johnson from listening to Johnson’s records (Oliver 173). A more recent example would be Clapton, who has frequently described teaching himself to play by imitating American blues records.

(*American Roots Music*). For much or all of their careers as professionals, many of these players never did learn even rudimentary musical notation.

This lack of a direct apprenticeship model probably plagues any emerging art form where the form itself reaches audiences before potential teachers do. When I was learning to play guitar, my teacher often recounted to me that when he was first learning about rock music, there were no “rock” teachers available. He studied guitar under several jazz artists, but pursued a career exclusively in the rock idiom. Later in his career, he became a teacher—in which role I met him in the mid-1990s—thereby re-establishing an apprenticeship model strictly within a defined idiom. However, his approach to teaching was still heavily mediated by recorded sound: notation was used only in its most skeletal form, and great emphasis was placed on playing “to” any given record, and thus reproducing the elements of a specific (recorded) *performance* with the greatest possible fidelity, often with the original record playing in the background. The aim here was not simply to play the correct notes in the correct rhythm, but to attempt to capture all of the specific nuances and quirks present in the recording. We might call this the “mediated apprenticeship model” and it is still a common method of teaching the rock idiom to instrumentalists. Whether they study from records, under an instructor, or a blend of the two, all musicians who learn in an essentially imitative model tend to share certain strengths and weaknesses. Their weaknesses are of special interest to this project.

One of the “weaknesses” of vernacular musicians is their inability to read standard musical notation. As I have noted, the apprenticeship model of musicianship typical of blues, rock, and other vernacular contemporary musical forms rarely involves the use of

musical notation. For players of tonal instruments, “lead sheet” notation appears as a simple, alphabetical list of chords, sometimes with lyrics. For guitarists and bass players, there is “tablature,” which uses lines and numbers to show players exactly where to place their fingers on their instruments to play specific passages. Obviously, both of these tools are sign systems specific to musical practice, but they do not offer many of the advantages of standard notation. Tablature functions as a teaching tool only; its inability to note rhythm makes it impractical as a sight-reading tool. Lead sheets, in contrast, function essentially as a mnemonic device, allowing a musician who is already familiar with how to physically make chords to learn or remember simple progressions. Both of these are signs, but tablature in particular, functions only in reference to previously written material. Without either a recording, or a musician present who is already familiar with the material for reference, both lead sheets and tablature are essentially meaningless. So, while they both function as signs of a sort, neither is available as a means of transmitting complex information unless they are linked to the conditions of the apprenticeship model or recording technologies. On the surface, this lack of suitably complex signs in these conditions would suggest that music practice in the absence of complex signs must always be formally rudimentary and lacking in compositional nuance. A lack of a formalized written language also suggests that vernacular musicians are unlikely to understand functional harmony or “music theory.” Given the breadth, variety, and cultural impact of popular, vernacular music, I think we must agree that there are probably several non-notational compositional strategies that lead to complex music and composers with highly developed knowledge of musical structures.

First, I think that it is pretty clear that even instrumentalists trained under the apprenticeship model often do achieve consciousness of the process and structure of their art. Blues players, for instance, were often highly inventive within their idiom, and capable of taking instrumental ideas far beyond their mentor's examples. Robert Johnson, for example, learned briefly from both Son House and Willie Brown, but developed (apparently independently) a dynamic guitar style that incorporated walking bass on the low strings with melody on the high strings. Both his teachers were stunned with the way Johnson's playing had become technically superior to theirs after only six months away from his teachers (Oliver 135). Clearly, consciousness and a cognitive approach to production are possible without the use of conventional signs. However, this formal consciousness does seem to be limited to the specific situation of each inventor. An instrumentalist might be able to invent a startling new technique and even teach others to imitate it, but there is little evidence to suggest that the innovator's way of *thinking* about composition can be passed on in this way. In contrast, standard notation is associated with a richly expressive vocabulary of music and long-established traditions and conventions of practice, typically including the discourse of "functional harmony." A classically trained composer knows that she might hold onto the dominant chord before moving to the tonic in order to establish tension and release in a piece. A player working within the blues or other vernacular traditions who has been successful knows, in a comparable way, that moving from "that chord" to "that other chord" brings harmonic closure to the piece, but she lacks a formal vocabulary by which to communicate this to an apprentice, who must therefore internalize such insight on the basis of examples only.

A lack of notation and vocabulary also limits a musician in another crucial way. Most modern musical compositions are “polyphonic,” meaning that they feature multiple voices sounding at once (a “voice” here being equivalent to any musical tone). A chordal instrument like a guitar or a piano is polyphonic and thus is typically a favorite of songwriters, who generally accompany chordal playing with their own singing. But a songwriter may also want to create music that goes beyond chords and a sung melody. This is typically where other musicians and instruments enter the scene of performance. Under these conditions, a musician taught only in the apprenticeship model runs into a problem. Without notation, it is difficult to communicate precise, complex ideas to other musicians, especially those who are playing different instruments. Backing musicians can be trained to play a composition by ear, but even musicians skilled at this method will find it tedious and complex passages of a song will still be hard to remember.⁷

Musicians have found some solutions to these limitations. For the most part, an accompanist in a given idiom can be counted on to have a command of major and minor chords and to be able to play them in any key. A musician on a non-chordal instrument like a bass-guitar can reasonably be expected to know a variety of musical phrases that “work” over certain chords and can be transposed to the demands of a given song. These conventions of accompaniment allow musicians of limited training to play together without the use of highly specific communication forms like standard notation. But these conventions introduce other limitations. The harmonic range and

⁷ The difficulties in communicating parts to other musicians may be part of the reason why vernacular musical traditions such as blues boast many solo performers. Surely, social and economic factors were also at play here, but players with highly idiosyncratic styles (like Johnson) may have found playing with other instrumentalists logistically challenging. This difficulty might also explain some of Johnson’s multi-faceted technique, which combined independent bass and melody on the guitar with his own singing. Johnson was essentially his own band (Oliver 173).

meter of any given song generally need to fall within narrow parameters. Rock and blues music are conventionally made with only a handful of chords; the tonic, subdominant and dominant chords of a given key tend to appear with greatest frequency. The diminished chord, which occurs often in classical music, is rarely heard in rock or blues. Also, the vast majority of rock songs are in “common” (4/4) time, even though many other time signatures are possible. This narrow range of parameters ensures that material can be learned quickly, remembered easily, and played confidently by musicians with possibly varying levels of skill, and little or no competence in each other’s instruments. Yet, there is also significant opportunity for creativity within these narrow parameters. While a songwriter will generally be adamant about the key, chords, tempo, and meter of a song, backing musicians may be allowed wide latitude within these constraints to accompany a song in the way they see fit. The limitation of these conventions comes into play when the composer has a very specific idea about a song and its arrangement. This is the first major pitfall of music under the apprenticeship model: even very experienced and skilled musicians who are unable to read standard notation cannot easily reproduce complex musical passages accurately and consistently. A composer with intricate ideas, which can only be represented (and reproduced precisely) via some form of notation, will find it difficult if not impossible to communicate those ideas to backing musicians.

The other major weakness of the apprenticeship model is that the inability to command complex signs in the form of notation means complex composition itself is difficult to say the least. Many musicians can “hear” intricate musical ideas in their heads and many can reproduce them on their instruments, but extended, reproducible

polyphonic composition with multiple instruments requires some form of notation or documentation for it to be said to exist at all outside of the conditions of a one-off performance. Notation has also historically served as a compositional tool where ideas can be temporally “stored” in a stable form while accompanying phrases are auditioned and added. In this way, the agent can build an intricate, multi-instrumental composition using notation as a kind of working memory that allows acceptable parts to be kept somewhere outside the composer's brain and frees up attention for composing and evaluating new parts. Surviving scores left by Beethoven are an excellent example of this process. Unlike Mozart, who apparently created pieces almost out of whole cloth, writing them down with few corrections, Beethoven's scores are filled with erasure and addition. Sometimes whole passages are pasted over old ones with wax. Such revision demonstrates the way in which the technology of notation allows the agent to overcome limitations of the human mind's short-term memory. But what about the imitative musician who has learned from a mentor or recordings and has no ability to command the complex signs of standard notation? How will this agent realize her more mature, intricate compositions when the limitations she faces are *within* her practice and are essentially a product of the vernacular idiom she practices?

Ultimately, our discussion of vernacular music demonstrates that while vernacular musicians often cannot read music, this constraint is not as crippling as one might initially think. Vernacular musicians often do compose complex music and they might also achieve a strong (if intuitive) understanding of functional harmony. These constraints *do* exist and have an effect on musical production, but their effects are not as extreme as audiences might expect. Even if an inability to read music is a real

constraint of vernacular music, the *compositional* limitations of the lack of written musical language are the real barrier that deserves greater attention.

As we shall see, musicians who are unable to read and write standard notation have also harnessed technology as an adaptive force. In Chapter 2, I will address the multitrack recorder and discuss its implications not only as a documenter of music, but as a technologically mediated notational strategy. As a technological solution, the multitrack might go beyond solving the immediate problem of documentation and actually transform the compositional process. My discussion of music recording technology will allow me to explore technology that can circumvent a given constraint and contribute to a novel aesthetic in the process.

ASCII art and Multiple Constraints

Unlike my last two examples, ASCII art is not such a popular and well-known form. The signature constraint is obvious: making representational visual art with only the standard typewriter or computer keyboard is plainly constraining to the artist. However, ASCII art has a surprisingly long and diverse history with multiple iterations of the basic idea. Each instance of ASCII or keyboard art deals with constraint differently. Over the history of the art form, we can observe ASCII as a deliberate limitation, a technological aide for the disabled artist, and the limitation that in itself *generates* artistic innovation rather than merely shaping its aesthetic.

The ASCII character set, which is comprised of the ninety-five characters of the standard keyboard, can be used to create impressive visual art with typewriters or computers, using only alpha-numeric characters to generate shapes and shading.⁸ The

⁸ See Danet 195–237 for a complete description of ASCII.

idea of the typewriter as a possible vehicle for art seems to have started quite early in the machine's existence. Remington and Sons manufactured what is typically considered to be the first modern typewriter in 1874. By the 1890s, typewriter manufacturers were already sponsoring contests for typewriter art (Stark). The oldest surviving example of typewriter art comes from the winner of such a contest. Flora Stacey's typewriter art butterfly is startling in its grace and detail (See Figure 1.1). Stacey created her art through a painstaking process of constantly tilting and repositioning the paper so that each character would land in exactly the right place (Stark). In the case of Stacey and other early typewriter artists, keyboard art seems to have been a deliberate limitation not unlike the limitations practiced by the French literary school the Oulipo.⁹ There is no indication that typewriter artists at this stage saw their machine as a way to overcome inherent handicaps. Moreover, the traditional artistic skill evident in Stacey's butterfly suggests that she was likely a skilled artist to begin with. It seems that outside the confines of a typewriter art competition, she probably could have achieved similarly skilled results with pencil and paper.

In stark contrast to these early typewriter artists, Paul Smith spent a lifetime creating highly skilled representational typewriter art specifically *because* he was disabled. Born in 1921, Smith's severe cerebral palsy kept him from ever attending school and caused him to live the majority of his life in a nursing facility (Paul Smith Foundation). At some point, Smith discovered that he could make representational art by exploiting the typewriter's ability to precisely place characters on paper even though his disability meant that he had extremely limited control over his own muscles (Paul

⁹ The Oulipo were interested in "consciously pre-elaborated and voluntarily imposed systems of artifice" with the basic idea that the more strict the constraint, the more elegant the resulting art (Motte 11).

Smith Foundation). As Figure 1.2 demonstrates, Smith's command of the typewriter allowed for intricate details and standard artistic techniques like shading. As he progressed, Smith even invented a method of coloration where he would smudge a colored typewriter ribbon with his thumb on to the page. Smith's use of the typewriter as an artistic tool closely parallels my example of vernacular music. In both instances, the artist uses technology to overcome inherent disability. But, as typewriter art was reborn as teletype art and finally computerized ASCII art, the conditions of production and aesthetic results are quite different and require a different framework to understand the operative constraints.

As a direct precursor to ASCII, the form that most interests this project is “teletype.” As Brenda Danet notes in her book *Cyberpl@y*, teletype was a means of transmitting text via radio and was popular with the military and merchant marine service in the 1950s and 1960s (Danet 207). Not only does teletype parallel the personal computer in that they were both methods of electronic communication, both forms place characters in discrete, ordered spaces with only one possible orientation for each character. In this more confined format, there is no potential for the “overstrike” technique that allows typewriter artists to add shading. Additionally, the page cannot be moved around to allow exact character placement. Flora Stacey's butterfly could not be reproduced in the teletype or ASCII domain. With such a restrictive system, it makes sense to ask why anyone would choose to use it as a medium for visual art.

What is most likely is that the representational or mimetic qualities of ASCII characters, and their ability to emulate other modes of representational art, were discovered by accident and then pursued for two main reasons: 1.) Ease of

transmission, 2.) Lack of any other way to make graphics in a purely alpha-numeric environment. But to the extent that ASCII continued to be created, it seems to have been because people liked certain aspects of the aesthetic. It is in the area of teletype where the first primitive “stick-figures” appeared (Danet 205). The fact that these first figures were primitive gives us some clue as to the form’s aesthetic origins. Formalized early history of the genre is sparse, but the original Teletype artists, who were technicians and computer scientists, were likely *not* familiar with typewriter art, which has largely been a minor element of modern art practice. We can only speculate that some serendipitous accident caused some operators to see some visual pattern in a block of text, which they then learned to exploit.

Unlike typewriter art, which seems to have functioned as both a deliberate limitation and a response to disability, the signature constraint of ASCII is both more severe and more obvious. That ASCII art is constrained by its underlying alphabetic, printing and display technologies is beyond question. As a method of generating mimetic images it is almost comically hobbled. The artist cannot even draw a continuous line or a smooth curve. The invisible “grid” in which individual alphanumeric characters are placed means that the smallest units of the image cannot be positioned with freedom; the artist can only choose which character might fill a certain space, or leave it empty. And yet, this very strict set of confining traits can generate art with surprising visual appeal. ASCII is charming in its use of the everyday and often humorous in its appropriation of alpha-numeric symbols for graphic purposes (see Figure 1.3 for an example). Finished pictures can be whimsical or serious and seem to reflect the agent’s everyday environment and concerns: just like any other art practice.

Ultimately, what we encounter in the case of ASCII art is a seeming contradiction. The framework of ASCII seems hopelessly constricting as a toolbox or platform for art, but this framework actually seems to *generate* a creative step forward that allows a purely text-based medium to function graphically. There is no evidence that any of the teletype artists who made a mark in the early ASCII art field brought considerable visual arts skills to the medium. The scant evidence we have suggests that ASCII itself brought these people into visual arts through the unexpected graphic possibilities of an everyday technology that had been designed with other aims in mind, namely the unambiguous reproduction of textual communications. The impact of ASCII's aesthetics will be dealt with in the next two chapters. For now, suffice it to say that such extreme limitations of a technological platform can actually *generate* artistic innovation, even in situations in which the agent is not trying from the first to make art.

As interesting as the example of ASCII art is, it is also potentially frustrating because of its apparent uniqueness. It is hard to think of another artistic medium that is equally or more rigidly defined, and yet also capable of sustaining a recognizable, unique aesthetic specifically because of its limitations. The singularity of ASCII art suggests that any conclusions we might draw about it would be only applicable to ASCII art itself. The challenge, then, is to find analogous systems of limitation at work somewhere else. This is one of the problems I will take up in Chapter 2.

Hip Hop and the Mythology of Constraint

A constraint might be located in a tool or in the agent herself, but could constraint be an integral part of the environment of artistic creation, so much so that it determines conditions of new artistic creation and spawns an entire aesthetic culture based on that limitation? For most historians of hip hop, the answer is yes. The idea that hip hop was

formed in a crucible of poverty and economic neglect seems credible for several historical reasons. And, perhaps just as important, hip hop itself consciously perpetuates the image of the street artist, grimly forging a new style from the cast-off bits of a technological high society that ignores him. This image of artistic creation in the face of blinding poverty is clearly the signature constraint of the form.

However, it is my contention that this view of hip hop is largely a myth. In this final section, I will critique the idea that hip hop is intimately tied to poverty. I will review some of the major scholarly arguments and I begin with a brief survey of the arguments surrounding hip hop and economic constraint.

Hip-hop culture (which includes rap music, graffiti art, and break dancing) is consistently linked with the severely depressed economic conditions of the South Bronx in the late 1970s and early 1980s. In her seminal study of hip hop, *Black Noise*, Tricia Rose describes the Cross Bronx Expressway and the forced relocations and economic desolation that followed in its wake (27–33). Rose explicitly points to hip hop as rising from the ashes of this economic desolation, as hip-hop crews became new social networks and hip-hop culture gave identity to people who were left on the cultural margins of media consolidation (28–29). In his more recent history of the genre, *Can't Stop, Won't Stop*, Jeff Chang describes this relation of hip hop to its economic moment in greater detail. Chang titles his chapter on the South Bronx “Necropolis” and makes a direct connection between the labor economy that had accompanied blues and that which would nurture hip hop: “If blues culture had developed under conditions of oppressive, forced labor, hip-hop culture would arise from the condition of no work” (Chang 13). Both Rose and Chang point out the wholesale defunding of New York

public schools during this period, which had a profoundly negative impact on arts and music programs and on young performers' opportunities for formal training (Chang 18; Rose 34). Rose, in particular, connects a decline in arts education to a loss of access to traditional instrumentation and an increased reliance on recorded sound, which would eventually grow into the hip-hop musical aesthetic (34). For these and other hip-hop historians, the links between poverty, cultural and racial disaffection, lack of access to training and instruments, and the birth of hip hop as a musical genre and cultural movement, are clear and unambiguous.

It's easy to see how this narrative has developed such currency. First, it is simple: a series of well-chronicled economic blunders and calculated real estate decisions leaves a large section of New York desolate; out of the ashes rises a new art form, complete with a bracing new aesthetic and confrontational identity politics. Second, the argument appears logical. As long as one believes in the innate creativity of human beings, it is a small step to believing that drastically reduced economic circumstances and associated cultural frustration and resentment might actually *fuel* artistic development. The narrative of economically disenfranchised people seizing technologies like the turntable and sampler and radically repurposing them to new ends is seductive; it confirms all of our most optimistic ideas about human resiliency and innovation. However, this conventional narrative is probably wrong.

In his ethnographic study of hip-hop producers, Joseph Schloss discredits the mythic connection between poverty and hip-hop innovation. Schloss starts by labeling the poverty/hip hop connection as a kind of "cultural determinacy." He points out that the trend in scholarship is to suggest that the circumstances were so right for the birth of hip

hop that it *had* to be invented; had the movement's progenitors not been there, then another set of poor youth would have made the same discoveries (Schloss 28). As Schloss rightly points out, such an approach neglects and even reduces the independent agency and creativity of hip hop's prime movers. Ultimately, art is made by people. Their environments may shape (and limit) their choices, but it does not determine all of the choices that they make.

Schloss takes aim at the idea that conventional instruments were unavailable, forcing practitioners to assemble their music from prerecorded elements. He cites convincing first-hand accounts of producers who scoff at this notion, asserting that instruments and training *were* available through local schools (28–30). (Here, Schloss' argument would be strengthened by some hard statistics. His largely anecdotal evidence comes from seemingly authoritative sources, but this is not enough to completely counter the unambiguous history of school funding crises in New York.)¹⁰

After his (slightly shaky) point about hip-hop innovators' trained competence in instruments, Schloss proceeds with what I take to be a very solid argument about the comparative costs of deejay and production equipment. Even by the 1980s, offshore manufacturing had made serious inroads on the American music market. Especially in the world of "rock" instruments, functional models were suddenly available at much cheaper prices than they had been before (Trynka 109–110). But, as Schloss points out, this new price-point for instruments did not extend to complicated new technologies

¹⁰ The idea that musical knowledge was easy to come by or common at the inception of hip hop is also open to debate. Consider the Akai MPC 2000, which Schloss identifies as the most popular sampler for hip-hop producers (Schloss 30). Unlike some samplers where the interface is set up like a piano keyboard, the MPC has a simple grid of buttons with no musical reference point. Presumably, someone with even limited musical training would prefer the apparent logic of the keyboard setup. The dominance of the Akai and its "grid of buttons" suggests that many producers are fairly divorced from conventional music traditions.

like the sampler—even an “inexpensive” sampler listed for \$2745 in 1986, much more than, for example, a first-rate guitar and amplifier would have cost at the same time (30).

This argument about cost of samplers, which would prove to be essential to the hip-hop sound, also extends to the turntable, which along with the necessary mixer and records (to say nothing of huge, complicated sound systems necessary to fill a performance space), also required significant financial investment. According to Schloss, deejay equipment has actually *fallen* in price since the beginning of the hip-hop era, despite the rise of highly specialized, professional deejay equipment intended solely for scratching and cutting.¹¹ Despite popular myths, the popular conceit that hip-hop technology was—or is—cobbled together out of cast-off parts and cheap components does not fit with financial realities of equipment purchase in the early years of hip hop.

Schloss does suggest that other aspects of hip-hop culture might be credibly associated with economic adversity: practices of breaking, graffiti writing, and emceeing were determined largely by economic hardship, but not deejaying and producing (Schloss 27). This claim requires a little analysis. At first, the idea of a “culture of limitation” exemplified by hip hop is tantalizing. Even if hip-hop music cannot be directly derived from limitation, perhaps the whole culture surrounding it can. Thus, this culture of limitation acts like a filter, creating an atmosphere when doing more with less as a method for creation extends to all aspects of the culture.

¹¹ This trend actually makes sense. As a given technology gains in popularity, manufacturers exploit the economy of scale and mass production to bring the technology to more people at a lower cost—in the way that, for example, Henry Ford’s “Model T” was significantly cheaper at the end of its production run than at its introduction (Lewis 43).

This more-with-less approach, rising as a way to work productively against adversity and limitation, is tempting as a way of explaining its prevalence in a culture. But, it is not enough. David Toop proposes the culture of limitation model in his highly influential book *Rap Attack*, pointing out that in this culture of “creativity from limited materials,” sneakers could be high fashion and “original music” could be created with a turntable (Toop 15). Schloss derides Toop for overlooking the creativity of the musicians involved, but seems content to extend this same argument to now-established art forms like graffiti. As Chang points out, graffiti had an evolution much like hip hop. Initially, “tagging” was certainly almost in reaction to economic circumstances; it was an act of reclaiming public space by individuals and groups who felt excluded by conditions of modern urbanism (118). But graffiti only really caught on when tags were turned into “pieces,” guerilla murals with ever bolder and artistically distinctive styles. It was at this point that the form attracted large numbers of agents (Chang 119). So, although graffiti was born of economic disenfranchisement, it caught on because the kids who practiced it *liked the art*. This is almost exactly what one of Schloss’ sources says about the attraction of hip hop: “we liked the music” (30). It is also worth pointing out that there is something dubious in the idea that *every* aspect of hip-hop culture springs from economic limitation, *except* deejaying and production. Resolving this apparent conflict is beyond the scope of this project, but basic economics offer some support for the idea that breaking and graffiti can be separated from deejaying. The tools of breaking and graffiti are quite simply much cheaper than the cutting-edge technology employed in rap music. Break dancing in particular requires essentially no equipment.

Having unpacked this idea of hip hop as being born from poverty, I would like to offer one caveat. While there is little evidence to support the idea that hip hop came from poverty in its wider environment, there is an argument to be made about a very specific situational constraint within the environment of early, live hip hop. I close this chapter with a brief discussion of the live show in the way this environment shaped the aesthetics of hip hop.

In its present form, hip-hop music is largely a studio phenomenon. Producers sit in home studios, arranging collections of samples into beats or using turntables to scratch sounds onto recordings. Despite this studio-centric model of creation, it is important to remember that the genesis of hip hop was in the live show. Most historians trace the roots of the music to house parties in apartments, recreation rooms, and school gymnasiums. These gatherings started out simply enough: an informal space in which to hear records, dance, and be seen. The function of the deejay was to play the best records, with as little break in the music as possible, and to keep the crowd moving. Hip-hop techniques gradually grew out of this environment, with each step forward being driven by a need to please the crowd. Kool Herc wanted to rock the crowd with a louder, bolder system and so found a way to rig his father's PA to make it peak (Chang 69–70). Herc then noted that the instrumental “breaks” of songs were the most sought-after by the crowds, so he started working two copies of a record back-to-back, extending the break (Chang 79). Grandmaster Flash refined this technique, making the transition from one break to another as seamless and rhythmically tight as possible. But, the crowd was initially unimpressed and Flash decided that strong vocal accompaniment was needed. Flash called in a local emcee and created a fully realized

hip-hop experience before the term *hip hop* even existed (Chang 113). In each of these instances, innovation was driven by several factors: the need to make money, the desire to please the crowd, and the fear of harsh criticism or even violence if things did not go well. And there was the omnipresent need for the deejay and the emcee to showcase their individual skills, to put their own mark on the proceedings. As deejay Prince Paul notes, “There’s other stuff that people don’t talk about. Like showing off, you know what I’m saying? There’s stuff like girls” (quoted in Schloss 30).

This starts to sound familiar. A group of people shows up for music and dancing. Those putting on the show need to perform, to show off, to please the crowd, and to put their stamp of individuality on the whole thing so that a reputation can be built, leading perhaps to further opportunities to perform, to show off, etc. These factors are characteristic of the situation faced by performing musicians as long as music has existed as an entertainment medium. Every blues or jazz player has felt these same pressures and tried to respond with polished instrumental skills or daring improvisation, all the while working to keep the audience happy, build a reputation, and express individuality through performance. As hip hop grew in cultural stature, it transformed parties from venues of performance in which music was replayed from records, to conditions within which music was *created*. Emcees and deejays faced pressures and rewards musicians always have faced, and they responded by developing techniques that would allow maximum crowd-pleasing and personal expression *with the tools at hand*.

Here we see how an environmental constraint may have the power to positively shape and encourage the growth of a new art form. In the live show, with all of its

possibilities for glory (or shame), the emcee and the deejay developed scratching, cutting, mixing, and rhyiming techniques that would allow them to define and exemplify their own criteria of musical virtuosity. They did not select the turntable and the mic because they could not afford “real” instruments; they selected them because these tools were already there, already intimately linked with the party culture in which hip hop would develop. The tools were there for the using and in their individually creative ways, the agents shaped these tools to the complex technological and social situation of the party scene.

Some obvious counter-arguments may be summoned here. First, we have established that access to traditional instruments and musical training might very well have been available to some of hip hop’s early agents. Assuming even a moderate level of traditional musical ability distributed among hip hop’s early practitioners, it seems that the need for individual expression might have led agents to bring instruments to shows and either play along with or improvise over what the deejay was spinning. Bringing in live instruments would pose several aesthetic challenges, such as the problem of suitably matching the timbre of the instruments to the recording they interact with (Schloss 69).¹² But for the moment, let us leave aesthetic problems of such a scenario aside. Rather than asking whether or not traditional instruments would fit stylistically with hip hop, let us ask if such a move would even have been technically possible.

Hip hop is rooted in dance music and as such, it prides itself on beats that are interesting and *steady*. Rhythmically, hip hop beats are within the ability of many competent instrumentalists. But pitch is a whole different matter. Traditionally, the

¹² See also Schloss 68-71 for a discussion of the aesthetic concerns of mixing live instruments with pre-recorded music.

instruments used in Western classical and popular music are tuned to the reference pitch “A440,” the first A above middle C, which sounds at 440 Hz. Despite the fact that nearly every musician tunes to this pitch, some finished records do not retain this standard. Especially in the era of tape, small fluctuations in recording or playback speed can produce significant fluctuations in the pitch of the final product. Consider, for example, Miles Davis’ landmark album *Kind of Blue*. For literally decades, this record frustrated horn players’ attempts to play along because side one of the record was roughly one third of a semi-tone *below* standard pitch; in other words, the influential recording of Davis’s performance was *out of tune*.¹³ This tuning issue was “corrected” by the digital re-release of the album to CD but any deejay spinning the vinyl pressing of the record is dealing with the out-of-tune version.

The minor variations in pitch I am describing are generally unnoticed by most music fans (and probably by most musicians), so long as the recording in question is used primarily for listening. But in those circumstances in which it must be combined with pitched instruments in a live setting, big problems will crop up. Due to the quirks of sound and human hearing, being out of tune by a small, microtonal interval can actually be more jarring to the listener than being out of tune by a larger, whole-tone interval like a major second. Playing a fixed-pitch instrument like a keyboard over a record like *Kind of Blue* could sound disastrous due to the inevitable clashing of tones that are irreconcilably out of tune with one-another.

A second major point needs to be mentioned here: instrumental performance in modern pop music has traditionally been viewed in terms of a struggle between the

¹³ For more on the tuning issues of this recording, see producer Ted Macero’s interview in *Artist House Music*: < <http://www.artistshousemusic.org/videos/teo+macero+on+the+arts+of+editing+and+mixing>>

performer and her instruments, or the performer and other performers. As Gracyk points out in his discussion of images of pop musicians, we see them in the throes of the performance, passionately throttling sound out of their instruments (75). We go to see live music to see musicians “engage in a ritual display of *energy* and *effort*” (Gracyk 78, my emphasis).¹⁴ The idea that music should in some way be difficult to perform is one that musicians themselves have largely bought into. Observe the tendency towards grotesque displays of “guitar face” on guitarists as they reach for an elusive note during a solo, or the ritual posturing of members of a band as they hand off extended improvisations.

To be fair to musicians, many of them are struggling with nerves, stage fright, and insecurities about playing. Many players really are struggling with limited skills or battling cheap, barely functioning instruments or inadequate amplification and acoustics. And even for seasoned performers in ideal circumstances, the scene of performance or the audience’s enthusiasm or skepticism may encourage extremity in performance, as audience and performer engage in ascending feedback.

While the values of hip hop should never be assumed to be the same as those of rock music, struggle, displays and competition were still at the heart of hip hop. For instance, Chang notes that early deejays tended to soak the labels off their records to keep other deejays from seeing what they were spinning (Chang 81). Here, the struggle is on two fronts. Obviously the deejay is working to maintain reputation and individuality against other deejays who want to copy the record selections that are most popular with the crowd. But there is another struggle going on between the deejay and the records

¹⁴ For additional discussion of the links between musical authenticity and effort, see Frith, Simon “Art versus technology: the strange case of popular music” *Media Culture Society* 8 (1986): 263-279.

themselves; a drive to draw individuality out of a mass-produced product. The deejay and the emcee are certainly working with records, but they are also working *against* these recordings. Chuck D first heard The Sugar Hill Gang's "Rapper's Delight" when a deejay began cutting it in behind him at a show. Unfamiliar with the song and unable to rap over someone else's words, he improvised: "The crowd didn't know. They're just thinking that I'm rhyming and I'm changing my voice or whatever. I held the mic in my hand, I heard the words and I lip-synched that motherfucker" (Chang 131). This is a key struggle in the world of hip hop, the fight to work both with and against the recorded material from which the music is crafted. As Chuck D's anecdote illustrates, the pressures of the live setting, the need to think fast in a surprising setting, and to never be overshadowed by a record are all the struggle a performer needs. To bring live instrumentation into this setting would have been superfluous.

In the context of the live show, the idea of a limiting environment is highly persuasive. Crucially, the live show and its limitations are not about economic conditions of innovative performance. Valorizing the aesthetic achievements of artists for, in effect, making art because they lacked money is over simplistic, but seeing the environment of limitation in terms of specific constraints of the live show is logical. People tend to work with what is available to them and in response to their audience, regardless of how expensive or inexpensive their equipment may be.

In Chapter 2, I will explore the relationship between the turntable and a piece of technology that has become equally inseparable from hip hop in a studio environment: the sampler. Rather than exploring the sampler as a mechanism for dealing with some specific limitation in either the agent or her environment, I will look at the ways in which

early samplers were technologically limited and how these limitations helped to generate or reinforce the stylistic conventions of hip hop.

CHAPTER 3 TECHNOLOGY AND ART

In 1953, Les Paul and Mary Ford appeared on Alastair Cooke's television show *Omnibus* to show audiences the technological "wizardry" that made their recordings possible. In the three years prior to their appearance, Paul and Ford had sold over 15 million records, all of which combined accessible pop melodies with novel production. In recording them, Les Paul used a "multitrack" approach where musical parts were layered one on top of another, sometimes as many as a dozen times. This layering turned a Jazz-pop duo into an otherworldly orchestra constructed of vocal harmonies and multitracked guitar.

Paul and Ford's appearance on *Omnibus* begins with a short clip of their music before the duo are welcomed onstage to demonstrate their recording machine, which Cooke describes as being "about as simple as a cyclotron." The machine in question turns out to be an immense contraption much taller than Paul himself and covered in a vast array of switches and dials. After spouting some jargon about high and low pass filters, Paul plays a short line on his guitar, flips a few switches, thumps the front of the machine with his fist, and stands back while complex, orchestrated music pours out. The whole performance is more than a little bit carnivalesque and it comes as no great surprise when the machine is revealed to be an elaborate fake and the real, much simpler recording apparatus is revealed. Cooke's speech during this transition is worth quoting at length:

This is the final demolition of this popular and ignorant rumor that the basis of Les Paul and Mary Ford's music is electronics. They make music the way people have made music since the world began. First of all, they are musicians: they have an accurate ear for harmony. They work very hard, they have a lot of patience, and they take advantage of the trick—which, granted, electronics makes possible—that you can record one part of a

song and then play it back to yourself. And then, you can accompany that part and keep on recording. That, I think is the basis. Now, quite seriously, they work—they have a set up which is nothing more than tape recorders in their own home.

Cooke's speech brings up several pertinent issues this chapter will discuss. He begins with the idea that the latest musical "sound" is just technological trickery. We have all heard this charge many times in relation to whichever new musical aesthetic is popular, and it is a bit surprising to hear it as far back as 1953. But luckily, Cooke is there to assure us that these rumors of unnatural dependence on technology are nothing more than lies and superstition. Paul and Ford are musicians; they have "an accurate ear for harmony." Far from being dependent on technology, Paul and Ford have an innate ability, one that sets them apart from other people. Additionally, they "work very hard." The audience should never get the idea that technology is somehow doing the work for them. Paul and Ford's music, like all music, is based on ability and effort. To prove the point, the two musicians proceed to play a song "live" along with recorded backing. The message here is that technology is only a "trick" that allows them to accompany themselves and essentially multiply their own abilities.

This project is about a lot more than music, but within this short television appearance, about eight minutes in length, are captured perhaps the most important questions I will address concerning the relationship between art, media, and technology. Certainly, we all recognize that technology makes new things possible, but can it ever do the work for the artist? Perhaps there are even better questions we can ask. Can technology ever "solve" the limitations of the artist? What happens to media when the technology used to make it is broken or underfunded? What if the tools the artist uses

are so new that they don't yet function up to their most basic potential? What if no one even knows what the tools actually do?

In my Chapter 1, I discussed the different sources of constraint. In this chapter, I will narrow my focus to technology and discuss the ways that it mediates, contributes to, or creates various forms of limitation. I will begin with relatively simple tools and discuss the ways that the very “newness” of novel artifacts presents real barriers to their functioning. Then, I will take up the question of complex apparatuses: the sound recording apparatus and the cel animation apparatus. In the area of sound recording, I will discuss the ways that the recording apparatus compensates for the inherent limitations in a certain group of users. In discussing animation, I will expand my discussion of Japanese anime and explore the specific ways that an under-funded and poorly functioning apparatus can still be made to generate compelling media. I will also begin the discussion of how these constraints influence aesthetics, a topic that I will expand in Chapter 3.

Tools and the Problem of Nascence

Before I deal with the more complex issues surrounding apparatuses and systems of tools, I explore how individual pieces of technology affect the creation of new media forms. In emerging media, tools are often significantly constrained by their very newness. Tools used to generate new media are often nascent; they are too new and undeveloped to work as effectively as the agent might require. Later on in this chapter, I will discuss how affordances of a technology can compensate for limitations in the agent. I will also discuss how a functional and fully developed technology might be crippled by environment or a lack of resources. In this first section, I will discuss

technology that does not *yet* do the things that a particular user group sees as essential and inevitable.

Nascence is the unrealized potential clearly suggested by a new technology. Examples of nascence abound in the history of technology. Thomas Edison's early tinfoil phonograph could hardly capture speech that was shouted into the recording horn; early cameras had such long exposures that even meticulously posed shots were hard to capture; producing texts on the first commercially produced typewriters was actually *slower* than handwriting (Basalla 142). In all of these cases, it seems reasonable to assume that the most important improvements of a new technology were obvious to early users. No matter how impressed people were by the miracle of sound recording in its first instances, they must have anticipated another kind of recording machine that could capture something less than a shout and reproduce it at more than a whisper. And it is difficult to imagine that the public would have been long satisfied with a writing machine that was markedly *less* efficient than paper and pen. Examples of just this sort of nascence are very common, and I will demonstrate that the constraint of nascence has a significant effect on the generation of new media.

It is also worth pointing out that nascence is even more important in media than industry or consumer technology. By its nature, recorded media *fixes* the products of nascent technology and gives individual medial objects longevity that technologies themselves do not enjoy. Art is different than technology in that individual works of art are not improved over time.¹⁵ Any "improvement" in an established artwork tends to be

¹⁵ Clearly, there are exceptions to this statement. Dramatic plays change with each performance, as do dances and live music. Additionally, some artists have a tendency towards "improving" or "updating" and re-releasing works. (Alfred Hitchcock and George Lucas come to mind here.) But still, in any recorded

viewed with suspicion and derided as meddling with a proven model. So, while the solid-state transistor improves over time, Miles Davis' landmark album *Kind of Blue* does not. The record does tend to suffer through some technological fiddling with each new release, but these "improvements" are always represented (namely, marketed) as having greater fidelity to an idealized source, supposedly bringing the listener ever closer to the pure original document. Because these medial objects themselves are relatively fixed and unchanging, the aesthetic consequences of technological nascence stay with us, embedded in artifacts of our culture.

What is Nascence? (Or, isn't All Technology Nascent?)

In initial conversations about this project, some of my assertions about nascence caused debate among my colleagues and mentors. The common thread in their objections is that technology is constantly in a state of change and thus it seems unlikely that any one period in the development of a technology can be marked off from others as distinctively nascent and limited. Most scholars seem to favor an evolutionary view of technology. In this framework, there is smooth continuity from one technology to the next. As George Basalla asserts in *The Evolution of Technology*, "continuity prevails throughout the made world. The existence of continuity implies that novel artifacts can only arise from antecedent artifacts—that new kinds of made things are never pure creations of theory, ingenuity, or fancy" (vii). It would seem that the theory of antecedence and the continuity between artifacts invalidates the very concept of nascence. But in fact, it is the evolutionary nature of technology that generates nascence and makes it an issue.

form from painting to music, individual works tend to be fixed and stable over time after they are produced.

For one thing, technologies evolve in (at least) two ways: in terms of *what* they do, and in terms of *how* they work. Consider the vacuum tube, which provides the essential function of amplification: using a small input current to control a much larger output current. The very function of the vacuum tube was completely new when it appeared; there was no antecedent for using one current to control another and create amplification. However, the method and construction of the vacuum tube were direct outgrowths of the development of the incandescent electric light bulb (Basalla 44). This is the “how it works” path of evolution. Later on, the vacuum tube was replaced by the solid-state transistor, which performs the same controlling function (use one current to vary another) through an entirely different technology. This is the “what it does” path of evolution. Despite the continuity in method and construction between the incandescent light and the vacuum tube, the novel function of the tube caused it to be viewed as new (regardless of its antecedents).

Because the vacuum tube did a new thing, its technology (which had existed for some time already) was also adopted by a new group of users. This fact is particularly important because newness in technology is always defined in relation to some user group. Viewing technological change as a direct consequence of various user groups is one of the central tenets of the sociological school known as the Social Construction of Technology (SCOT), whose model of change and adoption provides several useful insights into the nature of users of technology. In a landmark 1984 article that lays out much of the foundation of SCOT, Trevor J. Pinch and Wiebe E. Bijker use the term “relevant social group” to denote “institutions and organizations (such as the military or some specific industrial company), as well as organized or unorganized groups of

individuals. The key requirement is that all members of a certain social group share the same set of meanings, attached to a specific artifact” (Pinch and Bijker 414). This definition is helpful because it underlines the fact that not only are certain technologies nascent depending on expectations of the user group, but also that various user groups will ascribe different meanings to the same piece of technology.

Groups are also important for another facet of nascence theory: determining the end of the period of nascence. In order for nascence to be a plausible way of looking at technology, it cannot go on indefinitely; any piece of technology must eventually grow out of nascence and enter another definable phase. From the evolutionary perspective, it would seem that we can never say precisely that any tool has left its nascent form. But, for any specific user group, there are identifiable changes that signal the end of nascence. Pinch and Bijker use the concept of “stabilization” to signal that a given user group has come to accept a certain set of characteristics as being central to a piece of technology. For instance, early bicycles came in a huge array of designs, including many variants of the “safety bicycle.” Early in its development, the term “safety bicycle” might have denoted any one of several models, each with distinct features. But, as Pinch and Bijker point out, stabilization of the safety bicycle after 1898 meant that one no longer had to specify a “low-wheeled bicycle with rear chain drive, diamond frame, and air tyres... they were taken for granted as the essential ‘ingredients’ of the safety bicycle” (416). Thus, even though the safety bicycle continued to be refined, certain design features became stable enough to be embedded in the term itself, inevitably causing other designs to be permanently discarded. This stabilization has clearly continued to the point where we no longer even need the word “safety” to denote a

bicycle with equal-sized wheels and a chain drive. From the perspective of its user groups, stabilization of the bicycle, as a design and as a practice, seems to require that it move beyond nascence.

These concepts are entirely consonant with Basalla's theories of evolutionary technological development. According to Basalla, there is never a point where a given technology ceases to change, but there are often instances where user groups are indifferent to these changes. As an example, Basalla points to supersonic travel (SST). By the late 1950s, the US had established a position as a world leader in air transportation technology, and the drive towards constant improvement in aircraft had always been linked to greater speed. However, at a certain point, consumers were no longer interested in increased speed for commercial air travel; the greater speed offered by SST was not enough to offset additional costs and the disturbing effects of sonic booms (Basalla 158). Thus, commercial aircraft largely ceased developing in the direction of greater speed. Of course, more specialized aviation did continue to pursue ever greater speeds, but for the user group that mattered (consumers), commercial aviation had left its period of nascence and stabilized at sub-sonic speeds.

If we accept the role nascence in technological development, then the question for this project is how nascence affects specific technologies governing the media forms under discussion. The expression of nascence in media takes place in three registers. First, when technology is very new, neither users nor manufacturers really know its capabilities. Second, new technology that performs an intended function rarely does *enough* of the thing users wish to do with it. Finally, when a new technology is adopted in place of an older one, the new technology is perceived as superior in at least one

respect, but it may be perceived as inferior in other respects. This means that a technology is adopted that is actually more poorly suited to a task that was central to the technology which it replaces. All three registers of nascence function differently in relation to the character of products made with new technologies.

Nascence I: You Don't Know What it Does.¹⁶

When Thomas Edison first announced the invention of his tinfoil phonograph, he proposed a list of possible uses for the new machine:

take dictation without the aid of a stenographer; provide 'talking books' for the blind; teach public speaking; reproducing music; preserve important family sayings, reminiscences, and the last words of the dying; create new sounds for music boxes and musical toys; produce clocks capable of announcing the time and a message; preserve the exact pronunciation of foreign languages; teach spelling and other rote material; and record telephone calls. (quoted in Basalla 139–140)

As Basalla points out, the recording of music ranks number four on this list. It is also worth noting that only two out of the nine possible uses involve music at all, a fact that must seem in retrospect surprising given that the phonograph eventually gave birth to a huge worldwide music recording industry. But this very uncertainty regarding possible uses of a technology is actually common. Even though Edison failed to recognize the huge commercial potential in music recording and stuck doggedly to his view of the phonograph as a mechanical stenographer, we must at least give him credit for realizing that recording music with his machine was possible. It is not uncommon that inventors or manufacturers fail to realize that their products are capable of a function that will become central to their subsequent use.

¹⁶ This facet of the nascence constraint tends to delay aesthetic innovation rather than shaping it in a definable way. I include this section in the interest of a complete discussion of nascence. The subsequent two sections will deal more directly with nascence constraints that directly affect aesthetics.

There are several reasons why manufacturers fail to recognize the potential of their products. First, actual users, after a tool is released into the wild, are simply a much larger test group than those who previously tried out the tool. There will always be more users experimenting with a given tool after its commercial release than there could ever be during its development. Second, and more important for my argument, general users and inventors/producers represent distinct groups, each with its own motivations and requirements. In commercial systems of distribution, producers do not create tools in order to be neutral and open to various uses. Instead, the tendency is toward imagining not just the tool and its use, but also the characteristics of its user. In a process that Bruno Latour describes as “scripting,” the designer or manufacturer of the tool works with an “inscribed user” in mind (236). The very existence of an embedded script in a tool constrains its use, thus forming another constraint of nascence and demonstrating the motivations of manufacture. Of course, the user is, in the wild, under no obligation to subscribe to behaviors and uses inscribed in an artifact. It is widely recognized that tools (like musical instruments) are never complete in manufacturing, are only made complete through use. Paul Théberge even goes so far as to assert that musical instruments are “made over” in the process of making music (Théberge 50, 160).

An excellent example here is the audio sampler, specifically the E-mu SP-12. This model was designed with drum synthesis in mind and manufactured with the then-new sampling technology that would allow users to build “banks” of pre-recorded sounds to later be sequenced into drum patterns. The SP-12’s ability to sample phrases of music (as opposed to individual notes) was famously discovered by accident during a

recording session (Schloss 35). Additionally, early samplers contained a “loop” function intended to “exploit the potential length of notes played on keyboard controllers without taxing the sampler’s memory” (Schloss 136). This looping function could also be turned towards repeating a single break, thus turning it into the foundation of a song. Neither the product literature nor the scripting of the device itself suggested the uses that were to become central functions of sampling in popular music.¹⁷

A similar observation can be made about sampling technology in general, first introduced in the Fairlight CMI in the early 1980s. To the designers of the instrument, sampling technology itself was nothing more than a “clever hack” or a “technical shortcut” (Fink 391). There was little value attached to the technology specifically because no one yet knew what it was good for. Phrase sampling was not discovered for six years after the invention of sampling technology and early samplers had somewhat limited usefulness specifically because their potential was not realized until much later.

Nascence II: It Doesn’t Do Enough of the Thing You Like.

Whether intended by the manufacturer or discovered in use, users eventually come to decide on what function(s) they value in a given tool. But one of the main constraints of nascence is that new technologies tend to promise a future that they cannot yet deliver. Nascent technologies frequently suggest or begin to facilitate a particular application but fail to perform that function well enough to satisfy even modest

¹⁷ An equally interesting discovery was unintentional frequency filtering, as discussed by veteran producer Hank Shocklee: “[Another] aspect that we created is out of a mistake—one day I was playing ‘Black Steel in the Hour of Chaos’ and it came out real muffled. I couldn’t hear any of the high-end part of it. I found out that if you put the phono or quarter-inch jack halfway in, it filters the high frequency. Now I just got the bass part of the sample. I was like, ‘Oh, shit, this is the craziest thing on the planet!’” (Quoted in Detrick). Certainly, this idiosyncratic but effective use of the machine was never intended by manufacturers.

aspirations of new users. As an example, consider the crystal radio set. As Basalla explains, this device

became the first reliable and widely available radio receiver. Its main component with a holder containing a semiconductor [crystal]... and a thin, flexible piece of wire called the “cat’s whisker,”... by moving the cat’s whisker carefully over the crystal in a radio set, the user could locate sensitive spots that yielded a clear signal. The drawbacks to the system were that the proper adjustment of the cat’s whisker was a matter of trial and error and the crystal set could not amplify the incoming signal. (Basalla 44)

As exciting as it must have been for consumers to have an affordable home radio set, it seems impossible to imagine that they were satisfied tuning in stations by randomly poking a piece of wire at a chunk of crystal semi-conductor. In fact, it is logical to assume that an accurate and reproducible method of tuning in stations must have been foremost in consumers’ minds, especially once the pure novelty value wore off and users became interested in receiving transmissions from specific radio stations. The crystal set had a very attractive function, but performed that function in such an inconsistent and inefficient manner that improvements in function were probably obvious to even a casual user.

A similar observation can be made about early samplers. For instance, the previously discussed E-mu Sp-12 gave birth to phrase sampling, but was significantly hobbled by a 1.2 second memory (expandable to 5 seconds).¹⁸ This small internal memory meant that recorded samples had to be of very short duration. Depending on tempo, 1.2 seconds may not even cover a single measure of sampled music. This

¹⁸ For full technical specifications on the SP-12, see the Vintage Synth Explorer <<http://www.vintagesynth.com/emu/sp12.php>>

limited sampling time contributed to the characteristically short samples and ostinato compositions found in music of that period.¹⁹

Again, this is another example of technology that tantalizingly suggests a certain function, but is too immature, too nascent to deliver on its apparent promise. By their own account, early producers were enthralled with phrase sampling, but frustrated by the limited capabilities of these early machines. Even the SP-1200, which came directly after the SP-12 and boasted significant upgrades in performance, had a memory capable of recording only 10 seconds of sound. Producers' frustrations with these limited capabilities were evident in the techniques they developed to circumvent them. As Hank Shocklee explains, producers developed a standard work-around for the SP-1200's short memory: "For example, you got 12 seconds [10.07, according to the manufacturer] of sample time to divide amongst eight pads. So depending on how much you use on each pad, you decrease the amount of sample time that you have. You take a 33 1/3 [rpm] record and play it on 45 [rpm], and you cheat the system" (Quoted in Detrick). The sample created at 45 rpm can then be replayed at its original speed using some of the SP-1200's built-in de-tuning features.²⁰ The resulting sample compares favorably to the original sound, but takes up far less memory.²¹ Early users of the SP-1200 longed for a future in which the technology did the same thing, only more of it.

¹⁹ As I have noted elsewhere, it would be foolish to ascribe the ostinato nature of hip hop solely to technological limitations. Repetition has been a key element of African-American music for centuries. My contention here and elsewhere is that technological constraint contributes to an aesthetic rather than determining it.

²⁰ For an influential example of the SP-1200 at work, see Pete Rock and CL Smooth's 1992 release "They Reminisce Over You (T.R.O.Y.)"

²¹ "Favorably" being a relative term here. The SP-1200's 12-bit converters are inherently somewhat low-fidelity, but their characteristically gritty sound has come to be regarded as one of hip hop's classic sounds.

Equally interesting is the electric guitar (in combination with the early, then vacuum-tube-based amplifier). The volume of guitar-plus-amplifier was a vast improvement over traditional acoustic guitars. However, early amplifiers had insufficient “headroom,” a term that describes any amplifier’s ability to produce sound at a given volume without distortion. Even at relatively modest volumes, early amplifiers tended towards audible distortion. At this phase in the instrument’s development, distortion was considered an undesirable artifact and manufacturers of the day struggled heroically to produce tube-based units with ever-higher headroom. The culmination of this search is arguably the Fender Twin Reverb, an 85 Watt amplifier featuring a pair of 12 inch loudspeakers. In an interesting contrast to the SP–1200 sampler, the Twin Reverb represents the manufacturer’s understanding of their own product’s nascence and their attempts to compensate for its limitations. When working with vacuum-tubes (the only suitable technology available at the time of Twin’s 1963 introduction) it is literally impossible to engineer an amplifier that will be distortion-free at all volume levels. The Fender Musical Instrument Company sought to circumvent this limitation by building an amplifier that was so large and powerful that it would fill most venues using only a fraction of its power, and thus remain distortion-free. But even the extremely robust Twin will still distort at the higher range of its capabilities. Like all other amplifiers of the period, the Twin does something very desirable, but does not necessarily do enough of it.

While the electric guitar amplifier is similar to the sampler in terms of its nascence limitations, the way the two devices evolved in response to user demands is very different. The sampler steadily gained both memory and resolution throughout its

history. Essentially a small computer, the sampler has largely been supplanted by the Digital Audio Workstation, a consumer-grade (or better) computer loaded with multitrack recording software. In practical terms, this modern incarnation of the original sampler has essentially unlimited memory and extremely high resolution. The technological promise of the nascent device has been fulfilled. The electric guitar amplifier on the other hand has remained largely unchanged since the first three decades of its existence. By the mid-1960s and even earlier, the guitar amplifier had attained a form that would be very durable up to the present day. Early guitar amplifiers such as the aforementioned Twin Reverb are still highly sought-after as professional equipment, entirely apart from their historical value. Additionally, there is a sizable industry devoted to replicating early amplifier designs with only minor improvements for the sake of safety or reliability. The Fender Musical Instrument Company itself puts a significant amount of its manufacturing power toward the goal of re-creating its own historical designs as closely as possible with modern components and manufacturing. Given the way other pieces of technology such as the sampler have involved towards ever-greater reduction of nascence limitations, the relative stability of the electric guitar amplifier is puzzling.

Essentially, the tastes of both musicians and audiences changed to tolerate and then embrace harmonic distortion long before manufacturers could generate amplifiers with infinite headroom. In simplest terms, the tastes of performers and audiences evolved before the equipment on which they relied could be substantially improved. As early as 1947, performers had embraced the distorted guitar sound and introduced it to live audiences.²² Veteran blues player Buddy Guy recalls: “When I was playing in clubs I

²² See in particular Muddy Waters' 1948 release “I Feel Like Going Home” which features lightly distorted slide guitar playing, in contrast to the heavier sound that would gradually become more popular.

used to have distortion, feedback and the audience is used to love it. I told Leonard Chess [head of the highly influential Chess Records] we should get that sound on record, but he just told me ‘ain’t nobody gonna buy that noise, man’” (Trynka 42). Chess’s early reservations were eventually broken down, and his label was among the first to popularize the heavy, electric sound of “Chicago blues.” This trend continued and even accelerated throughout the 1960s, with the emergence of ever-heavier rock music from acts like Cream and Jimi Hendrix. While the sound of the distorted electric guitar continued to evolve into the 1980s, the period from the mid-1950s through the 1970s defined a relatively stable model for acceptable electric guitar tones. By the time high-headroom, transistor-based amplifiers were available in the 1980s, both musicians and audiences had come to appreciate the distorted, tube-based tones of prior decades as being the most “authentic” sounds the electric guitar was capable of creating.

Pinch and Bijker offer a compelling explanation for exactly this type of shift in expectations of a nascent technology. In their discussion of the bicycle, the authors present the concept of “closure,” which “involves the stabilization of an artifact and the ‘disappearance’ of problems” (Pinch and Bijker 426). Pinch and Bijker use the concept of closure to explain the acceptance of the air tire in the world of cycling. This invention was originally marketed as a safety feature, but was dismissed as both unnecessary and comical by most cyclists. Only when an air-tire-equipped bicycle was entered in a race and easily outdistanced all competitors did users come to embrace this new technology (Pinch and Bijker 427–428). In this case, closure was reached because the debate moved from the realm of safety, where it convinced few users, to the realm of performance, where users’ aspirations were met. The electric guitar amplifier similarly

reached closure through a change in user priorities. Although transistor-based amplifiers did appear, they were generally commercially unsuccessful and functioned as something of a “hiccup” in the development of guitar amplifier technology. In this instance, closure was reached not because a new technology was introduced but because the technological drive shifted from a quest for high fidelity to a quest for appropriately “authentic” and “vintage” sounds.

Nascence III: The New Technology is Inferior (in Some Respect) to the Technology it Replaces.

Consumers in the industrial world are accustomed to thinking that new technologies are *objectively superior* to the ones they replace. Although new products are frequently more advanced, this perceived superiority is often a byproduct of effective marketing rather than a genuinely superior product. Consider the short battle between vinyl LPs and compact discs (CDs). Ostensibly, CDs offer greater fidelity and lower noise, typified by the absence of background “hiss” found on analog media such as magnetic tape and vinyl.²³ Even if we take the lower noise of CDs as a given, compared to vinyl LPs, compact discs are more expensive, more fragile, and less suitable for archiving.²⁴ More importantly, in certain key respects compact discs are much less flexible than LPs from the player’s standpoint. Unlike LPs that can be easily moved backwards and forwards, visually cued to a particular location, and manually started or stopped at desirable times, CDs (especially in their earliest incarnations) were

²³ The avowed (by manufacturers) superiority of CDs in terms of clarity and fidelity remains contested within the audiophile community. See Perlman 786 for discussion of this debate.

²⁴ A recent study commissioned by the Library of Congress reported that “optical discs can be convenient media for access and temporary storage. Unfortunately, such media are machine-dependent, so access is contingent on surviving and working hardware and software.”
<http://www.loc.gov/preservation/resources/rt/NIST_LC_OpticalDiscLongevity.pdf>

difficult to queue, and (depending on the playback device) they were actually impossible to rewind or fast-forward within songs. For professional deejays, the compact disc was a nonstarter (Souvignier 42). It offered none of the flexibility of vinyl, removed the deejay's tactile engagement with her music, and its purported higher fidelity had little value in a club setting.

In many instances, new technologies often improve on a single feature of the technology they claim to replace, or offer users one decisively new function. But at the same time, new technologies often fail to replicate ancillary functions essential to certain user groups. Much like the contrast between CDs and vinyl LPs, new technologies also tend to sacrifice something of the flexibility inherent in older technologies.²⁵ While some of these facts might be attributed to the priorities of disparate user groups, others can be explained by the first nascence limitation I discussed above. New technologies are by definition unexplored and tend to offer fewer options than established devices. Consider the computer as it relates to ASCII art. While the home computer does offer many functions previously unavailable to consumers, it is a terrible replacement for the manual typewriter as a tool for visual art, because of fundamental design decisions that were made in its development, in keeping with certain models established by teletype. As I discussed in Chapter 1, early home computers were far more rigid and constraining than typewriters. Granted, typewriter artists were an extremely small user group with

²⁵ As an example, consider the nail gun. At first glance, it seems objectively superior to the carpenter's hammer, operating both more quickly and more efficiently. In reality, the nail gun excels at only a single function: driving fasteners. Unlike the basic carpenter's hammer that has been stable for decades, the nail gun cannot "hammer" or deliver percussive blows to objects, it cannot pull nails, it cannot be used as a prybar, and strictly speaking, it cannot even drive standard nails. (And it cannot reproduce many other affordances of the highly portable, handheld hammer.) The fasteners used in most nail guns are headless shafts of metal that would be unusable with traditional tools.

little influence, but for them, this replacement technology was notably inferior to what had come before.

User groups are an essential variable in this discussion of new versus old technologies. The sampler was not designed or marketed as a replacement for the turntable. Rather, as Schloss points out, samplers only resemble turntables because hip-hop producers see them that way (Schloss 52). We might view the ideological linking of the two technologies as a byproduct of the environment of early hip-hop shows. Because the turntable was the central creative technology of a hip-hop show, any technology that replaced it was likely to be seen as an updated or more advanced version of the turntable. Like the other technologies under discussion, the sampler does provide at least one decisively new function. Phrase sampling and the ability to create layered compositions of multiple breaks were clearly novel. At the same time, early samplers in particular were less flexible than turntables. While samplers do offer precise trimming, filtering, and modulation of sampled sound, their sequencing functions lack the elastic timing that a live deejay can give to her breaks. Additionally, samplers do not allow for scratching, thus eliminating a large segment of the turntablist's vocabulary.²⁶ But, as is so often the case, this limitation of nascence is turned into an asset. The very precision and regularity of sampling has come to be prized (broadly speaking) as part of the hip-hop aesthetic. Schloss relates an interesting anecdote about a skilled producer who made his compositions without a sampler, relying instead on a pair of turntables and a four-track recorder. According to his contemporaries, they were shocked to find

²⁶ It is worth noting that recent software like VirtualDEEJAY allows convincing emulation of turntable scratching applied to digital samples. Additionally, sampling vocabulary has gradually expanded to include producers sampling their own scratching and incorporating it into their compositions, often as a mark of individuality (Schloss 54).

out that no sampler was used in generating these tracks. The fact that the producer in question could operate turntables with such precision as to make them sound like a sampler was considered a mark of extreme competence (Schloss 54). We can see that the aesthetic generated by the very rigidity of the sampler has become prized to the extent that making the older, more flexible technology sound like the new technology is a genuine accomplishment.

This environment-based ideological linkage probably explains why many technologies come to be seen as replacements for older tools. A similar effect can be observed when technologies resemble each other. I would contend that one of the main reasons that computers came to be used for a variant of typewriter art is simply that they *looked like* typewriters. Had computers come with an entirely different user-interface, or not adopted the QWERTY keyboard, it seems unlikely that users would have seen it as a site for text-based graphic art. But, this ideological linkage between two very different technologies that happened to share a keyboard may have contributed to users' ability to ignore the inherent limitations of the early computer. In effect, it was users' tendency to see the computer as an updated typewriter that helped make ASCII art possible.

In all of the instances under discussion, the very newness of the technology generates numerous limitations, even as it suggests tantalizing possibilities. Despite the allure of new, seemingly advanced tools, users are frequently hobbled by technologies that were not intended for them or were not fully explored during the research and design phase of their production. At the same time, these constraints offer valuable new opportunities for innovation. The electric guitar is a good example. While it seems

unlikely that a distorted sound would have been deemed desirable if it had not been unavoidable, we can objectively say that harmonic distortion offers a more complex sound with more overtones and allows for the kind of sustain and expression previously impossible on the guitar. As in many other instances, nascence limitations create real problems for the producers of new media, but these constraints also influence the creation of a new aesthetic.

The nascence limitation I have outlined above is mainly applicable to tools; pieces of technology that are physically distinct from one another and perform specific individual functions (a sampler “samples,” an electric guitar produces amplified guitar sounds). In the following sections, I will explore the constraints that affect not just single tools but entire apparatuses. In the remainder of this chapter, I will consider networks of tools functioning under constraint to produce media forms with novel aesthetic characteristics.

The Recording Apparatus

In Chapter 1, I introduced the concept of constraint pertaining to the agent, a situation in which the artist’s limited abilities or knowledge prevents the production of her work as she envisions it. This constraint is the product of abilities or resources that the agent simply does not possess. Such is the case, for example, of a musician who cannot read standard musical notation. This artist is not only prevented from using printed scores to learn or perform other people’s material, but is also largely barred from complex, multi-instrumental composition.²⁷ Without some type of storage and

²⁷ This is not to say that musicians without access to a recording and transmission technology never compose complex music. Many musical traditions feature ensemble performance that is extremely complex, even without a system of notation. However, most of these instances involve groups of musicians where each individual performer essentially “composes” her own part with varying levels of

transmission medium, most musicians will only be able to communicate with other musicians through embodied (in person) example and imitation, and will not be able to create “fixed” versions of their work. In the face of such a constraint, technology can sometimes be an adaptive force, allowing the agent to overcome her internal limitations and produce the material she envisions. The modern recording apparatus is just such an adaptive technology. With appropriate recording technology (particularly magnetic recording) the musician who cannot read or write music can generate permanent, transmissible versions of the kind of multi-part compositions that would otherwise be impossible.²⁸

Discussing the history of a complex technology like recording also requires the introduction of other constraints like the material limitations of artists who had access to some modern recording technologies but lacked the resources to exploit these technologies the way better-funded mainstream musicians and engineers did. We must also consider the ways that a revolutionary technology mediates the constraints applying to all human activities. Recording manages to overcome some of the innate limitations that even the most gifted musicians have struggled with and its effect on these constraints has influenced the subsequent history of recorded music.

input from other group members. In this section, I am concerned with the constraints facing a single composer who needs to communicate a precise idea to a group of musicians for performance or documentation.

²⁸ It is worth noting that both magnetic tape and standard notation are “recording technologies.” Both inscribe the composition in a fixed and durable manner. For additional discussion on this topic, including the intersection between standard notation and the “binary notation” of CDs and digital technology, see Katz 140.

Rise of the Apparatus

Perhaps the most significant aspect of the history of recording technology is that advancements were primarily driven from an engineering rather than an artistic standpoint. Throughout the 20th century, recording engineers and equipment manufacturers consistently sought to improve the volume and perceived fidelity of their recordings. The earliest phonograph recordings were so quiet during playback that they required the insertion of a tube into the listener's ear. Even subsequent developments that dispensed with the tube still produced a quiet and scratchy recording, one that could not be heard even over conversation. In addressing these shortcomings, engineers consistently succeeded in generating consumable music with less distortion and greater perceived clarity. In the process, they also continuously drove forward technological changes that gradually compensated for more and more of the constraints that might be present within any individual musician. In what follows, I will trace the most significant advances in the history of recording technology and show how each one provides new opportunities for documentation and feedback. Each of these advances has specific effects on the utility of recording as a compositional medium.

The very existence of recording technology provides feedback that would be literally impossible without this technology. Before the advent of sound recording, there was no way that a musician could ever hear her performances when she was not playing. It is worth pausing for a moment here to contemplate the significance of this fact. Prior to the advent of the earliest crude cylinder recorders, none of the great instrumental or compositional masters ever heard themselves play unless they were at

that moment playing (Chanan 7).²⁹ Neither Bach nor Mozart ever had the opportunity to study the sound of their own playing outside of performance. This fact is especially significant when one considers the cognitive effort a musician requires in order to play an even moderately difficult piece. While the brain is engaged with the complex mechanics of turning muscle motion into sound, there is simply less concentration available for the dispassionate evaluation of playing itself. The gap between what a musician thinks she is playing and what she actually hears in a recording of herself can be significant. Any musician who has recorded within the last 50 years can recount at least one story where she was carried away in a moment of instrumental virtuosity that a recording later revealed to be either simply mediocre or perhaps just inappropriate to the moment. Musicians have coined expressions such as “tape never lies” to describe this disconnect between what the musician thinks she is playing in the moment and the cold reality of what the recording apparatus has captured. It is also worth mentioning that, due to acoustics of the performance space, most musicians’ proximity and orientation to their own instruments means that what they hear is substantially different in timbre and volume than what the audience hears.³⁰ Recording changes all of this. Sound recording and mechanical reproduction allow musicians to hear themselves in much the same way an audience does.³¹ Not only do recordings make musicians more

²⁹ Thomas Edison filed patents for his first experiments in sound recording in 1877 (Morton “Sound” xi).

³⁰ For instance, some guitar manufacturers now make models with a second sound hole on the “upper bout” facing directly toward the musician in the hope of allowing her to hear something closer to what her audience hears.

³¹ It is worth pointing out that a record is *never* an entirely faithful representation of what a live audience will hear. A microphone is not a human ear, and while early records suffered from poor fidelity, later advances in fidelity also came with the development of an idealized sound which favored effect over strict documentation. At no point in the history of recording has this technology achieved exact reproduction of what an audience hears.

aware of the timbre and nuances of their own playing, some have speculated that access to recording has made musicians more self-critical and ultimately less self-indulgent in their technical flourishes (Chanan 120). Already, we can see that recording does not simply document performance; it creates a feedback system that begins to mitigate the constraints inherent in the musician, while introducing new conditions and awarenesses of performance.

While early recording did allow for critical self-listening, early technologies enforced significant delays between the *events* of recording and listening that limited the potential for immediate feedback. Early recording used wax as the master medium. The relative softness of wax made it a sensitive material, good at capturing nuance, but wax masters could not be played until a new master was pressed in some harder material like shellac (Chanan 69).³² This delay between recording and playback meant that musicians could never hear a take immediately after it was played. In order for immediate feedback, new technical solutions were needed.

Transcription disc technology took a major step forward with the introduction of aluminum and then acetate recording discs between 1931 and 1934 (Morton “Sound” 96). The folklorist Alan Lomax describes his experience with both media: “the portable recording machine, which my father and I were the first to use, provided the first breakthrough [in audio documentary]. It was heavy (five hundred pounds) and it engraved a rather noisy sound groove on aluminum discs” (Lomax xi). Lomax later switched to acetate discs, which introduced their own problems. “Acetate was harder to

³² These wax masters should not be confused with Thomas Edison's early wax cylinders, which *could* be played directly after recording. My discussion here is mainly concerned with professional, commercial recording in studio settings rather than home recording on early wax cylinder phonographs.

engineer than aluminum, because you had not only to keep the mike focused and monitor the volume, but also to prevent the acetate chip from piling up under the recording needle” (Lomax xi). While these media had issues with fidelity and ease of use, the new transcription discs could be immediately played after recording, a capability significant enough that it was marketed under the name “instant” recording (Morton “Sound” 96). The ease of use and lower cost of acetate discs meant that recordings could also be made for purposes that would have seemed frivolous under the more cumbersome and costly wax master system. It was now common, for example, to make “audition” recordings for acts that might perform at a given venue.³³ The new economics of instant recording meant that a professional musician’s career was increasingly dependent upon recordings of her playing. Musicians were now likely to be acutely aware of not only how their live performances sounded, but how they would be heard on records, a fact that inhibited some musicians and liberated others. But despite the powerful documentary attributes of instant recording, this system would need another layer of flexibility before it could be an effective compositional tool.

While acetate masters were a huge step forward, they still represented a fixed and rigid system with little possibility for correction or editing.³⁴ In order for more flexible recording to be possible, engineers had to develop magnetic recording technology. The first expression of magnetic technology came in the early 1900s with the wire recorder.

³³ See for instance Mitch Miller, who auditioned acts by recording them and playing the recordings on a deliberately cheap phonograph in his office. Miller reasoned that if an act sounded good on record when played on poor equipment, then they sounded good, period (Morton “Record” 37-38).

³⁴ Technically, editing of a limited sort is possible with acetate masters. However, this editing only allows for two takes of a song to be grafted together at some middle point. The process requires two recordings, presumably one where the beginning of the take is desirable and another where the end of the take is preferred. These two can then be recorded onto a third disc where the two desirable halves are joined. This process requires two takes of nearly identical speed and the edit itself is difficult and expensive. (Morton “Sound” 122).

This device recorded sound onto thin steel wire moving at high speeds. Magnetic technology initially had little effect on the entrenched recording industry, but it was significantly more portable than previous recording systems (Morton “Sound” 110). This portability drove investment from the military, eventually leading to wire’s successor, steel tape (Morton “Sound” 106). Early steel tape required heavy and complex machinery, but the system offered the novel ability to erase and re-record using the same tape (Morton “Sound” 113). When the ability to erase and rerecord was combined with metal oxide tape (rather than steel) the essential elements of the modern magnetic recording apparatus were in place.³⁵ By 1945, the frequency range of tape was superior to that of all previous media. Tape also exceeded the reproduction capabilities of photographs or radios, and approached the limits of human hearing (Morton “Sound” 114). Tape became the obvious format for sound recording and brought with it a surge of technical and aesthetic changes.

Aesthetic Implications of Tape

Magnetic tape recording is one of those rare technological advances that creates new opportunities without losing the functionality of the technology it replaces.³⁶

Magnetic tape has all of the benefits of earlier recording systems, including the ability to fix a recording in a durable medium. In fact, compared to acetate masters, seemingly

³⁵ In the early 1930s, steel was replaced by thin tape (typically made of either paper or plastic) coated with specifically formulated metal oxide. This switch to a lighter and cheaper medium seems like a purely technical concession, but as we will see later in this chapter, it had huge aesthetic implications for the recording industry. The Germans were initially far ahead of America (and the rest of Europe) and developed the commercially successful “Magnetophon” which was used during the war for primarily “telephone surveillance, broadcasting, dictation, interrogation, or monitoring enemy broadcasts” (Morton “Sound” 114). Seized by the Allies as a spoil of war, the German device was introduced into industry and further developed.

³⁶ This fact would seem to contradict my earlier assertions about nascent technology, but the recording industry’s resistance to magnetic recording combined with intense military and private research meant that technology was unusually mature by the time it became available to consumers.

fragile metal oxide tape actually stands up to being played many more times. Tape is also an “instant” medium, allowing for immediate playback without the delay of additional processing. Even more important, tape recording and playback is a more automated procedure, requiring less attention to the material processes involved. In his description of working with acetate discs, Lomax mentions the delicate juggling act necessary to monitor volume levels while also keeping the acetate chip from building up under the stylus. Magnetic tape requires comparable degree of attention. Once the recording head has been properly aligned, the tape recorder itself requires little attention from the engineer during normal conditions of use. This development means that with the birth of magnetic tape, recording engineers could now devote more of their attention to the music itself (Chanan 104). Finally, the reusability of tape caused a radical shift in the economics of sound recording. Disc masters could be extremely expensive. In the late 1920s and early 1930s, a wax master transcription disc cost \$100–\$150 (Morton “Sound” 97). Acetate was significantly cheaper, but it was still a fixed medium, meaning that a poor or interrupted take always meant a ruined disc and wasted money. Magnetic tape, on the other hand is highly reusable.³⁷ It can be recorded upon and erased over and over again. When recording to tape, a bad take requires nothing more than the time it takes to rewind the tape machine and begin again.

While the cost savings of magnetic tape were an obvious boon to studio owners. Musicians (and creative engineers) also seized on the flexibility of the tape system as a tool for gradually revising successive recordings. By the time Elvis Presley made his

³⁷ In practice, there are some real limitations on the number of times magnetic tape can be reused. Contact between the tape and the recording head inevitably causes tape to “shed” some of its oxide coating with each pass. Eventually, there will be loss of fidelity and a tape will gradually become unusable. However, because of the inherent flexibility of tape, a “shedding” master can be redubbed onto a fresh tape and recording can continue uninterrupted.

seminal early recordings in Sam Phillips' Sun studios, musicians could record a "take" of a song and then choose to record another immediately, not because there had been any obvious error in the recorded performance, but because the process of repeated recording itself gradually revealed new directions for the material being recorded. Presley and his bandmates crafted their first records by playing a song, listening back to it, making adjustments, and re-recording in a continuous cycle (Gracyk 14). This process allowed Presley and his band to essentially become "co-songwriters" even though they were recording strictly cover material (Gracyk 13–14). In this context, tape is not simply a medium for documentation; it is fully integrated into the conditions of performance and refinement of the source material. With the advent of magnetic tape, recording becomes an inherently *compositional* process, even for a musician like Presley had almost no formal musical training.

In this case, it seems musicians' notational deficits could be compensated for in some contexts by changes in recording technology. Additionally, the constraints arising from the training and abilities of the musicians helped the medium of magnetic recording explore all of its possible uses. For instance, when magnetic tape was first introduced at major studios, its main benefits were that it saved time and costly materials for engineers and studio owners. Established musicians continued to work much as they had before, arriving at the studio either with polished material, or the ability to read sheet music fluently enough to quickly produce usable recordings (Morton "Sound" 144). It was almost universally those musicians with less formal training, working in poorly funded independent studios, who began to exploit unanticipated possibilities of tape recording.

It is important to keep in mind in this discussion that the presence of tape technology alone does not foster change. By the time tape became widespread in American recording studios in the late 1940s, the same recording technology had been in use in Europe for over 15 years (Morton “Sound” 142). Morton is uncertain as to why innovative uses of tape that emerged in American popular music did not originate in Europe but I would suggest that it was specifically the constraints *in* the musicians and their need to find a new method of composition that drove them to explore the possibilities of tape. America’s long tradition of vernacular music and apprentice-based instrumental learning created a breed of musician particularly well-suited to composing in an aural, imitative rather than transcribing mode. Since these were musicians already familiar with the process of listening to a piece and repeating it—often with distinctive variation—they were well-trained to take advantage of magnetic recording. In effect, these musicians could use tape as either a teacher or a songwriting partner—a sounding board, in effect, for the honing of ideas.

Equally important was the relative poverty of the studios in which early rock music was recorded. Morton points out that a “hi-fi” sound was not an option for poorly funded independent studios, but the creation of a new and potentially idiosyncratic sound was potentially useful (Morton “Record” 42). At first, especially in the early rock era that Morton is describing above, technical innovations were limited to basic mixing and crude “effects,” like echo chambers. More advanced manipulation of tape technology only came later. However, the freedom enjoyed by American independent record producers, coupled with the vernacular tradition and limited formal training of “race” music and early rock ‘n roll were specific catalysts for new sounds that emerged

from certain material constraints. Similarly, a lack of training, coupled with the desire to compose and revise led to the development of tape as a compositional rather than documentary medium. As Morton points out, the advance of tape technology meant that by the 1960s, musicians would commonly arrive at studios with *no material in hand to record* (Morton "Sound" 144). Largely because of tape, musicians came to understand that they could compose directly onto the recording medium.

Stephen Davies has noted that in the absence of a highly developed system of notation, music becomes simple and privileges improvisation and performance over harmonic complexity (Davies 31). Davies' observation certainly offers an explanation for many of the characteristics of early rhythm and blues and rock music, but what is most interesting is that popular musical forms like rock have become increasingly complex and harmonically sophisticated, even though there is little evidence to suggest that standard notation has become significantly more common among rock musicians in the last 50 years.³⁸ Indeed, the dominant methods of instruction for the guitar and the bass guitar (along with the drums, the most common and iconic instruments of the genre) often forgo standard notation entirely.³⁹ If vernacular-based popular music is becoming more sophisticated even in the absence of notation, it appears likely that the compositional opportunities offered by magnetic recording are making it possible for even non-literate musicians to store, rework, and transmit complex musical ideas. And, much like standard notation, recordings function as both a compositional space and as

³⁸ As an example of this sophistication, compare Elvis Presley's early recordings to any of the Beatles albums from *Rubber Soul* forward. In this short span (less than 15 years), records considered "representative" of rock music have moved forward considerably in their harmonic and instrumental complexity.

³⁹ See Chapter 1 for an extended discussion on this topic.

a set of instructions. Even the earliest performers of rock 'n roll music saw the instructional value of the records they were making. Presley advised one of his early drummers to “play it simple because some of these guys in those club bands can’t learn this stuff if it gets too complicated” (Gracyk 13). Gracyk observes that the records Presley was making would become “the model for future performances,” but I think we should take his observation a step further and assert that these records were literal instructions for musicians in the same way that sheet music might instruct more traditionally “schooled” musicians.

It also makes sense for recording to become a compositional/instructional medium (rather than simply a documentary one) because recording is superior to standard notation in several ways. Notation has only a limited vocabulary for marking changes in volume, and has almost no capacity to describe timbre. Notation is also somewhat harmonically inflexible, limiting the available pitches to the 12 fixed notes of the Western chromatic scale. This system is insufficient to describe the nuance and microtonal maneuvers of many blues singers, to name only one example (Channan 47). Given all of this, it is worth asking why recording has not become a more widespread substitute for standard notation in well-established musical forms such as classical music and opera. Partially, the answer comes down to the conceptual traditions embedded in disparate styles. The classical player, for instance, is inclined to view a score as an idealized representation of the music it transcribes and to view each performance of that piece as a particular instance of that score, existing for the moment of that performance and then disappearing forever (Chanan 52). For the classical player, recording may be perceived as a burden because it fixes forever the “mistakes”

or places where the performer deviates from the score. Rock, and other early vernacular recorded music are fundamentally different because they were born via a connection to recording technology.⁴⁰ As we have seen in the example of Elvis Presley's records, recording was fundamentally responsible for the emergence of rock as a distinctive style. Rock music has become significantly more complex and intricate, specifically because the increasing plasticity of recording has fostered this complexity—mostly in the context of recorded music. Magnetic tape not only allows cheap and easy repetitions with time in between for evaluation, but it also introduces the possibility of flexible editing. The flexibility of tape meant that it could be physically edited in a way that would have been impossible on earlier transcription discs.⁴¹

Editing allows performers to deal with constraint in several ways. First, extraneous sounds or extra time at the beginning or end of a recording could simply be trimmed away. Additionally, it was now much easier to cut out mistakes or replace bad sections of a performance with a superior section from another take (Morton "Sound" 142). These factors led to a more relaxed atmosphere in the recording studio and a greater acceptance of repetition. Performers with limited formal training might previously have been barred from professional studios, but the new tools for editing out "mistakes" meant that a wider variety of musicians could enter the studio setting with less concern that they would waste time and money. Also, it requires only a short mental leap to go from seeing editing as a corrective tool to seeing it as a compositional one. Bing Crosby

⁴⁰ And their connection to blues traditions that did not put a cultural value on being able to read.

⁴¹ By the time magnetic sound recording became popular, the film industry had already been cutting and splicing film for decades. In fact, the film industry's "optical sound" recording technology (which has never caught on with commercial music recording) meant that film sound could also be edited with a razor and tape long before it was possible in the record industry (Morton "Sound" 79, 122, 126).

appears to have been a major force in the early development of editing as a creative tool. As a condition of his move from NBC to ABC, Crosby insisted that all of his radio performances be pre-taped. Partially, this requirement was simply convenience for the singing superstar, but even more importantly, Crosby rarely gave a “perfect performance” on the first take (Morton “Sound” 123). Even when recording onto disc, it was Crosby’s practice to record several takes and then edit portions of them together into one “perfect” recording. Tape recording only makes this process easier. From the outside, Crosby’s desire to splice recordings to perfection seems conscientious but unremarkable. But it is important to note that editing was not simply a technique that Crosby could use to repair a bad take, but a premeditated element of his working method—essential enough to his process that it was written into his contract before he would take a new job. Crosby entered the studio knowing ahead of time that he would use tape editing to produce a finished product that was less a reproduction of an actual event than a deliberate amalgam of discrete, partial reproductions (re)assembled so as to give the illusion of a single take.

Performers in other idioms such as classical music also saw the potential for editing to create idealized performances. Musicians such as Glenn Gould were comfortable combining sections of several performances to create one that was deemed to be not only technically perfect but also more dramatic or emotionally satisfying than anything the performer could play in a single take (Chanan 133). Highly trained classical musicians like Gould do not suffer from constraints brought on by inexperience or lack of training. In his use of editing, Gould was circumventing the simple constraint of being human and thus unable to physically produce every idea or

nuance of performance he might conjure up in the moment.⁴² Editing allows even classically trained musicians to realize performances beyond anyone's actual playing ability. This trend toward what we might call "mechanical composition" only intensified as new techniques entered the field of magnetic tape recording.

The Expanding Vocabulary of Tape

At the dawn of the recording era, getting multiple instruments on a single record meant having multiple musicians playing at the same time. As the vocabulary of tape expanded and the operations of recording grew more complex, having musicians in the same place at the same time became less necessary. Through a technique called overdubbing, sounds can be layered one on top of another to achieve the effect of multiple musicians playing simultaneously. Overdubbing is technically possible on acetate discs but, like editing in this medium, the process is difficult, expensive, and results in inevitable sound degradation with each additional recording. Nevertheless, Les Paul used the acetate method of overdubbing to create salable overdubbed recordings for Capital Records as early as 1945 (Coleman 95). Paul's work appears to have been chiefly motivated by his exuberance for experimentation, but as is the case with most recording technologies, initial work in overdubbing by most performers seems to have been driven by cost and other practical concerns more than by artistic zeal. Around the same time Paul was creating his iconic Capital recordings, Patti Page used overdubbing on at least one recording, allowing her to fill in for the backing singers who simply never showed up to the session (Coleman 95–96). Like every other aspect of recording, the switch from disc to tape makes overdubbing both cheaper and more

⁴² We might assert that this type of "perfect" performance is the realization of the "ideal" piece of music represented by standard notation.

technologically flexible, eventually allowing for more intricate composition. In 1948, Paul added a fourth recording head to his tape machine, allowing for essentially unlimited overdubs. Paul then tracked no fewer than six guitars for his breakout hit “Brazil,” which represented a major stylistic leap at that time (Coleman 95).

The chief effect of overdubbing is that it disassociates the recording process in time. The record that the consumer hears as a simultaneous collection of sounds could be recorded over essentially any span of time, in any order, and by any number of musicians. Aside from rare technological wizards like Les Paul, this disassociation in time was mostly pursued by the recording industry because it saved time, personnel, and money. But in time, overdubbing, like most other advances in recording technology, was revealed to be a new creative and compositional tool. With the ability to cheaply and easily layer sounds, a musician can not only preserve and transmit musical ideas more easily and accurately than was ever possible without notation, she can also essentially be her own band. In the tradition of Les Paul, musicians now regularly record and overdub multiple times, listening to each successive take, rejecting those that are deemed flawed in some way, and slowly building a complex, polyphonic composition.

My previous discussion of overdubbing has centered on the earliest form of the technology, known as “sound-on-sound.” In this system, sounds can be layered one on top of another, but all recordings are contained on a single track and are inseparable from one another. If a mistake is made on the 10th overdub, the nine previous recordings are also compromised because they cannot be separated from the most recent “bad” take. Although the recording-as-composition process benefited hugely from sound-on-sound technology, the decisive advance in recording came with the advent of

“multitrack” tape technology. In the multitrack system, magnetic tape is literally divided into multiple parallel tracks, each with its own recording and erase heads. With multitrack, the individual tracks of sound are now fully independent of one another and each can be erased, recorded, and manipulated with no affect on the others. The earliest multitrack machines of the mid-1960s were relatively simple 2 and 3-track devices that allowed individual recordings to be “auditioned” before being moved over to another track where they would be combined with previously recorded tracks (Morton “Sound” 148). However, by 1970, studios were commonly equipped with eight, 16, or 24 track recorders (Morton “Sound” 150). With this technology, each individual track in a recording could now stay separate from the rest of the tracks throughout the entire recording process.

This final shift to multiple, autonomous tracks had several implications for the process and aesthetics of recording. First, multitrack makes it impossible for a listener to know which elements of a finished recording were captured “live” and which were later overdubbed (Gracyk 48). As a result, writing and recording music merge into a single process in which there is no distinction between composition and documentation. With true multitrack, recording takes on the full plasticity of the pen-and-paper notational system. Because musical ideas can be recorded, erased, and rerecorded independent of one another, the final recording can change in literally any way during the recording process. An idea that is recorded to begin a composition will commonly not even appear on the final recording. Crucially, multitrack makes it possible for musicians to record even when they have no material-in-progress prior to entering the studio. A song could be recorded even when there is *no song to record* (Gracyk 48). Even if a composer

does have material “written” in her head, a musician without access to systems of notation will need the recording apparatus to “fix” the composition. In fact, that composition’s very existence is dubious until it is fixed in some external form like notation or magnetic recording. As Gracyk points out, when Brian Wilson recorded the iconic “Good Vibrations,” he had the composition entirely worked out in his head before it was recorded. Gracyk asserts that the only reason Wilson needed to be in the studio to instruct the musicians is that he himself could not write notation (43).

The Digital Revolution

To conclude this section, I would like to discuss the shift from analog to digital recording and the ways that this shift have begun to address some of the constraints inherent in magnetic recording technology. The affordances and limitations of magnetic tape are particularly interesting when contrasted with those of standard musical notation. As the compositional powers of tape have multiplied, so have its powers as an instructional medium. Recording has become ever more a substitute for traditional notated composition and we can see this transition because the two forms are actually *converging*. It is no coincidence that the display of a digital multitrack recording program looks somewhat similar to a page of standard notation. Both of them feature parallel lines of information, with each line typically representing a single instrument or sound. Both media also visually represent individual sonic events within the line. Notation primarily shows events as pitch, which digital multitrack does not. Multitrack, on the other hand, shows events as a function of volume, which notation also makes some attempt to describe through instructions and dynamic symbols.⁴³ Both magnetic

⁴³ It is worth pointing out that graphically displaying the waveform in digital recording is not inevitable. Music producers worked for decades with magnetic tape that offers no visual information about what it

recording and standard notation have always overlapped to a certain degree, but in the digital age they are increasingly and deliberately encroaching on one another's territory.⁴⁴ Digital multitrack programs now commonly offer functions that turn MIDI⁴⁵ information or even sound directly into notation.⁴⁶ At the same time, commercial digital notation programs like Finale function more and more like multitrack programs as time goes on. Finale (and its competitors) allows users to digitally create sheet music either by manually placing notes on a score, or playing a MIDI instrument. But Finale also offers a large library of built-in instrument sounds that can be assigned to each "track" in a composition and then played just like any track from a recording. These individual tracks can also be "mixed" for relative volume just like a multitrack, and the finished product can be rendered to an MP3 file and played or shared just like any digital recording.

It seems that both approaches to digital music creation are aware of inherent limitations and gradually moving to eliminate them. Musicians without recourse to

being recorded. The "optical sound" technology of the film industry *did* display waveform and was strongly preferred by film sound editors for ease of editing (Morton "Sound" 126). Including this visual information in digital multi-track is a deliberate choice on the part of programmers, who understood the benefits of visual representation of sound in the recording and composition process.

⁴⁴ While this shift is most evident in the digital domain, it has actually been going on for some time. Long before digital recording existed, some composers were themselves entering the control room and directing engineering. Even more interesting are written scores with instructions for the *engineer*, almost as if she were another musician (Morton "Record" 37)

⁴⁵ MIDI or (Musical Instrument Digital Interface) is a protocol that allows electronic musical instruments to communicate with one another. MIDI contains no audio as such, but rather is a set of descriptive terms about audio events. MIDI allows a given composition to be played by any digital instrument without rerecording and makes possible minute editing of pitch time much more easily than any recording format. See Théberge 80-90 for more details.

⁴⁶ See for instance the "Score Editor" function in the industry-standard digital multi-track software, Pro Tools. At the moment, this function works only for midi, but other, stand-alone programs like Audioscore can work directly on digitally recorded sound. If past industry trends are any indication, similar functionality will likely be integrated into programs like Pro Tools in the near future.

standard notation have been using multitrack for well over half a century now to achieve largely the same compositional function as pen and paper. However despite the usefulness and flexibility of the multitrack approach to composition, the one thing it does not supply is standard notation that can be read by a schooled musician. But, as digital sound recording and analysis improves, it is increasingly possible to create just this type of score out of a digital sound recording.⁴⁷ In contrast, standard notation offers a relatively precise set of instructions that can be reproduced by a musician immediately after being written. It seems likely that composers throughout history, regardless of their ability to “hear” their compositions mentally, have often wished to simply hear their scores played back during the composition process. This capability for immediate auditory feedback is perhaps the greatest advantage that sound recording has traditionally had over standard notation. But with a current digital notation program, this advantage is erased and the digital score functions more and more like a multitrack recorder.

In my next section, I explore the role of constraint on the animation apparatus. Unlike the multitrack recorder, which I discuss as mainly an adaptive technology to compensate for constraints within the agent, the animation apparatus is itself constrained by lack of resources. The result is a “broken” technology that introduces its own aesthetic effects into the process of cel animation.

The Animation Apparatus

It is tempting to assume that animation and music are formally similar because both are concerned with constraint, technology, and innovation. Both feature a complex

⁴⁷ See footnote 45 for details.

apparatus of technologies and a product carefully assembled out of parts. But animation is fundamentally different from music recording and has its own relationship to constraint. Where sound recording is an instance of technology modulating the limitations found within agents, the technologies surrounding animation can themselves be constrained so that technological limitations are instrumental in generating new aesthetics. This is the case with anime.

It is important to understand that the technology of animation is not a tool, but a set of tools. Traditional, non-digital animation is based on the “cel,” a transparent sheet of celluloid on which characters or pieces of characters can be drawn and placed on top of painted backgrounds (Perisic 10). Stacked together in various combinations, cels and backgrounds are then photographed to produce the series of composite images that make up animation. Precise photography of these disparate elements is made possible by the animation stand. This device consists of a base where artwork can be stacked, a glass platen for flattening celluloid sheets, and a vertically mounted camera (Perisic 14). This basic apparatus also requires numerous lights, lenses, filters and other elements to function effectively. The entire contraption is a fascinating hybrid of apparently disparate technologies. In his discussion of the animation stand, Lamarre notes that it “effectively combines art ‘techniques’ (drawing, painting, compositional techniques, and so forth) *and* film ‘apparatuses’ (movie camera and film projector)” (“Machine” 16). Lamarre notes that the “animation stand feels rather ad hoc, a combination of devices and techniques designed to rationalize and perfect an arrangement that already existed in ‘paper animation,’” the immediate precursor of the cel technique (Lamarre “Machine”16). An essential fact of animation is that it depends on a whole set of

apparently disparate technologies functioning as a synthetic whole to bring forth the product we call animated film.

The above description of the animation apparatus suggests the huge amount of work that goes into creating even a short cel animation. Characters and other foreground objects each occupy their own cels, with characters' body parts frequently split up onto multiple cels. The entire stack of cels, often a dozen or more, must be precisely located in relation to one another and flattened under the platen to eliminate perceived "slippage" between layers. This entire collection must then be carefully lit with high-powered lights to eliminate shadows and other undesirable artifacts. For its own part, the camera requires close attention to lens-selection, field size, focus and positioning, just like any other highly specialized camera.⁴⁸ Only when all of these elements are in place can the camera operator activate the shutter and take a single frame of animation. When one realizes that standard film runs at 24 frames *per second*, it is obvious that animation is massively labor-intensive.

Because of its painstaking nature, animation demands large amounts of time and money. When either of these resources is curtailed, the animation apparatus runs up against hard limits on what can be produced. As I observed in Chapter 1, a world-wide economic downturn in the animation industry, coupled with a high demand for animated programming in 1960s Japan meant that there were powerful incentives for producing animation cheaply. In 1961, Tezuka Osamu proposed an animated adaptation of his hugely popular manga *Tetsuwan Atomu* (eventually anglicized as *Astro Boy*). In order to get his series produced, Tezuka promised to deliver half-hour programs at roughly one

⁴⁸ See Perisic 1-50 for details on these processes.

third the standard budget (Lamarre “Machine” 187). He accomplished these cost savings by producing his program with a significantly reduced frame-rate. Taken together, these conditions set the stage for the birth of anime and the large-scale commercial success of “limited animation.”⁴⁹

My contention in this chapter is that these constraints on time and money forced the animation apparatus to essentially function in a “broken” state, in which full-motion animation was impossible. In this broken state, the animation apparatus generates modes of cinematic representation, or “representation in motion” that had previously been considered unacceptable to audiences. Rather than focus on smooth character motion and a certain type of cinematic realism established by Walt Disney Studios, Japanese animators found ways for characters and motion to be “abstract” and yet still emotionally powerful for viewers. The animation industry’s tendency to efface its means of production is helpful in this circumstance. Since viewing audiences typically have only the vaguest idea of how animation is made, they don’t see limited animation as a lack of sophistication, but merely as a style that is appealing. As television producer Fred Ladd notes in his account of anime and American audiences, anime features severely limited motion compared to most American animation, however “the storylines coming from Tokyo were compelling, zingy, and the editing fast and snappy... Kids don’t count cels; if a story is great kids will watch” (Ladd and Deneroff 23). In this instance, the constraints of time and money and their tendency to disable the animation apparatus encouraged new aesthetic advances that would be unlikely or impossible without technological

⁴⁹ This is a somewhat simplified account of this history.

constraint. In my next section, I will briefly expand on the unique aesthetics of anime fueled by constraint.

Limited Animation and the Birth of Style

The signature constraint of anime is its limited frame rate. Most animation works with 12 drawings per second and each drawing repeats once for a total of 24 frames. Because each drawing appears twice, this frame rate is referred to as animating “on twos.” Operating under constraint, limited animation tends to show each drawing three times, thus the expression “on threes” (Lamarre “Machine” 64). The most conspicuous effect of this frame rate is that anime (and indeed all limited animation) is noticeably less smooth in its depiction of character motion than full animation. There is also a great tendency towards long holds where characters are static for several seconds or longer. The most iconic anime image is a character or characters on screen for a relatively long period of time, stock-still except for their mouths, which oscillate between open and closed in time with dialogue and provide a fairly primitive representation of characters speaking. While this limited frame rate and tendency toward stillness are the aesthetic features most often associated with anime, there are several other characteristics worth noting. Thomas Lamarre is probably the foremost academic involved in cataloging these aesthetic features. The following summary will use key terms from his work.

Master animator Norman McLaren is often quoted for his assertion “Animation is not the art of drawings that move but the art of movements that are drawn; what happens between each frame is much more important than what exists on each frame; animation is therefore the art of manipulating the invisible interstices that lie between frames” (quoted in Lamarre “Machine” xxiv). But while traditional animation has focused on breaking down motions and reassembling them via projection, anime often

works in the opposite direction, actually *moving drawings* across backgrounds while photographing them (Lamarre “moving drawings” 336). As Lamarre points out, anime also features a tendency towards camera effects, with an emphasis on panning and tracking shots (Lamarre “moving drawings” 336). These strategies have the dual advantage of being dramatic and also less expensive to produce than traditional character animation. Like the tendency towards fewer drawings and limited motion, these effects are not simply strategies of production, but are tangible artifacts that combine to produce a recognizable anime style.

Anime specializes in new representations of motion, both the motion of characters and of the implied camera. For instance, Lamarre distinguishes between two different types of motion relative to depth. In his formulation, traditional cinema has tended towards motion *into* depth, which Lamarre calls “cinematism.” This is the motion associated with the mobile camera that can move into a scene, allowing the viewer the sensation of “speeding into, and even cutting into, the world” (Lamarre “Machine” xix). This is ballistic vision, a “surgical strike on reality” (Lamarre “Machine” xix). In contrast, Lamarre identifies an aesthetic feature of anime that he terms “animetism,” characterized by the separation of an image into multiple planes with the force of motion directed laterally across and between these planes, rather than into depth (Lamarre “Machine” 6, 34). Because of animetism, there is a lack of hierarchy within the image. In general, no layer is deeper or sharper than any other and depth appears on the surface, drawing greater attention to image composition (Lamarre “Machine” 110). Anyone who has seen anime is familiar with animetism. Images of motion, especially those including landscapes seen from a distance, are separated into discrete image planes that move

independently of one another as the viewer's apparent position changes. This is not to say that animation never uses motion we might classify as cinematism. Although motion into depth is a technically challenging illusion, it is still common. What is important here is that anime has a specific *tendency* towards animetism, a tendency that generally highlights the non-filmic qualities of animation and relies on alternate modes of suggesting motion even if these modes break with our traditional notions of cinematic realism.

Anime also tends to favor detailed character design over smooth character motion, another aesthetic choice motivated at least partially by economics. Throughout the history of animation, there has been a constant tension between the level of detail in drawings and the amount of motion. This divide can be seen as early as the 1916, when the Bray studio turned out several films in which the drawings are quite detailed and painterly, but the motion is very limited (Barrier 17). In contrast, most animation tends toward the opposite formula, where backgrounds are highly detailed but foreground characters tend to be simplistic in favor of more motion. Warner Bros. cartoons of the 1950s are an excellent example of this trend. The circumstances of anime tend towards reversing this paradigm. Under the conditions of limited animation, where motion is necessarily curtailed, the trend in anime has been towards much more detailed characters. Lamarre asserts that limited animation requires that the essential personality traits of any character must be plainly visible on characters even when they are not in motion:

The movement of the soul or brain or psyche—feeling, thinking, discerning—is written on the surface of the character. This is how character design in limited animation captures and directs the force of the moving image surfacing as potentiality. You'd then see in the character not only a

potential movement of the limbs but also a potential movement of the heart and mind. (Lamarre 203)

This tendency toward what Lamarre calls “Soulful Bodies” is again indicative of the aesthetics caused by limited animation. In the absence of full character motion, character traits that might have been displayed through action in motion are now part of character design.

The reduced frame-rate of anime encourages all of the aesthetic features I have identified. With fewer frames, action is noticeably less smooth and there is a tendency toward extreme stillness and explosive transitions. Barred from the smoothness of traditional animation, anime also tends toward new representations of motion, especially motion across depth (rather than into it) and a focus on camera moves rather than character motion. Photographing the same cels in new positions is cheaper than re-drawing, so apparent camera motion and the “sliding” of various background planes are cost-effective methods of producing compelling motion on screen. Finally, characters only need to be designed once, even if their actions need to be drawn many times. Consequently, the more of their personalities can be seen on the surface, the less these traits need to be communicated through action. In each of these instances, the economics of anime can be seen as contributing to the distinctive aesthetics of the genre.

The thesis I have articulated above is accurate and functional as far as it goes. While there is some debate about the extent to which time constraint and economics played a role in the formation of the anime aesthetic, few historians or theorists would challenge the notion that limited funds and short production schedules created something of a crisis for Japanese animators attempting to create full character

animation in the Disney mode. These constraints clearly played a significant role in generating the distinctive aesthetics of anime. While this thesis is compelling, it also generates at least as many questions as it answers, specifically: What is the role of *technology* in all of this? Should we not give all the credit to the artists and animators who solved difficult problems? What does the apparatus itself contribute? Why were the aesthetic characteristics of anime not discovered or exploited sooner, especially since anime is not the first animation ever produced under financial constraint? Finally: Given that anime is hardly the only aesthetically distinct limited animation ever produced, how can we account for its explosive worldwide popularity?

The Role of Technology

Any time a project like this makes claims about the agency of a technological apparatus in shaping events of production, there is a great danger in slipping into technological determinism; the notion that the existence of certain technologies makes various advances inevitable. In the deterministic view, technology effectively makes history.⁵⁰ Like many other scholars, I find the deterministic viewpoint problematic, particularly in the insufficient agency it grants to humans and human culture. On the other end of the deterministic spectrum, we find SCOT (Social Construction of Technology), which gives most of that agency back to human beings by claiming that people mostly determine the uses and functions of technology through their own needs and networks of social interaction. Between these two poles, we seem to have a dilemma. Determinism is mostly out of favor with scholars due to its overly mechanistic view of history, but SCOT can be fairly criticized for under-representing the agency of

⁵⁰ For extended discussion on this topic, see *Does Technology Drive History?* Ed. Marx, Leo and Merritt Roe Smith.

technology itself within the social processes that determine its function. With this dilemma in mind, I now turn briefly to Peter-Paul Verbeek's philosophy of technology in his book *What Things Do*.

Verbeek clearly articulates the problems we face in trying to plot a course between technological determinism and SCOT. He begins by observing that determinism has been largely discredited by empirical research (Verbeek 101). Much of this research took place under the banner of social constructivism, but Verbeek is equally critical of SCOT, noting that the constructivist approach gives insufficient agency to technology itself and the power it holds in relations between humans and machines (102). Even early in his book, Verbeek seems to be laying the groundwork for a middle space between these two views, observing that human beings "are not sovereign with respect to technology, for technology itself co-shapes the ways in which they relate to it" (46). Within this brief statement, Verbeek ascribes agency to both humans and technology, giving neither one of them overwhelming power in their relations. Verbeek endorses the concept of "Actor-Network Theory" in which both humans and non-human technologies are all actors in a network of relations (102).⁵¹ Verbeek also affirms philosopher Don Ihde's position that technologies "have an intentionality, a trajectory that promotes a specific kind of use" (Verbeek 115). In this view, technologies promote certain behaviors without determining them. Verbeek's perspective is consonant with Lamarre's own view of technological *determination*. In Lamarre's discussion of the ways that anime "thinks technology," the author calls attention to "the material limits of anime which constrain [its] 'thinking' and make it possible" (Lamarre xxxi). This formulation,

⁵¹ Actor-Network Theory is generally credited to the philosopher and anthropologist Bruno Latour. See in particular, Latour's *Science in Action*.

which signals the possible power of technology without over-determining its force, seems like the most reasonable perspective on agency and technology, especially during the process of innovation. Taking this position as my starting point, I will articulate the specific ways that the animation apparatus both *constrains and enables* the aesthetic advances of anime.

When Lamarre talks about the ways that technology makes thinking “possible,” we might reasonably view this as technology’s tendency towards revealing possibilities to its users. Heidegger famously refers to technology as a “way of revealing” and this seems an apt description of the function of the animation apparatus. Admittedly, there is a seeming paradox here. I am asserting that the animation apparatus is itself limited *and* that it reveals the solutions to limitation. But the technical strategies that enable limited animation’s success are *embedded within* the apparatus and the constraints placed on the apparatus do not diminish its ability to reveal new ways of thinking. In fact, the result of constraint is to force the rediscovery and reevaluation of aesthetic strategies that have long existed in the animation apparatus.

The major strategies that anime uses to cope with constraint existed long prior to anime itself. As I discussed above, animated films with severely limited character motion have been commercially produced since at least the mid nineteen-teens. For instance, Barrier points out the 1916 production *The Artist’s Dream* and notes that during its production, “rather than make, say, 10 individual drawings to represent a rapid action, an animator might make only five drawings, or three, and had each drawing shot for two or three successive frames (‘on twos’ or ‘on threes’)” (17). Equally common during the early days of animation was the practice of holding a single drawing for as

long as several seconds of screen time (Barrier 17). Even Winsor McCay, an undisputed early master of animation was known to use cycles and repeated animation, which allow repetitive motions to be extended without tediously redrawing every repetition (Barrier 16). All of these techniques are long-standing solutions to various economic and technical constraints, and all of them have become closely associated with anime.

Not only does technology itself mobilize these aesthetics strategies, technology is often the specific means by which these strategies arise. An excellent example occurred in the early 1930s at the Disney Studio. Up until this point, it was common for animation teams to shoot “pencil tests” by photographing the pencil drawings for a given scene. Directors and animators reviewed this unfinished film without inking or color in order to check for corrections that needed to be made (Barrier 77). Before these tests could be viewed, the animator was responsible for drawing the inbetweens and cleaning up the individual drawings. Sometime in 1932, someone, probably Walt Disney himself, ordered a test made of a set of rough sketches without this cleaning and inbetweening. As one of Disney’s own animators reports “The great discovery was made that you could read the action perfectly well from the rough drawings” (Barrier 78). One important facet of “rough tests” is that they do bear a certain resemblance to later forms of limited animation. The character motion tends toward jerkiness and long holds reminiscent of anime. But the vital detail is the above reference to “the great discovery.” Obviously, Disney was expecting *something* of value when he ordered the first rough test, but the suggestion is that no one was expecting a functional piece of animation from which corrections could be made. In the history of film, similar stories are fairly common. In

one legendary example, the early filmmaker Georges Méliès was filming unstaged street scenes sometime after 1895. As the story goes, his camera jammed just as a bus was passing by. Méliès fixed his camera after several minutes and happened to resume filming just as a hearse was occupying the same space the bus had when filming stopped. When he later developed and projected the film, Méliès was astonished to discover that the bus appeared to suddenly transform into a hearse (Bordwell and Thompson 113-114). There is no indication that Méliès planned or could even predict that such a transformation would occur. In this, as in many other instances, technology does not do what we expect; it merely does things and it is left to humans to come along behind to understand and exploit these discoveries. So it goes with animation.

Technology often surprises its users by producing unintended effects that can then be exploited for various aesthetic purposes.

Multiplying the Real

These unexpected solutions to aesthetic problems bring us to another important question: Why are there so many apparently acceptable ways of doing animation?

Technology may supply us with many options, but why do audiences so often accept these different aesthetic solutions? In asking this question, I am not just wondering why there are different strategies for reaching a homogenous end, but why a seemingly simple operation like having a character move from one side of the screen to another can be accomplished in several ways, each of them distinct in appearance. For instance, Disney animators move a character from point A to point B by animating that character walking or running in a manner that audiences judge as being “realistic” (an idea that I will unpack shortly). Looking at this same problem, a UPA animator would also animate the character walking but might make the motion relatively abstract. The

character's legs might scurry along at improbable speed while the character's upper body remained perfectly still.⁵² An animator working in the anime style could choose not to animate that character at all, but simply move the character's still form across a background and thus create motion without animating *any* individual movements.⁵³ The question is: why do audiences accept and even embrace such apparently disparate ways of representing what seems like a straightforward operation? I think the answer is that we do not fully understand how films and audiences arrive at conclusions about what is "acceptable" in animation. I will now address this question with recourse to Kristin Thompson's landmark article "Implications of the Cel Animation Technique."

Thompson structures her discussion of animation around the concept of "novelty." In her view, all film was initially dependent on novelty for its appeal (Thompson 108). Once the pure novelty of moving images wore off, live action cinema eventually moved on to strategies like the "star system" and a reliance on story and perceived realism as a means of selling product. Animation, on the other hand continued to promote itself as an instance of "mechanical magic" (Thompson 109). Because of this separation between live-action film and animation, viewers and producers increasingly saw animation as the province of the fantastic. And because only animation could do fantastic things, it was eventually assumed that animation only *should* do these things (Thompson 110). As animation became increasingly segregated from the rest of cinema as the province of the fantastic, it also became increasingly

⁵² In fact, this is the kind of motion displayed by the doctor in *Gerald McBoing Boing*.

⁵³ Is worth pointing out that this type of "frozen motion" is rarely a signifier for walking in anime. Rather, it generally signifies flying through the air, or moving in some unusual way as in a specialized martial arts move. Regardless, the distinction still holds. Even for characters launched into the air, traditional animation does not generally allow for perfect stillness in motion to be treated as realistic.

trivialized as a medium for “serious” storytelling and viewed as suitable only for children’s entertainment (Thompson 111). While Thompson’s article provides valuable insight into the ideologies surrounding animation, her framework is insufficient to account for the multiple and varied ways that even a single animation studio might approach the same problems of motion, distortion or perspective. On my way to explaining audience acceptance of these disparate approaches, I must take issue with a few of Thompson’s assertions.

Thompson articulates her central claim most concisely when she writes: “During the late teens, twenties and up into the fifties, filmmakers and audiences maintained this ideological view of animation’s difference; animation could do things live action could not. As a result, cartoons did not opt for the naturalism of imitating live-action films” (Thompson 110). While this contention is persuasive, especially where it concerns the marketing and distribution of animated programs, Thompson overreaches when she extends this claim to include producers and audiences. The idea that producers of animation saw their form as a trivial medium suitable only for children’s fantasy is at odds with Disney’s considerable and well-documented drive towards realism, and his interest (as evidenced in *Fantasia* [1940] to adapt animation to self-consciously “serious” filmmaking). Thompson acknowledges the cinematic realism of Disney’s feature films, but she immediately dismisses these as being more like live-action features (110). The problem here is that Thompson provides no criteria for judging an animated film to be somehow “insufficiently animated” and more akin to live-action. At the same time, first-hand accounts of work at Disney suggest that the drive for realism started long before Disney’s features. As an example of how this drive for realism

affected the aesthetics of animation, let us examine Thompson's use of two important animation terms.

To account for the impossible distortions of cartoon characters, Thompson uses the terms "stretch and squash." Thompson uses these terms too broadly, as if they accounted for all character distortion in animated film. Take for example early animated star Felix the Cat, whose body was so malleable that Barrier refers to it as "a sort of infinitely versatile Swiss Army knife" (45). In early features like "Felix Finds Out" or "Doubles for Darwin," Felix forms his tail into various numerals to help a friend cheat on his exams, or opens the skin of his torso like a jacket, displaying bare ribs to emphasize hunger. Neither "stretch" nor "squash" is adequate to account for these distortions. In fact, stretch and squash best describe specific advances by Disney animators who, by 1931, were being instructed to cleanse their work of "arbitrary" motion. "Arbitrary" in this sense refers to any of the motions or distortions that characters can make specifically because they are drawn (Barrier 74). Felix is a good example. His ability to contort his body into any convenient shape was considered the height of arbitrariness. Disney found this arbitrary motion to be directly at odds with his drive for greater "realism" in animation. Arbitrary motion was being rooted out at Disney in 1931, a full six years prior to the 1937 release of *Snow White*, Disney's first feature (Barrier 74). In fact, the short subjects that appeared before *Snow White* were an essential proving ground for the development of Disney-style realism. Particularly important was 1933's *Three Little Pigs*, where animator Fred Moore developed a particular kind of distortion where characters' volume on screen remained constant regardless of the ways they might distort. Previously, when a character's arm stretched, the volume of its body would

simply expand (Barrier 89–90). As Barrier observes, “there could be no sense of attenuation, or any other sympathetic response to the character’s actions” (Barrier 90). But a character whose body became progressively thinner as he stretched would be visually representing the very human sensation of straining for something just out of reach. Stretch and squash allow a certain degree of fantastic motion while creating visual consequences that seem “real” to audiences. Over time, Disney’s overall aesthetic strategy was to create illusions that were *believable* rather than strictly realistic, but certainly not pure fantasy. If we can observe that the line between fantasy and realism is movable and that “believability” matters to audiences, then we begin to get an idea of how wildly different aesthetic strategies can yield disparate yet equally acceptable results.

Because the line between fantasy and realism is flexible, animation has always been a space for technological and aesthetic experimentation, whether in the cash-strapped world of anime or the relatively flush Walt Disney Studios. For instance, Disney developed techniques like “overlapping action” where different body parts move at different speeds. This technique adds a sense of realism because it is similar to the way “bodies and clothes move against gravity” (Barrier 76). Overlapping action can add believability to even fantastic characters. For instance, even though there is no real life analog for a cartoon dog like Pluto, overlapping action can make him seem more real: he wears no clothes, but overlapping action can be applied to his loose flesh, making him seem to be realistically affected by gravity (Barrier 76). In this way, Disney animators were developing strategies for making these motions consonant with the real world without being slavishly imitative of it. Disney animators slowly discovered that they

could “create a *more* lifelike illusion without copying life” (Barrier 76 emphasis mine). This was the line that Disney animators straddled throughout the studio’s first few decades. With enough work, animation could imitate live-action cinema to almost any degree. Through the technology of “rotoscoping,” animation could directly copy live-action footage.⁵⁴ However, rather than being appealing for its apparent verisimilitude, roto-scoped animation was viewed as cold and unappealing (Barrier 219). The Prince in *Snow White* was considered among the film’s weakest animations specifically because he looked *too much* like the live-action footage he was traced from (Barrier 229).

My point in all of this is that animation is clearly *not* a space for fantasy. Instead, we should view animation as a place where a relationship to cinematic realism is always being negotiated. In drawing distinctions between fantasy and realism, we must also acknowledge the disparate elements of any animated film. In terms of set, setting, and scenario animation is fantastic; no question. In the animation under discussion, animals speak and inanimate objects come to life. However, in terms of character animation, the distinction between fantasy and realism is less clear. In areas such as character motion, classic Disney animation is often judged to be the most “realistic.” But as we have seen, even Disney shies away from the pure photorealism of roto-scoped animation. At the same time, we have the highly stylized motion common to anime that is not “realistic” in the traditional sense, but is still considered acceptable to many audiences.

Nowhere is the negotiation between fantasy and reality more apparent than in camera motion, which is important to all animation and vital to the anime aesthetic. The

⁵⁴ Rotoscoping involves shooting live action sequences and then painstakingly tracing over each individual frame to create an animated simulacrum of the live footage. This process was also popular for creating special effects for live-action films in the pre-digital age. See Barrier 22-23 for details on this process.

real camera in animation is fixed to the animation stand and is only able of actually moving vertically. At the same time, the animation apparatus creates a “virtual camera,” capable of realistically simulating a wide array of traditionally cinematic camera movements. For instance, believable motion into depth while maintaining traditional perspective is possible in animation, but extremely difficult. As Lamarre describes, such a cinematic camera motion in the realm of animation requires strict control over scalar proportions and a monocular perspective that places the viewer’s eye in the camera lens (Lamarre 22–24). All of this effort is aimed towards creating a believable facsimile of cinematic camera motion.

A similar level of effort goes into creating the illusion of speed, typically by carefully managing various types of blurring. In the realm of film, blurring is an unavoidable artifact that arises when motion exceeds shutter speed, but this blurring has also become a signifier of speed, either of objects or of the camera itself. In the realm of animation, blurring does not exist as a technical artifact. Rather, animators insert a facsimile of cinematic blurring into implied camera motion to keep up the illusion of cinematic realism. But, as with many other cinematic devices, different studios utilize the same basic idea quite differently while still achieving believable results. A Warner Bros. cartoon from the 1950s will often indicate speed by reducing a character to a blur as he moves. As Thompson points out, this blurring of a foreground character while leaving the background sharp is actually the opposite of what would happen in cinema, where a character moving with the camera would remain distinct and the background would blur (116). In contrast, we might look at a modern animated program like *The Simpsons*. This program refuses to use traditional animation character distortion, but

does employ an essentially impossible camera; one that does things far beyond the capabilities of the cinematic camera.⁵⁵ *The Simpsons* tends to move locations via hyper-fast tracking shots that transport the audience across an entire town in roughly a second. During these tracking shots, *The Simpsons* blurs the scenery while the “camera” is in motion. This type of shot is clearly impossible, but the animators use a deft blend of cinematic blurring and occasional recognizable details to give the audience the impression that what they are seeing is what a cinematic camera *would* do if it were possible. Anime takes another, equally extreme approach to the problem of speed. While some anime does blur characters in a manner similar to the Warner Bros. example, most anime inverts this formula, choosing instead to keep the foreground character sharp while blurring the background. Here again, anime responds to the constraint of reduced frame rates by suggesting rather than animating motion. However, the background blurring in anime is not a facsimile of cinematic blurring. Take for instance the feature film *Ninja Scroll*, where martial artists often run or jump at very high speeds. In these cases, not only does the background blur, it often loses all relationship to backgrounds seen before and after the blurred shot. When a character is meant to be perceived as moving at an extreme speed, the background frequently transforms into a wash of color, and even this color is often different than the established background colors of the scene. It is as if the character has momentarily left reality, so great is her velocity. These examples are clearly very different from one another in the way they handle speed. But, because audiences are being appropriately cued with familiar film artifacts, they are willing to accept camera motion exceeding anything they have seen

⁵⁵ See Knox 74 for extended discussion of the “impossible camera” in *The Simpsons*.

on film. In the complex negotiation over fantasy and realism, animators frequently offer facsimiles of familiar cinema artifacts to persuade audiences that the plainly impossible is still believable.

Constraint plays an important role in limited animation and anime because it tends to “reboot” this negotiation over realism in traditional animation. In its drive toward realistic character motion, traditional animation rejected such ideas as a still character being moved across a background as a signifier of character motion. Because studios like Disney invented a plausible illusion of walking, other methods of representing motion were discarded as “cheap” or “slapdash.” But when constraint makes full animation and smooth character motion impossible, it also reveals alternate methods of motion. When early Japanese animators like Tezuka produced limited animation in an era dominated by Disney-style smoothness, they were essentially beginning a new negotiation with audiences. Anime was then able to introduce plausible character motion that was jerky instead of smooth and long static holds that would have previously been considered unacceptable. The popularity of programs like *Astro Boy* indicated audiences’ willingness see limited animation techniques as acceptably realistic and worthy of emotional engagement.

Another Determinism?

Despite the several pages I have spent divesting this project of technological determinism, it might now seem that I am falling into another trap that we might call “constraint determinism.” One might assume that I am suggesting that constraint *had to* create anime, and the limitations placed on the animation apparatus make the anime style somehow inevitable. In one sense, this is exactly what I am suggesting.

Anime did not invent limited animation. As we've seen, reduced or limited frame rates have existed as long as animation itself. In fact, we can only call animation "limited" in reference to some standard of cinematic smoothness like the frame rate established by Disney. But the idea of "limited" animation in the minds of producers has existed at least since the mid-1940s and the UPA. Animators working in this studio referred to their product as "limited animation" in the words of one animator, because "it was limited by the money we could spend" (Barrier 512). And, in a now-familiar story, these reduced funds led to fewer frames per second. To a large extent, a reduced frame rate is the only way to cut costs in traditional cell animation. Since the number of frames per second is the largest factor in determining cost, a significant reduction in resources will inevitably lead to limited animation, and this is exactly what happened with UPA. And, looking at an iconic UPA production like *Gerald McBoing Boing*, one might observe several characteristics associated with anime. This cartoon has at least some of the jerky motion and explosive transitions associated with anime. So, we might plausibly say that economic constraints on the animation apparatus do inevitably lead to the technological constraints that give us limited animation.

At the same time, no one will ever confuse a UPA cartoon with anime. UPA is the "modern art" of animation, influenced by modernist concepts like the "dynamic space experience" and "forces of visual energy" (Barrier 516). Characters are highly abstract in their design and there is a deliberate erasure of the distinction between background and foreground except as a function of movement. In *Gerald McBoing Boing*, all objects have essentially the same weight on screen. A table lamp reads visually as being equal to a person. Settings are self-consciously abstract. In Gerald's living room, there are not

even lines to differentiate between floor, walls and ceiling. In the flattening tendencies of this approach and the shift away from traditional perspective, there are some similarities between the UPA and anime. But anime tends to abhor abstraction for its own sake or as a means of artistic experimentation. Backgrounds are often painterly and highly detailed. Spaces tend to be carefully drafted with clear delineations between different architectural elements. The key distinction here is that UPA artists were consciously seeking to “attack the aesthetic foundations of the Disney cartoons on which [UPA animators] had once worked” (Barrier 505). For UPA animators the point was not to push their limitations and make the best stories possible, the point was to disrupt the status quo by bringing the ideas of modern art into animation. Most tellingly, UPA animators saw the animation camera as a “printing press” rather than a cinematic camera (Barrier 512). As one animator states, UPA pictures fulfilled his “dreamed-of opportunity to make a film that owed nothing to the traditions of animated cartooning or to live-action features, a film that would be purely graphic design in every aspect and it would break away, totally, from everything that had been before” (Barrier 513). These ideals bear no similarity to the aesthetic foundations of anime. The fact that both forms are limited does not make them the same. So constraint, while a crucial component of anime is not enough to create the aesthetic by itself. Other animators in similar situations came up with different results.

Why Anime?

If I have established that anime’s distinctive aesthetic does not arise solely through constraint, then I should explain the other factors at work that have contributed to this aesthetic. To put it another way, why does anime look distinctively different from

other animation? And, can I account in any way for its explosive popularity and the tendency of anime conventions to persist even outside of economic constraint?

The obvious answer is that anime is from Japan and that anything from Japan must be (for Western audiences). . . different. Lamarre criticizes just such an approach as leading to “a simple reproduction of unitary, self identical, and monolithic Japaneseness” (“Machine” 89). Lamarre’s critique highlights the fact that all versions of determinism, be they technological, economic, or cultural are ultimately unsatisfying as a means of explaining the complex network of actions and environmental factors responsible for generating an aesthetic like anime.⁵⁶ It seems more productive to discuss the broader animation environment.

During the period when the anime aesthetic was being developed, Disney was a monolithic force in the world of animation. Disney made the first feature-length films, and by far made the most money off of their productions. As Paul Wells points out, the burgeoning maturity of the animated film “established Disney as synonymous with ‘animation’. This has led to animation being understood in a limited way” (24). Even if we do not accept the idea that Disney made itself synonymous with animation as a whole, even the most casual observer must accept that for much of the mid-20th century, the animation industry was essentially Disney and “everybody else.” This situation extended to Japan, where Disney’s impact was “profound” to say the least (Lamarre “Machine” 212). This type of dominance tends to lead to a “beat them or join them” mentality in the competition. Many animators of the period were content to simply

⁵⁶ And in fact, Lamarre is severely critical of attempts to lump all Japanese animation together under the heading of “anime.” Despite the fact that anime is only one part of this larger project, I hope to avoid this lumping together (at least somewhat) through my subsequent discussion of Japanese animations which are self-consciously *not* anime. See Chapter 3’s discussion of Miyazaki Hayao.

imitate Disney, or try to “out-Disney” them through an even more intense focus on realistic character motion and stylized cuteness. On the other hand, UPA made every effort to compete with Disney by tearing down the aesthetic foundations Disney was built on. Japanese animation charted something of a third course, largely due to constraint. Early studio heads like Osamu Tezuka were great admirers of Disney (Ladd and Deneroff 192). Their cute characters and straightforward morality bear great resemblance to the Disney aesthetic. At the same time, imitation of Disney’s cinematic realism and highly fluid motion were out of the question for any animators working in limited animation. In trying to explain anime’s distinctive aesthetics, one persuasive viewpoint is that anime takes elements of Disney, adjusts them for the tastes and concerns of Japanese viewers, and then filters all of this through the technical constraints of limited animation. I find this multifaceted explanation more convincing than any deterministic argument that emphasizes just one of these factors.

In regards to the aesthetic distinctiveness and ultimate success of anime, Japanese animators should be given credit for at least one more thing. Whether by accident or design, they realized that the constraints of limited animation were not just acceptable, but were in fact ideal for telling certain kinds of stories. From its earliest moments, anime has been concerned with science fiction and fantasy. The machines and robots of series like *Astro Boy* and *Gigantor* appear well-suited to a medium that encourages jerky motion, stasis, and sudden explosions of movement. Anime is not just stylized, it is also *stylish*. Highly designed characters and epic camera motions are fitted to science fiction and supernatural melodrama with young protagonists who look hip and stylish during their adventures. This type of storytelling is well-suited to the formal

conventions of limited animation. One of anime's common emotional tropes is shock, an emotional state tailor-made for the long static shot. Characters frozen in place by their emotions provide a visual analogue for the viewer that is every bit as powerful as the stretch and squash (especially when the frozen character is set against a sliding background layer, showing how the world is literally moving beneath that character's feet). Characters in this state are relatable, especially to the teen and adolescent audiences who have often been anime's largest audience. Curiously, anime seems to be a highly cinematic medium. Between its dynamic, explosive action and its ability to deploy stylistic conventions to generate emotion, anime is highly charged with potential energy.

For me, the most interesting recent example of anime's dynamic power is Aaron McGruder's 2007 animated television series *The Boondocks*. McGruder's production is American and is certainly not anime, but it deliberately and ostentatiously appropriates many of the stylistic conventions of anime, including long static holds and dramatic camera motion. Even the character design borrows heavily from the large-eyed aesthetic of Japanese manga. When questioned about his decision to appropriate features of anime, McGruder declares it to be the "most cinematic" mode of animation (Hutchins, non-paginated). This comment is ironic given everything we have discussed about Disney's drive for cinematic animation through fullness and smooth motion. The fact that a contemporary, American cartoonist can see anime as the *most* cinematic form and use its stylistic tropes in crafting a highly successful television series demonstrates animation's ability to provide many acceptable solutions to the same

problem, and shows us that on questions of realism and emotional impact, audiences are willing to negotiate.

Conclusion

In many ways, the basic assertions of this chapter are uncontroversial. Few would argue that the recording apparatus sometimes serves as a compositional space for vernacular musicians or that economic factors played a major role in creating the distinctive aesthetics of anime. My goal throughout this project is to demonstrate how constraint facilitates innovation in many different media forms, and technology does have central role in all the media forms under discussion. Whether technology is limited by nascence, disabled by economics, or used adaptively to compensate for the agent's own personal limitations, it consistently functions to reveal new directions or solutions to problems. Whether we are discussing the accidental discovery of phrase sampling or the surprising viability of rough pencil tests in animation, technology is never the neutral servant of humans. It always does unexpected things. But if technology reveals possibilities even when it is not limited by nascence or broken by lack of funds, then can we say that constraint still plays a valuable role? Of course we can. In all of these instances constraint plays the role of forcing agents to consider their process. Constraint is the barrier that demands thoughtful and deliberate workarounds. An excellent example is magnetic recording, which as I discussed above, existed for decades in Europe before it was creatively exploited by relatively poor independent American recording labels. These labels employed musicians who frequently could not read standard notation but saw a way to exploit magnetic recording for practices of composition. Their experiments drove the expanding vocabulary of magnetic tape. We can make a similar point about anime. The basic aesthetic strategies that make anime

so distinctive existed long before anime as we know it came into being. But economically prosperous studios like Disney tended to discard aesthetic strategies that could not fit into their ideology of cinematic realism. It took cash-strapped animators like UPA and Osamu Tezuka to revive and refine limited animation techniques. If constraint has one consistent function in that it always encourages agents to review their options.

CHAPTER 4 THE AESTHETICS OF CONSTRAINT

The Clipped; The Missing

If the attributes and operations of media created under the conditions of limitation I am discussing are comparable, then it follows that these media may be also identified by distinctive, shared aesthetic characteristics. In this regard, it is crucial to keep in mind that this project is not interested in just any media created under constraint, but rather those that are known for being constrained either in technology, resources, or by the skills and abilities of the agent. In this chapter, I will describe specific aesthetic traits that I propose are common to media produced under these limitations.

Briefly, these fall into three kinds of aesthetically significant effects. First, there are effects of “clipping.” Media produced under economic, technological, and personal constraint tends to display a clipped aesthetic that I will discuss in detail below. Second, this clipped aesthetic tends to be *durable*; its characteristics persist (are sustained by practitioners) even when the initial constraint that appears responsible for it is removed. Third, media produced under the types of limitation I will discuss often explicitly addressed by some aspect of their performance or reception qualities or procedures of the technologies used to create them. These media objects are explicitly invested in technological conditions of their creation in ways that other media rarely are. After exploring these three kinds of aesthetically significant effects, I will incorporate these observations into the broader framework of critical noise theory.

ASCII

The appearance of jaggiess as a visual signifier of the clipped aesthetic is readily evident in art generated using the American Standard Code for Information

Interchange (ASCII). This form has an inherently rough and pixelated quality. ASCII art is made of discrete elements that can never touch each other continuously, so curves have to be suggested like points on a grid.⁵⁷ See Figure 3.1 for an example of this grid effect.

This underlying grid structure is responsible for the jaggedness of ASCII art. By limiting the locations where a character (a pixel) can be placed and therefore stipulating empty space in between individual characters, the grid defines the central visual constraint of ASCII. Whalen specifically links the jaggy aesthetic to the grid when he discusses the basic features of jaggedness in digital typography, noting that the aesthetic includes: “stair-stepped angles and curves instead of smooth arcs, a sharp distinction between foreground and background colors, (on-screen) pixels aligned flush with the actual screen’s pixels, and rectilinear units which build each letter shape out of uniform bits or pixels and imply a containing grid” (Whalen 187).⁵⁸ These aesthetics are found in ASCII art. Even straight lines are never optically continuous in ASCII pictures; under magnification, pieces of each graphic element are literally missing and reveal visible gaps within the image. Unlike earlier visual art forms like painting or drawing where lines and curves can be smooth and continuous, ASCII depends on the viewer to mentally complete the image: to literally suture together the segments of lines so as to produce a continuous line between vertices of the image. This process of mental completion is often aided by the fact that much ASCII is highly referential to other art works; indeed,

⁵⁷ In her work on ASCII, Brenda Danet links ASCII to needlepoint and various other pre-digital, textile-based crafts where the work in question is constrained by a grid-like structure (194).

⁵⁸ The term “jaggedness,” with all of the roughness it connotes is offered in contrast to “antialiasing,” the software function that smoothes out the edges of graphics and minimizes the jaggedness perceived by the viewer.

much ASCII art openly mimics well-known, even iconic, imagery produced in other media. ASCII art is frequently something of a technical challenge where the artist attempts to create a viable simulacrum of a familiar artwork using the limited toolbox of the text-based medium. In the Figure 3.2, the image of Leonardo's Mona Lisa shown in the middle has been deliberately stripped of some of its data, as a kind of intermediate step towards the ASCII-generated image on the right. Note the similarities – and the differences – between this version and the ASCII Mona Lisa provided for comparison. The decreasing resolution of the images does not just render them increasingly less precise mimics of the original; the shift to ASCII alters the visual relationships and patterns. While still recognizably the “same” image, the result also changed (vertically compressed and elongated), its attributes contoured by the affordances of the elementary units from which it is composed.

Hip Hop

Just as ASCII image is composed from discrete, individual elements—and therefore its expressive capabilities are oriented by qualities of the elements—hip hop's main sonic building blocks are truncated and clipped, individual elements. The drum breaks that provide the initial foundation for hip hop are clearly delineated sections of music with definite beginnings and endings. Constructing songs out of these breaks, aggregating them into larger series of breaks, necessarily meant using sonic material that would give evidence its own truncation and clearly reveal the interruptions where these breaks were taken out of their original context. Hip hop nomenclature is revealing in this respect: the process of working a break or sample into a song using a turntable is

referred to as “cutting.”⁵⁹ In his discussion of hip hop aesthetics, Greg Dimitriadis notes: “This hip hop aesthetic, broadly speaking, allows for sharp and abrupt discontinuities or ‘cuts’ as it encourages continuity by way of the all-important ‘mix’” (425).

But even though the inherently truncated qualities of drum breaks and samples influenced the (literal and generic) construction of hip hop music, it is a mistake to define the agency involved in this process to only the technological process of aggregation. Hip hop’s producers made conscious and deliberate aesthetic choices that were at least as important as the units of construction, however more difficult it may be to measure the contribution of these choices. As Rose points out, “Rap music relies on the loop, on the circularity of rhythm and on the ‘cut’ or the ‘break beat’ that systematically ruptures equilibrium. Yet, in rap, the ‘break beat’ itself is looped – repositioned as repetition, as equilibrium inside the rupture. Rap music highlights points of rupture as it equalizes them” (70). Rose highlights African aesthetic traditions of repetition and equilibrium that existed long before hip hop, which she argues played an important role in defining the musical logic of the hip hop loop. At the same time, he indicates that hip hop foregrounds the *ruptures* in the line, or within equilibrium: “In hip hop, visual, physical, musical, and lyrical lines are set in motion, broken abruptly with sharp angular breaks, yet they sustain motion and energy through the fluidity and flow” (38). This foregrounding of interruption against a background of a cultural and generic musical tradition is where we should, I propose, look for evidence of the technological over-determination of an aesthetic practice.

⁵⁹ See Rose 69 for further discussion of “the cut.”

This is directly represented in procedures of sampling. The practice and technology of sampling were initially invented to “flesh out” a song where a specific instrument or sound was needed but unavailable, generally due to lack of funds for additional recording time or the hiring of appropriate session musicians (Rose 73; George 439). The tendency in initial, non-hip hop sampling was to disguise the artifice of the sample by blending it as seamlessly as possible with live material, which could be opportunistically fitted (given a performer of sufficient skill) to the obvious breaks in the samples. But hip hop sampling, strictly speaking, works in the opposite direction, deliberately highlighting the sonic edges of the sample. Richard Shusterman notes that “there was never any attempt to conceal the fact that they [hip hop musicians] were working from prerecorded sounds rather than composing their own original music. On the contrary, they openly celebrated their method of sampling” (461).⁶⁰ Especially since hip hop often works with well-known snippets of recorded popular music, the audience is often aware that it is listening to material extracted from a larger sonic context.

Distortion

Distortion is the direct sonic consequence of missing information, and in this respect related to procedures of sampling and recording, as well as any performance that is mediated by electronics.⁶¹ In fact, distortion is widely referred to among musicians and audio engineers as “clipping.” As much as distortion has become associated with the electric guitar and rock music, the phenomenon has much more to

⁶⁰ See also (George 439).

⁶¹ In referring to performance “mediated by electronics,” I mean to encompass situations of musical performance that include either electric or electronic instruments as well as any kind of amplification. So, even a performance featuring only acoustic instruments is still heavily mediated by electronics if the sounds created are captured by microphones and then electronically amplified. Harmonic distortion is explicitly possible and sometimes even inevitable in these situations.

do with technological mediation than it does any genre of music.⁶² Distortion is a potential for sonic alteration that is actually present in any form of recorded music, and thus it needs to be discussed as a distinct entity.

As I discuss in Chapter 2, distortion in the realm of the electric guitar has historically been a consequence of vacuum tube technology and various inefficiencies in early guitar amplifiers.⁶³ The inability of early amplifiers to produce clean (undistorted) sound at desired volume levels led to an acceptance and eventual embrace of distorted timbres in guitar-based music. In acoustic terms, distortion is the term used to describe the way the peaks of a sound wave are literally *clipped off* when they exceed the efficiency of whatever machine is amplifying them. See Figure 3.3 for a graphic representation of this clipping.

As Gracyk points out, the guitar at high volumes also exhibits increased harmonic content that greatly varies the timbre of the instrument (112). In limiting the sound wave, distortion actually introduces new textures to the sound produced by the instrument. Guitarists have been exploiting and experimenting with possibilities offered by high-volume, harmonic distortion for as long as the electric guitar has existed.⁶⁴ However, the tendency toward exploiting distortion is hardly unique to rock music. Rose notes the ways that hip-hop musicians are similarly inventive in their uses of sonic distortion:

⁶² For the most part, distortion in rock music is seen as a timbral element of the electric guitar. Many if not most canonical rock songs feature distorted electric guitar.

⁶³ While vacuum tubes tend to be the major source for harmonic distortion, it is worth pointing out that many electronic components can be pushed into clipping, including transistors, diodes, and even speakers. In fact, as we shall see later on in this chapter, speaker-generated distortion is a significant element of many regional hip hop cultures.

⁶⁴ And in fact, this experimentation is still robust today. See for example, *The Tonequest Report*, a monthly journal exclusively dedicated to the exploration of various electric guitar timbres.

Using the machines in ways that have not been intended, by pushing on established boundaries of music engineering, rap producers have developed an art out of recording with sound meters well into the distortion zone. When necessary, they deliberately *work in the red*. If recording in the red will produce the heavy dark growling sound desired, rap producers record in the red. (Rose 75, emphasis in original)

“Working in the red” here means pushing recording and playback technologies beyond their normal capacity, into *situations where accurate reproduction of sound is impossible*. Hip hop significantly expands the vocabulary of distortion in recording beyond that caused by early instrument amplifiers. For instance, sampling a sound using a deliberately low sampling-rate produces a particular flavor of digital distortion that has become identified with aspects of the hip-hop aesthetic. Chuck D recalls:

And in ‘Rebel without a Pause’, we programmed that weird screechy sound. It was sampled to have a clean sound, and it just didn’t feel right, so we cut the amount of time in that siren sample, redid it with, like, a two-bit sampling rate, which made it really gritty-sounding, almost unpresentable, and then we looped that at a point where it was kind of imperfect. That’s what made the record have more soul, have more funk (quoted in Dery 411).

Beyond the deliberately low sampling-rate, hip hop also often makes deliberate distortion part of the aesthetic during playback. In his discussion of regional hip-hop cultures, Chuck D notes:

It doesn’t have to be clear; it just gots to be boomin’! A good 80% of the people who listen to rap music listen to it with their car systems all the way up. . . . A lot of these guys got them fat speakers in the back, and they want to turn that shit up and hear those back speakers go *boooooommm*. Sometimes these guys turn the bass *all* the way up, like they do in Miami or Atlanta or New Orleans, and they don’t even hear no words— just *boooooommm*” (quoted in Dery 413).

Just as in our discussion of the turntable, the line between consumer and musician is being blurred. The music-listener is using distortion and clipping to make a deliberate timbral choice, regardless of the recording artist’s initial intent. Here, the clipped sound

is valued so highly that it can even eclipse the focus on lyrics, which is particularly fascinating for a genre that so values wordplay.

Both rock music and hip hop not only tolerate distortion but actively seek it out its effects, to the point of doing everything possible to exploit timbral possibilities. This fact is especially interesting given that rock and hip-hop fans often see their genres as being specifically opposed to one another in terms of their methods of production and the aesthetics they value. Equally important is the fact that distortion is just as often an inevitable consequence of the recording process as it is a deliberate decision by a performer or a music listener.

Recording

As the preceding discussion suggests, the process of documenting sound is an essential aspect of the aesthetics of limitation. On the most superficial level, audio recording serves to document sounds that would otherwise be non-repeatable, one-time events. In their essay “The Social Construction of the Early Electronic Music Synthesizer,” Trevor Pinch and Frank Trocco remark on the temperamental qualities of early synthesizers. The authors quote musician David Borden who remarks

Here was a machine that was supposed to be absolutely infallible, you can't get anything more well-defined than a perfect sine wave, but it wasn't perfect. The oscillators wouldn't keep exactly perfect pitch, there would be some drifting, depending on the temperature, depending on in accuracies in the line voltage they would change. They were temperamental. One day you would get something incredible and you try to get it the next day and you couldn't. If you got something, some incredibly complex sound, and you worked on it and you finally got it, then you'd better get it down on tape because you'd probably never get it again (Pinch and Trocco 78).

In this instance, the recording apparatus captures effects of limited, inconsistent technology and the possible timbres generated by irregular functions or even nominal malfunctions that resulted in incorrect, or incomplete synthesizing of tones.

Even more importantly, the recording apparatus *a/ways* makes distortion possible. Any part of the recording chain (the chain of devices from microphone to recording medium, and any number of possible intermediaries) can be induced, by intention or accident, to distort and clip the incoming signal. This is why almost every piece of commercially available recording equipment includes at least one indicator light to indicate that the device is being overloaded—that it is, in Rose’s “red zone.”

Manufacturers tend to include these lights so that engineers can avoid distortion, but the lights can also serve the opposite function, letting engineers know just how much signal it takes to overload a given circuit and produce a novel but possibly desirable effect. Because of the vast array of capture and processing devices employed in sound recording, many combinations of various clipping sounds might be applied to any sound source. Working in the red may entail pushing one or many elements in the chain of recording past its nominal limits. In his discussion of why hip-hop pioneers chose turntables and samplers over other instruments, Schloss quotes producer Prince Paul, who remarks “man, you playing the clarinet isn’t gonna be like, BAM! KAH! Ba-BOOM-BOOM KAH! Everybody in the party [saying] ‘Oooohhhhh!’ It wasn’t that ‘Yes, yes y’all—y’all—y’all—y’all,’ with echo chambers. You wasn’t gonna get that [with a clarinet]” (Schloss 28–29). Prince Paul obviously views the clarinet as, theoretically, an instrument incapable of creating the distinctive timbres required by hip hop. But at the same time, the sonic territory he describes is almost entirely a function of recording and sound production—in other words, in registers apart from the capabilities of an instrument like the clarinet. He even mentions “echo chambers,” a device most closely connected to studio recording. While the huge “BOOM-BOOM” sound Prince Paul

describes is probably not possible with the clarinet, the myriad possibilities of postproduction, especially various flavors of clipping and distortion could absolutely generate some surprising timbres from even that most un-hip of instruments.

The clarinet is actually an excellent example in this context because it, like many other acoustic instruments, can be most feasibly distorted in the studio environment.⁶⁵ The fact that many sounds can best be distorted in post-production makes intentional clipping a compositional choice that musicians and producers can employ whenever it suits them. While distortion is typically applied to single tracks, the process of recording also makes it possible to distort entire records.⁶⁶ To take the concept one step further, implications of distortion and clipping resulting from recording extend all the way to playback devices. Particularly in the digital domain, the inherent limitations of storage and playback make clipping and deliberate information loss a useful compositional tool. In his *Cracked Media*, Caleb Kelly discusses “glitch” music that is created out of digital playback errors that are unintended by device manufacturers, but intentionally sought out by musicians who saw the errors as an opportunity for deliberate invention. Kelly discusses several methods of forcing a compact disc player to misread information on a disc and create unexpected sounds, akin in some respects to practices of scratching an LP record. Kelly specifically highlights “false sounds” that are created by damaging compact discs to such an extent that in their interaction with CD players, they create

⁶⁵ Certainly it is possible to distort a woodwind instrument in a live setting. However, this type of signal-boosting of a microphone-amplified instruments is likely to be difficult to control and produce undesirable artifacts such as feedback. No such restrictions exist in the studio setting. I use the clarinet here in contrast to the electric guitar, which is essentially indifferent to its setting and can be made to distort equally well in the studio or on stage.

⁶⁶ The rock band Dinosaur Jr famously recorded their record *You're Living All Over Me* so that the entire signal on the master tape was audibly distorted. "The group reasoned that since an electric guitar sounded better with distortion on it, a whole distorted record would be even better" (Azerrad 361).

new sounds that have no relation to the sounds recorded on the disc (221). This type of glitch music takes the aesthetic of clipped, missing information to its most extreme conclusion.

The recording apparatus makes clipping and data loss possible in one further important way: editing. Especially since the advent of magnetic tape, sound recording has made possible the most total data loss imaginable; any and all aspects of a given performance can be trimmed, spliced, reversed, or erased entirely, all with relative ease. The editing possible in sound recording is very similar to the truncation of samples in hip-hop production, but more deceptive in several ways. While hip hop tends to highlight the edges of an edit, making it stand out for the listener, more “traditional” recording techniques deliberately efface all markers of editing. With a few notable exceptions—for example John Lennon’s experiments with multitrack editing on some Beatles album—in rock and pop recording especially, these tools are used to create the illusion that a completed recording is a mimetic transcription of a single event, in which the artist or artists performs a piece just as it sounds on the recording.⁶⁷ Essentially, most rock records construct a fantasy that a recording is the literal record of an actual event, a group playing together. The reality is that any pop song produced in a studio is not so much an actual performance as it is an aggregate of smaller performances, all of which have been carefully edited to include only the most “desirable” information, and to minimize perceptible gaps between the parts. Unlike live performance, where every note played by the performer is heard by the audience, an entire day’s worth of studio

⁶⁷ On this very subject, Pete Townshend has said: "A lot of people, I'm convinced, that buy records don't realize what happens when a group records on an eight-track machine. They don't realize that they record half of it one time, then another eighth another time. They record it in eighths at different locations and this ceases to become music to me" (quoted in Gracyk 41).

recording may be reduced to a few seconds of audible sound, and a song that would take only a few minutes to play live may reflect days or weeks of performance. The remaining performance(s) and all the rest of the “data” generated is simply clipped away. And, of course, some pieces can never be performed live in the way that they sound on the recording, because their distinctive sounds are the direct effects of the recording and editing process.⁶⁸

Anime

Anime can be said to be also clipped in the way that I have applied that term, in that anime frequently suggests motion, rather than depicting it. As I discussed in Chapter 1, limited animation often uses a small number of static poses, or even a single static pose over a moving background to give the impression of motion, rather than the high frame-rate and moving foreground objects or characters of traditional full animation. The aesthetic implications of this limited form of animation will be discussed in much greater detail later in this chapter. For now, it is adequate to note that anime essentially clips away aspects of character motion, and that anime’s distinctive visual and narrative aesthetics follow in large part from this clipping. In this way, limited animation is like a moving analog to the clipping characteristic of ASCII art. Where ASCII uses fixed characters to suggest (but not imitate) curves and continuous lines, anime uses fixed poses and flat foregrounds to suggest (but not imitate) realistic character motion and narrative dimensionality; it effectively “clips away” the remaining representations of motion.

⁶⁸ For example, the rock band Queen faced apparently insurmountable challenges in playing their hit "Bohemian Rhapsody" live. Rather than attempt to re-create the faux-operatic center segment of the song, which was entirely a composition of the multitrack tape recorder, the band would simply walk off stage and play this segment of the song from a tape of the original studio recording. The band would then return to the stage and play the more traditionally arranged final segment of the song.

The Durable Aesthetic

Perhaps the most interesting consequence of the interplay of technical, economic and personal constraints is that the aesthetics produced under conditions of their application tend to persist even once conditions of original limitation are removed. This statement should not be taken too far. As technologies improve and agents become more skilled in their uses, new aesthetic decisions certainly are made; art forms evolve. But at the same time, many of the distinctive aesthetics that emerge in conditions of limitation are still applicable even years after their invention. Even further, these durable aesthetics are often subsequently codified as markers of authenticity or rules that must be followed in conventional situations of use and subsequent invention.

The durability of such aesthetics is easy to see in the case of hip hop. As much as early hip hop was informed by traditional African aesthetics, technologies used by hip hop pioneers also imposed significant limits on what was possible. Drum breaks from popular music tended to last only several bars. In order to make these breaks suitable material for entire songs, they had to be looped back-to-back, encouraging clearly discernible repetition. This tendency towards looping became more pronounced with the advent of the digital sampler. Schloss's approach to looping theory is exemplary in one crucial respect: in discussing the primacy of loops in hip hop, he accords practitioners the greater agency and attributes aesthetic decisions to conscious choice and tradition. However, he under-emphasizes the degree to which attributes of the recording technology may have shaped these early aesthetic decisions. For instance, the E-mu SP-1200, which was an extremely popular early sampler, had only a total memory of 10 seconds, and each individual sample was limited to a length of 2.5 seconds (Detrick).

As a result, short samples were, even if a deliberate artistic choice, a technological necessity. Audio recording technology since has moved far beyond the capabilities of these early samplers. Modern, computer-based recording and production allows for samples whose length is limited only by available storage media, which grows less expensive with every year, even for the bedroom producer. Yet, while hip hop has certainly expanded on its early formulas, it remains a largely ostinato form, favoring relatively short, repeating segments of sound, such as those mandated by the technologies of the first hip hop performers. The ostinato loop has become embedded in the aesthetic of hip hop.

A similar aesthetic durability is shown in uses of the electric guitar in popular music. Harmonic distortion caused by overloaded vacuum tubes is without a doubt the dominant timbre in electric-guitar-based music. The transistor long ago replaced the vacuum tube in essentially all technology, except from devices associated with sound production or playback. Transistor guitar amplifiers do exist, but they are typically the province of low-cost, beginner equipment; professional instrument amplifiers are almost always based on vacuum tube technology. It is worth noting that there are genuine, qualitative differences between the sounds created by tubes and those created by transistors. When pushed into distortion, vacuum tube technology moves smoothly into the clipping stage and produces an abundance of even-order harmonics, which are typically perceived as being “warmer” in timbre. Transistor-based amplifiers are less expensive, more reliable, more durable, lighter, produce less heat, and require less maintenance than vacuum tube amplifiers, but, because they are generally incapable of producing timbres comparable to tube amplifiers, transistor amplifiers are widely

considered inappropriate for guitar amplification.⁶⁹ In this instance, a technology that in other contexts would be considered technically superior to its predecessor in every way is rejected because it cannot duplicate an aesthetic that was originally produced under technological constraint, and that has remained durable in popular use. Effects of the constraint are now considered hallmarks of authentic, accomplished performance.

The durability of the aesthetics created under this technological constraint is evident in the most advanced sound-shaping technologies. An interesting recent development in amplification technology has been the introduction of “modeling,” which uses computer models to simulate different types of amplification. Modeling technology has given rise to both computer software and stand-alone processing units like the “POD”, produced by modeling pioneer Line 6.

The most important aspect of modeling technology is its extreme flexibility. The POD might have been designed as a sonic toolkit, essentially allowing guitarists to craft new timbres from the ground up. However, instead of creating a unit capable of extreme flexibility, the designers at Line 6

began a three-year project to analyze and map out exactly how different types of tubes respond under various conditions typical of guitar amplifier design. [Specifically, Line 6’s engineers studied] how tubes process an input signal, how the signal is colored and shaped, at what point it begins to distort, the quality and characteristic of the distortion. . . [T]he Line 6 engineers were then able to apply their digital expertise to develop *software* which simulates the signal processing of tubes and other electronics, as well as the speaker cabinets, entirely within the digital domain. (Line 6 POD *Pilot’s Handbook* 1–3)

⁶⁹ A notable exception to this trend is the Roland Jazz Chorus 120. This amplifier, introduced during the brief heyday of transistor-based guitar amplification in the 1980s, is still appreciated by some musicians for its clean, high fidelity sound. The Jazz Chorus 120’s most high-profile exponent is probably U2 guitarist, The Edge.

The refusal of Line 6's developers to exploit the flexibility of digital models should not be seen as mere commercial timidity. Electric guitarists are notoriously conservative in the timbres that they will accept as useful or "authentic." They talk a good game about searching for new tones, but will generally only experiment within narrow parameters, established decades ago by musicians of the 1950s through 1970s. Needing to create a product that was marketable as well as innovative, the developers at Line 6 focused on perpetuating an aesthetic that was initially created under conditions of limitation *that do not apply to their technical innovations*.⁷⁰ Any technology powerful enough to accurately model so many complex analog components could presumably be harnessed to create tones that have never been heard before. Instead of pursuing entirely new timbres, Line 6's engineers focused on those timbres first made popular under conditions of technological constraint; the very timbres that guitarists are most interested in. This choice has paid off. To date, there have been 20 different models of the POD as well as numerous software applications. All of these iterations of the POD modeling technology focus on "classic" guitar sounds from the vacuum tube era, regardless of the options made possible by advanced digital technology. This trend exemplifies the durable aesthetic.

In the visual realm, we can see the durable aesthetic clearly at work in conventions of anime. The economic conditions that encouraged the development of the anime aesthetic are no longer at play—anime is among the dominant forms, if not the dominant form, of animation in the world today—yet the distinctive visual and

⁷⁰ Essentially the same point can be made about the professional sound recording industry, which is equally obsessed with "vintage" analog timbres and techniques. Open any magazine aimed toward the recording professional, and you will find literally dozens of ads for software and hardware that model, mimic, or otherwise re-create timbres from a bygone, vacuum-tube era.

narrative aesthetics of early anime persist. A particularly good example is the work of animation auteur Miyazaki Hayao whose anime is often praised for its lush, painterly detail and smooth character motion. Miyazaki himself even rejects the tag “anime,” instead referring to his work as “manga-films” (Lamarre “Machine” 186).⁷¹ But, as Lamarre points out, Miyazaki’s work is marked by moments that speak directly to anime, specifically an emphasis on still images, rapid cuts, and a tendency towards camera motion rather than character motion. Lamarre declares that Miyazaki’s characters frequently do not move very much at all; an aesthetic choice closely aligned with limited animation (Lamarre “Machine” 189). Miyazaki’s work is the epitome of high-budget art film. He is certainly not constrained by economic forces to choose an expedient method for animation, and yet his films often deploy the aesthetic markers of limited animation.

If the appeal of anime aesthetics were limited to Japanese animated films, we might attribute their durability to cultural influence and tradition. This hypothesis might be especially applicable to Miyazaki, who made limited animation for television for years before embarking on feature-length film. But anime has proved appealing beyond Japanese productions. An excellent example is Aaron McGruder’s popular animated television series *The Boondocks*. McGruder, the show’s creator, head writer, and executive producer is American and has never worked in Japanese television.

Additionally, *The Boondocks* is produced by Sony Pictures, a Japanese company with deep pockets and an international profile. The series is produced primarily for American

⁷¹ Manga refers to Japanese sequential art and is often particularly used with reference to graphic novel-like publications that are serialized in monthly magazines. Unlike western comics, manga are targeted to all segments of the Japanese population and are as likely to be read by adults as children and by women as men. When Miyazaki calls his work “manga-film,” he is situating himself within the Japanese national graphic storytelling tradition, rather than the low-budget television animation that formed the aesthetic basis for modern anime.

audiences and receives consistently high ratings. It seems fair to assume that the show is not produced under crippling economic constraints. Nevertheless, McGruder uses several aspects of limited animation in the production of the series. *The Boondocks* routinely features extended static shots, multi-plane composition, explosive transitions, and the use of blurred backgrounds to indicate motion. All of these techniques are hallmarks of the anime tradition that McGruder has deliberately chosen because of their aesthetic cachet and appeal (Figure 3.5).

McGruder identifies anime as “the most cinematic” and the most flexible style of animation. He also credits limited animation with giving him a way to break away from the influence of the popular animated television series *The Simpsons* and establish his own aesthetic (Hutchens, non-paginated). In this instance, we can observe an agent not only continuing a traditional aesthetic that was first produced under limitation, but also selecting that aesthetic because it is considered well-fitted to his specific artistic needs, or the expectations of his audience. It is particularly interesting that McGruder refers to anime as being the “most cinematic” style of animation since the anime aesthetic is largely defined in opposition to the cinematic smoothness of supposedly hyper-real animation like Disney.^{72 73} But, because of its stylized presentation and tendency towards explosive transitions, the hyper-kinetic aesthetic of anime adds not just visual distinctiveness, but also a more dramatic style of presentation than is typical of Western (Disney-style) animation.

⁷² For hyper-realism in Disney, see Paul Wells’ *Understanding Animation*.

⁷³ In claiming that anime is the “most cinematic” form of animation, McGruder probably intends to say that anime is the most *dramatic* in a way that we connect with cinema, not that anime is literally the form of animation that most resembles cinema.

The concept of the durable aesthetic applies as well to ASCII art. An initial problem in this case is that ASCII is by definition plainly an aesthetically specific medium. Unlike other media forms I am discussing, in which durable aesthetic elements have to be teased out of a form that continues to evolve and adapt to popular reception, certain fundamental traits of ASCII do not really evolve. The character set on which ASCII art is based is rigidly defined and does not allow for significant aesthetic change over time. However—or, rather, because of this—ASCII art is very durable, especially considering how far digital computer and print graphics have come since the early period of ASCII practice. Not only do individuals continue to make ASCII art by hand, there are now computing tools, web sites and standalone applications that are capable of converting essentially any digital image into ASCII art. (See Figure 3.4 for an example.)

The fact that such auto-generated ASCII production is practiced is evidence that the aesthetic still holds value for some people. The demand for auto generation suggests that although some people enjoy the process of creating (hand-tweaked) art within the ASCII idiom, some others are specifically interested in having access to the ASCII aesthetic without having to engage in the tedious detail of the artform.

The allure of the jaggy aesthetic of a supposedly out-of-date technology has significant precedent in the world of computer graphics and typography. For instance, consider the technological constraints faced by Zuzana Licko when trying to design new typefaces for first-generation Apple Macintosh computers. Licko recalls:

I started my venture with bitmap type designs, created for the coarse resolutions of the computer screen and dot matrix printer. The challenge was that because the early computers were so limited in what they could do you really had to design something special. . . . it was physically impossible

to adapt 8-point Goudy Old Style to 72 dots to the inch. In the end you couldn't tell Goudy Old Style from Times New Roman or any other serif text face. . . . it is impossible to transfer typefaces between technologies without alterations because each medium has its peculiar qualities and thus requires unique designs (Vanderlans and Licko 18, 23).

Licko tells a familiar story of nascence constraint and its influence on the emerging aesthetic of digital typeface. By itself, her “Lo-Res” font, designed to compensate for the material limitations of nascent computer displays, is an impressive creative solution to technological constraints (see Figure 3.5). But what makes these early digital typefaces valuable to this project is that they continue to be used even long after the development of technologies that allow traditional fonts to be used in the digital domain. As Matthew G. Kirschenbaum writes:

what began as a material limitation in hardware and display technologies was quickly accepted, adopted, and adapted as an integral aspect of the medium's aesthetic identity. . . . Though Apple's TrueType technology, cross-licensed to Microsoft, today allows anti-aliasing, which produces smoother looking letterforms on the screen, the jaggies remain emblematic of the radical new ontologies of the medium (Kirschenbaum 142).

Licko writes that her typefaces were seen as “idiosyncratic, with limited applicability, soon to be rendered obsolete with the impending arrival of high resolution computer screens and output devices” (Licko).⁷⁴ But the imagined obsolescence of bitmapped fonts never fully came to pass. In fact, “coarse bitmapped fonts have made a huge comeback in print. And this time, their usage goes far beyond computer-related themes, although it remains a dominant typographic force within areas such as techno music and other disciplines where computer technology has had an impact” (Licko). Crucially, the supposedly primitive aesthetic of Lo-Res is not just accepted, but is actually

⁷⁴ This notion of the bitmap-based font as idiosyncratic is similar to the early conception of sampling as a “workaround” or a “technical hack.” In both cases, the supposedly idiosyncratic “hack” ends up being a viable solution that persists even in the face of supposedly superior alternatives. See Chapter 2 for discussion of sampling as idiosyncratic.

desirable as a particular aesthetic marker: “Through our everyday encounters with computers, the idiosyncrasies of bitmaps are disappearing—visible pixels are becoming accepted as the natural mark of the computer, like brushstrokes on an oil painting” (Licko).

In this way, the story of Lo-Res is also the story of ASCII art: a set of technical constraints helps to generate a unique aesthetic that seems destined to disappear as the technologies associated with it undergo change. But instead, the constrained aesthetic is eventually valued, even celebrated, on its own terms. Both ASCII art and Lo-Res, have become the “natural mark of the computer” and are valued as being emblematic of the conditions that created them.

In addition to ASCII art’s survival in its pure form, the ASCII art aesthetic is maintained in the common “emoticon.” These minimalist interpretations of facial expressions are created using a minimum of keyboard characters. The most ubiquitous is the smiley face :-) but numerous variations like the winking face ;-)) are possible. In her discussion of ASCII, Danet explicitly links smiley faces to the ASCII genre known as “miniatures” (Danet 217). And while Danet herself never uses the term “emoticon,” there seems little doubt about the relationship between the ASCII miniatures and the emoticons that are still in use in modern, text-based chat environments, which in several respects force the use of such devices.

By all accounts, the original ASCII smiley face was invented by Carnegie Mellon University professor Scott E. Falham in 1982 (Lovering).⁷⁵ Falham’s original intent was

⁷⁵ There is some debate as to whether or not Fahlman’s use of the sideways smiley face was in fact the first. For instance, at the time of Fahlman’s invention, the pre-Internet computer system PLATO had been using smiley face miniatures since at least 1972 (“PLATO Emoticons”). However, these emoticons were purpose-designed graphic characters, rather than Fahlman’s inventive use of ASCII text. There has also

to create a marker for bulletin board posts that were not to be taken seriously. In his own writing on the subject, Fahlman explains that his invention of the ASCII smiley face was intended to reduce misunderstandings and differentiate between serious and humorous posts by Carnegie Mellon professors and graduate students (Fahlman).

The text of Fahlman's e-mail suggests the same kind of re-envisioning we have observed in other areas of technological constraint (see Figure 3.6). Much in the same vein as hip hop Deejays who were able to see the turntable as instrument for creating music rather than a simple device for replaying the recordings of others, Fahlman repurposed a few ASCII characters and re-envisioned them as a graphic representation of the smiling face.⁷⁶ As I have discussed in this chapter, typewriter, teletype, and digital ASCII art all predate Fahlman's smiley face, but Fahlman took the concept of text-based graphic art one step further by suggesting that the viewer "Read it sideways." This ability to read characters graphically while "rotated" sideways seems to have been quickly adopted by bulletin board users. Fahlman himself reports seeing dozens of his smiley faces, many with additional variations to represent eyeglasses, open mouths, etc., within weeks of his original post (Fahlman). In this way, reading ASCII characters graphically, even with a sideways orientation became part of the computer user's visual language.

The emoticon itself is arguably even more aesthetically durable and widespread than ASCII art. From bulletin boards, the concept quickly spread to Internet chat applications like America Online's Instant Messenger (AIM). AIM and other applications

been some speculation that a typesetter used a winking smiley face in a story about a presidential speech in 1862 (Lee). Given the evidence provided, this speculation seems dubious at best.

⁷⁶ For more on the re-envisioning of hip hop technology, see Bartlett 400.

soon added auto-formatting to turn the original ASCII characters into a more directly mimetic graphic. For instance, Microsoft Word automatically converts :) into ☺. Many commentators on technology have suggested that exactly this type of auto formatting and the increased graphic power of modern computing will render the initial “sideways” :-) obsolete. For instance, Ryan Stansifer, a computer science professor at the Florida Institute of Technology asserts that “Now we have so much power, we don’t have to settle for a colon-dash-paren. . . . You want the smiley face, so all these chatting softwares have to have them” (Lovering). But such predictions of inevitable obsolescence fail to take into account effects of aesthetic durability. Many people still use the original ASCII smiley face in e-mails without bothering to convert it to a more modern graphic character. Fahlman himself decries the use of such characters saying that they destroy “the whimsical element of the original” (Fahlman). Fahlman and numerous other computer users appear to either prefer the aesthetics of the original or feel that the original ASCII smiley face communicates just as well as any more modern graphic.^{77 78} Regardless of the application where it is found, the traditional ASCII emoticon retains both its power as a communicator of emotion and its “whimsical” aesthetic allure.

⁷⁷ It is also worth noting that cutting-edge technology for communicating via text often does not offer the advanced formatting that turns :) into ☺. Cell phone-based text messaging, for instance is still a pure ASCII environment for many users who still receive traditional ASCII smiley faces in text messages on a regular basis. The traditional ASCII smiley face is also built into certain software applications. Because of hand injuries, I am writing this project with a dictation program that turns spoken words into text. Any time I speak the phrase “smiley face,” my dictation program automatically types :-). This auto formatting—a sign of the deep conventionality of the emoticon—forces me to manually type the phrase “smiley face” anytime I want it to appear.

⁷⁸ For instance, the Japanese Emoji are similar to emoticons but are more visually sophisticated and allow for features like movement and color. Emoji are common in Japanese texting applications.

Technological Reference of the Constraint

Another aesthetic consequence of constraint is a pronounced tendency for media to implicitly or explicitly address technologies used to create them. We can see this tendency at work across all the media forms being discussed here. ASCII art, for instance, embeds reference to computer technology in its very structure, but this is arguably a consequence of material attributes of the medium rather than an aesthetic choice. Since ASCII art can only exist as a function of placing digital characters on the screen, the very fabric of ASCII art expression is constantly reiterating its technological heritage. At the same time, other media forms show surprising consistency in their tendency to *deliberately* represent technology.⁷⁹

Hip hop tends to focus on its technological roots through the language of the genre. There are, for instance, the constant exhortations to, “Get on the mic.” The call to perform, to vocalize is explicitly connected to the microphone, the technology that, in the crowded and noisy atmosphere of the hip hop show, literally separates the emcee from other members of the crowd. Also common on early records were boasts about the DeeJay’s skill with the turntables. Note the following lyrics from Run DMC’s “Jam Master Jay”:

Kick off shoes, jump on the jock
Listen to the Jam Master as he starts to rock
His name is Jay and he’s on his way
To be the best DJ in the US of A

J-a-y are the letters of his name
Cutting and scratching are the aspects of his game
So check out the Master as he cuts these jams
And look at us with the mics in our hands

⁷⁹ An excellent example here is early Blues music and its tendency to continuously reference and discuss the train. See Bartlett 396 for additional discussion on this topic.

Then take a count, 1 2 3
Jam Master Jay, Run-D.M.C.

The song references not only Jay's skill on the turntables and his ability at "cutting and scratching," but also the function of the MCs and the mics in the performers' hands. The focus here is explicitly on the technological conditions of music production.

This tendency towards focusing on technology extends far beyond the self-referentiality of hip hop lyrics. As Nabeel Zuberi notes in his work on the "corporeality of music equipment" in hip hop culture: "The transnational culture around beats and bass-heavy music fixates on the physicality of music media such as computers, amplifiers, speakers, and turntables. Like [science fiction], this commodity fetishism sometimes animates these technological objects in spectacular fashion" (283). Zuberi specifically points to the visual aesthetics of hip hop culture: "For example, a graffito on the studio wall of Auckland's Base FM radio station shows the gigantic woofers and tweeters of a sound system stacked in such a way that they construct a huge robotic figure" (283). Zuberi also catalogs typefaces, album covers, and posters with just the kind of exaggerated pixelation but I have discussed in reference to dance music. In hip hop, fascination with technology and its aesthetic markers reaches beyond the lyrics of a few songs. The culture seems suffused with a keen awareness of its own technologically mediated practice.

This reference to the technological situation is also apparent in guitar-based music. A search of Apple's iTunes Store database of recorded music, for example, turns up at least 1200 songs where the word "guitar" is either in the title of the song, the title of the album, or in the performer's name. One could do a similar search for the word "violin" and turn up an also large number of titles, but most of these appear to serve

taxonomic functions. The title “Violin Concerto No. 4 in G. minor” tells the listener what the song is constructed from and how to catalog it, but not—or not directly—the thematic concerns of the work. This stands in stark contrast to pop hits like the Beatles’s “While My Guitar Gently Weeps,” which explicitly refers to the guitar and its role as an extension of the musician’s affect. This tendency in guitar-based music is especially pronounced in that performers are often so closely associated with their instrument as to become identified by it. While virtuoso performers of all kinds are commonly closely associated with their instruments, they appear to be named by their instruments only in the context of popular guitar music. Many people are familiar with Guitar Slim or Johnny “Guitar” Watson. While their profile may be lower, no one bats an eye at the name of the band Guitar Wolf. In contrast, no matter how closely each is associated with his instrument, Arty “Clarinet” Shaw, or Yo Yo “Cello” Ma appear unlikely sobriquets. Much more than in Jazz or classical music, vernacular forms are explicitly concerned with technology.

Anime provides perhaps the best example of an evident fascination with the technological conditions of restricted media. Since precise representation of the movements of the mouth in dialogue and facial expressions are problematic in limited animation, as is smooth, naturalistic motion, artificial characters are common in anime storylines; robots, humans in robotic suits, and other automatons are mainstays of the genre. As Lamarre puts it: “not surprisingly then, technical innovation and experimentation also became central to anime stories and the many stories deal with the passage towards a new order, pivoting on the rise of computers, robots, cyborgs, biotech and so forth, albeit often with great ambivalence” (“moving drawings” 337).

Lamarre takes the concept one step further by describing animation itself in terms of machines: “Animation then becomes something other than a process of animating figures, of drawing all the stages to produce seamless movement. It is a process of inventing machines of movement—machines of walking, of talking, of running, leaping, flying, and so forth—that take up all manner of objects” (339). In this way, anime is perhaps the best example of media created under constraint that seems called upon to cite a technological imaginary the traits of which correspond closely to the practices by which it is represented.

Noise and Aesthetics

Having made these observations, it is appropriate to address how the aesthetics generated as a condition of technological or personal constraint fit into the broader field of aesthetics. Theories of noise provide a useful framework for understanding the matter and material with which limited artists must work—and choose to work—and for exploring the occasionally disruptive effects of limited media have on prior, more established media forms.

A Brief History of Noise

In his seminal 1875 treatise *On the Sensations of Tone*, Herman Helmholtz places noise and musical tones on a continuum, declaring that the two “may certainly intermingle in very various degrees and pass insensibly into one another, but their extremes are widely separated” (7). Although Helmholtz allows that some tones may cross boundaries between musical tone and noise, he makes sharp distinctions between the sounds at the extremes of his continuum. For Helmholtz, a musical tone “strikes the ear as a perfectly undisturbed, uniform sound that remains unaltered so long as it exists and it presents no alternation of various kinds of constituents” (8–9). On the

other end of the continuum is noise, which is characterized by “rapid, irregular, distinctly perceptible alternations of various kinds of sounds which crop up fitfully” (Helmholtz 7). The key to Helmholtz’s theory of noise is “periodicity.” A musical tone is periodic, it repeats regularly and predictably throughout its duration. A noise, on the other hand is nonperiodic, its repetitions are irregular and unpredictable.

Helmholtz’s theories initially appear precise and well-justified, but, as Henry Cowell has observed, there are flaws in a theory of noise based on periodicity. Cowell draws our attention to the singer, whose tones sound very pure to the human ear. However, consonants pronounced by the singer are clearly nonperiodic and thus, qualify as noise in Helmholtz’s terminology (Cowell 23). Similarly, the violin produces sustained tones with a very periodic sound, but the instrument simultaneously produces nonperiodic sounds that, according to Cowell, “must be considered noise” (23).⁸⁰ The important observation to be made here is that almost all sound *contains* noise. Only the tuning fork and the synthesizer are capable of creating a pure sine wave, a sound as boring as it is perfect. Cowell closes his argument by suggesting: “Since the ‘disease’ of noise permeates all music, the only hopeful course is to consider that the noise-germ, like the bacteria of cheese, is a good microbe, which may provide previously hidden delights to the listener, instead of producing musical oblivion” (23). This idea of noise as a possibly beneficial force will be useful in understanding noise’s function in constrained media.

Understanding the significance of noise is further advanced when it is addressed in a culturally determined perspective. In his *Noise, Water, Meat* Douglas Kahn posits a

⁸⁰ Similarly, there is also the sound of fingers squeaking across guitar strings as the performer changes positions.

theory of noise defined not by its material traits but by musical practice and discourse (68). Kahn sees the line between sound (including noise) and musical sound as a frontier that can be crossed to bring back previously unexploited resources (69). The barrier between sound and noise is the threshold at which much of the world is detected (Kahn 71). This last idea can be associated with other concepts of noise. Cowell's assertion that all sound contains noise tells us that noise is an irrevocable constituent of the world. And when Claire Taylor asserts that noise interferes with the transmission of a message, she is reifying this concept that noise reveals the world to us (Taylor 74). As my argument develops, I will demonstrate how noise reveals not just the world but also is evidence of the irreducible materiality of media.

If noise is to be applicable to all the media forms under consideration, then clearly our conception of it must move beyond sound and music. Although Jacques Attali's *Noise: The Political Economy of Music* is specifically concerned with music, his theories will enable us to apply a theory of noise to many media forms. Attali points out that music is the force that gives form to noise according to a code (10). "Code" in this instance does not refer to some single, unifying set of signs and symbols. Rather, the code refers to the more general organizing principle that either permits or disallows various forms of expression within the given framework. This code is theoretically knowable by the listener; she can be made aware of what is acceptable sound and what is not before a piece of music is even heard (25). Crucially, noise is taken to be *outside* the code and has the power to disrupt the code. In the remainder of this chapter, I demonstrate how this disruption of the code applies to the aesthetic observations I have made so far.

Noise and Materiality

All of the aesthetic consequences of technological and personal constraints I have explored can be described in relation to noise. In terms of the materiality of sound and the practice of music, distortion, record scratching, and deliberately truncated samples have all been recognized as noise at one point or another, and all have existed outside of the previously established code; outside of a set of sounds that are considered acceptable. Attali asserts that the instrument predates the sound that it authorizes (35). This is certainly true of the sampler, the turntable, magnetic sound recording, and electric amplification, which all existed long before their potentials for generating noise was exploited or brought into the mainstream of “acceptable” sounds. These technologies conform to Attali’s idea that new instruments contribute “through the possibilities [they] offer, to the birth of a new music, a renewed syntax” (35). And indeed, all of these technologies (based in technological constraint in one way or another) expanded the possible syntax for musical expression. All of these sounds were initially found jarring to audiences accustomed to conventions established by prior musical tools and practices but are now accepted parts of the language of musical expression. Record scratching, for instance, was initially an extremely novel sound closely associated with noise; the distinctive sound of the scratch had been until then largely associated with a faulty gesture: the user dropping the phonograph needle in the wrong place or accidentally causing the tone-arm to skip across the record’s surface. These associations still held even when scratching was introduced to a popular audience via national hits like Herbie Hancock’s “Rockit” (1983). In the intervening years, record scratching has become an accepted mode of sonic expression and can be found in the context of not only mainstream “urban” music but also a certain subset of

rock 'n roll acts, as well as soundtracks of television commercials. Scratching, which once epitomized undesirable noise and conspicuous error or malfunction, has entered the popular language as a sound that within certain contexts is aesthetically meaningful and desirable.

This conception of noise works equally well for the traits of visual objects. ASCII, for instance, strongly shows the jaggy quality previously discussed; it is arguably among the most direct of visual analogues to audio distortion. ASCII transmits this visual noise in at least two ways. First, in terms of the aesthetic of the object, ASCII foregrounds signs of the artifice. Because of its technologically constrained form, ASCII is never the capture of an “actual” object to which it, with only approximate mimesis, corresponds. Rather, ASCII always bears the signature of an art-making subject.⁸¹ The elements of construction and in fact the process itself can always be read on the surface of the work. ASCII also denotes a second type of noise: uncertainty. Because of the constrained, grid-structure underlying all ASCII art, all lines are approximate and suggest shadows and the indistinct edges of objects rendered with uncertainty and inconsistency, even though in another sense its jaggies are the effect of the most determinate regularity.

Perhaps more importantly, ASCII is made from a source (a limited repertoire of alphanumeric characters) that contain their own, fully autonomous meanings. Not only might short words be intentionally or unintentionally spelled out inside of ASCII art, but the individual characters themselves often have meanings as in the English “I” or “A”, which can be words by themselves. Taylor points to just this type of noise when she

⁸¹ This is equally true of auto-generated ASCII, which is a computer generated art-form and bears the mark of the digital in its characters.

discusses the newspaper which “reaches our hands with all its noise, such as the drama of the headlines and photography, the manner of writing, the typography and layout” (276). Taylor asserts that this type of noise has been absorbed into the medial object to the degree that it is considered normal and implicit in the message, despite its ability to break up or distract from communication that is ostensibly the primary function of the object.

Anime provides perhaps the best example of the kind of visual noise I am interested in here. First, motion in anime is frequently associated with fast, jarring transitions that naturalistic depictions of motion in other media. These sudden explosions of movement are analogous to sudden, transient spikes in auditory objects. An unexpected and brief jump in the volume of music may be surprising and upsetting to the listener, who has come to expect a relatively narrow dynamic range and predictable transitions between loud and soft passages. Similarly, someone familiar with traditional, Disney-style animation might be initially put off with the sudden visual explosions of movement characteristic of anime.

Additionally, the long, static shots characteristic of anime might easily be perceived as a form of noise. Anime has always been associated with stasis. Even its own most important artists frequently refer to anime as “static image,” “stopped drawing,” or “still-image” (Lamarre “Machine” 184). We might easily draw an analogy between this static image and sound. A sound that is generally sudden and short, like a drum hit, but which is extended to an unusual length would be perceived as noise. Imagine a drum hit stretched out to last 10 seconds. Perhaps more importantly, the static shot is important in that it *breaks the code* of certain, well-defined forms of

animation. In an art form so obsessed with realistic motion that Walt Disney would frequently film and then rotoscope live action during the creation of animated motion, the extended static shot is unthinkable.⁸² Anime foregrounds and destroys the suggestion of continuity that other forms of film, but especially animation, are built on. By emphasizing the single, static image, anime foregrounds the materiality of the medial object by allowing the audience to focus on a single animation cell.

These examples indicate that noise presents a viable circumstance for the artist who is either trying to innovate or who breaks new ground as a consequence of technological or personal constraint. In the sense of Kahn's frontier, noise is the unused matter, the new material (69). For instance, in Lamarre's discussion of the UPA, which was one of the first organizations to experiment with limited animation, he asserts that the former Disney employees who made up the UPA explored limited animation at least partially out of artistic choice and in fascination with its novelty (Lamarre "Machine" 188). Under such circumstances of creation and performance, an artist may go outside of the established code, past the frontier of noise, and bring back new matter for an art form, which may in turn alter the code of what has been established.

Noise and Crisis

As Kelly points out "Noise is widely considered to be situated within excess, as a transgressive act exceeds managed data. Noise is 'out of control'" (63). There is significant historical precedent for this association of noise within excess. For instance, Kahn points out Dayton Clarence Miller's 1916 study, in which Miller attributes noise to over-complexity in sound (Kahn 96). Noise has also frequently been associated with

⁸² Disney's *Snow White and the Seven Dwarfs* (1937) is perhaps the best-known example of rotoscoped animation.

increased or excessive volume, which produced an increase in harmonics (Gracyk 112).⁸³ Yet, while noise might credibly be viewed as a consequence of excess, the role of technological constraint in the generation of noise is underappreciated by these critics and historians. As I have discussed, it is *missing* sonic information that causes distortion, even if this sonic clipping frequently comes as a consequence of high volume.⁸⁴ And, if we were to go back to the question of noise and periodicity, we might see that a sound could be perceived as noise simply because it was too truncated to be periodic. Animation might be “noisy” if it cuts away too much of the data of motion. A sampler can make a grittier, noisier sound if a low sampling rate is used and too much of the original data is lost. If constraint is a generator of noise, then the noise that comes from constraint should conform to Attali’s concept of noise as disrupting existing cultural and generic codes of meaning. Attali notes that codes collapse due to internal and external noise (31). He further notes that a network can be destroyed by noises if codes cannot attack and transform these noises (33).

In addition to theorists like Attali, Musicians also seem to see noise as a potential source of crisis. Pop musicians of the early 1950s often blame rock music and its “new sound” for their inability to remain commercially viable. This trend continues with soul music and hip hop. In a 2008 radio interview, Philadelphia soul producers Kenneth Gamble and Leon Huff point to the emergence of hip hop as a deciding factor in the decline of their own music (*Fresh Air* Interview. March 10, 2008). However, new musical

⁸³ This brings to mind the infamous “these go to 11” scene from the rock “documentary” *This is Spinal Tap* (1984).

⁸⁴ It is worth pointing out that “high volume” is a vague and subjective term, while distortion and clipping tend to refer to more objective phenomena that both perceivable by the human ear and measurable by instrumentation.

noises that initially produce situations of crisis within a genre may be eventually assimilated into dominant codes of performance and recording. The distorted electric guitar is no longer a sound that causes outrage, and record scratching has become an accepted part of the contemporary musical landscape. What initially seems to set record scratching outside any dominant paradigm was its inability to be represented on a score, something it has in common, as I observed in Chapter 1, with whole traditions of Blues music performance. But, as the documentary *Scratch* demonstrates, earnest efforts are underway to develop a notational language specifically for scratching, one of which is clearly based on standard musical notation. For example, DJ Rob Swift has developed his own system of musical notation adapted specifically for the turntable (see Figure 3.9). Although this system of notation has not been widely accepted by deejays, it does appear to offer a functional method for transcribing essential moves of turntablism on to the written page. Perhaps in this case, the crisis is sustained for awhile but does not endure, or not with the full force of its initial emergence. Perhaps all noise can eventually be subsumed into the dominant paradigm and the test of its revolutionary potential is how long the crisis it initially provokes actually lasts.

CHAPTER 5 CONSTRAINT AND THE BREAK

So far, this project has focused mostly on media objects near their inception, before they have received significant attention. While this approach has been illuminating, it leaves an obvious question. After rising to wide popularity, do the innovators behind these objects not then receive resources? Aren't all constraints removed when a new media object becomes a hot product, and its distinctive traits become new conventions of practice? And, there is a more basic question that should concern us. What do we even mean when we say "break"? Is this "break" a thing that exists, or is it mythmaking, like the "poverty thesis" of hip hop I discussed in Chapter 1?

Much like my discussion of hip hop, an analysis of the break is important to this project because of the considerable folklore that surrounds popular media. Discussions of "big breaks" abound in stories about media practitioners. If we are going to make any useful observations about the forms under discussion, then we must seek out faulty assumptions. In the preceding chapters, I myself may have been guilty of romanticizing a conception of a lone genius, struggling away in a garage. The myths and promotion surrounding media production tend towards this view of the hero innovator, even when the facts don't support this view. Now is the time to reexamine this idea.

In this chapter, I will examine the break to understand its properties and its effect on media. Through a discussion of the ways that the word "break" is used in conversation and popular culture, I will separate romantic myths from the realities of media distribution. Finally, I will explore the ways that popularity and wide distribution can themselves generate *new* constraints of practice that have discernible aesthetic consequences for the media objects under discussion.

Dismantling the “Break”

This term is generally used in one of two formulations: “When I got my big break” and “This act just broke nationally.” The grammatical differences between these two are considerable. In the first, “get my big break,” “break” is a noun, and the verb is “get,” a synonym for “receive.” The giver is effaced. The “break” is a thing given by an unseen hand. In the second formulation, “this act just broke,” “break” is a verb; it is an action done by the subject. There is also the connotation that the break is organic and spontaneous. Some ambiguity is marked between uses of “break” as an action deliberately taken and “break” as an event that befalls the subject.

This break-as-verb is supported by many of our common uses for the word “break.” The Oxford English Dictionary lists several definitions for the word, among them: “to publish or reveal,” “to start forth from a hiding place,” and “to come out or emerge by breaking barriers, to burst forth, rush out with the sudden violence.”⁸⁵ There is also the obvious connection to journalistic language. It is common to say that a given story or scandal “breaks” when it receives sudden, widespread distribution and attention. The important question here is: why do we see the “break” as an organic event where an object or form is suddenly thrust into the spotlight? Why do we connect the popularity of a film or musical act with the journalistic notion of vital information suddenly coming to light? The break-as-verb phrasing suggests that the practitioner is laboring in a garage or basement somewhere, away from corrupting influence and attention, and then bursts through a membrane of obscurity, to be embraced by a public

⁸⁵ Also of interest are: “to escape from an enclosed place,” “to happen, occur” (as in “It was time things broke for me.”) “to become public or available for publication,” and “to burst out of darkness”. See: “break, v.” 3rd ed. 2011. OED Online. Oxford University Press. 6 Feb 2012. <<http://www.oed.com.lp.hscl.ufl.edu/view/Entry/22915#eid14528502>>

that was eagerly waiting the whole time for a novel experience. This view of the authentic, solitary artist probably comes from the entwined, perdurable notions of the Solitary Romantic Genius of literature and the myth of the Great Man / Heroic Inventor common to uncritical histories of technological change. Since these notions remain prevalent in popular discussion and are reflected in legal institutions like patent and copyright law, we must decide how far they can be trusted. In fact, both of these notions are problematic.

In his *Multiple Authorship and the Myth of Solitary Genius*, Jack Stillinger dismantles much of the modern mythology of the lone artist. Stillinger declares that all works have multiple authors, regardless of the creation myths that are retroactively attached to them.⁸⁶ Stillinger analyzes John Keats' *Sonnet to Sleep*, demonstrating how a significant poem by a major Romantic figure was actually the work of many contributing authors. Stillinger begins by noting the ways that various published editions of the poem are all different from one another and all make changes from their manuscript sources (18-19). In this way, copyists and publishers become effectively coauthors of the received work, making notable contributions to formatting and punctuation that have since become elements of canonical versions of the poem. Keats himself is known for having been somewhat indifferent to punctuation, happy to leave it to his friends when they transcribed his work (Stillinger 19). Even more significantly, Keats' friends sometimes deliberately replaced entire words, as apparently happened in *Sonnet to Sleep* when the word "lords" was replaced by "hordes." For anyone invested

⁸⁶ Certainly, this principle holds true for this very project. While I am the ostensible author, my work is edited, sometimes significantly, by my Dissertation Chair and my committee members, who are also responsible for shaping many of the key concepts. Friends and colleagues contribute ideas and references in casual conversation. To say that I am the sole author is inaccurate.

in the myth of Keats' solitary, tortured genius, it comes as a surprise that the poet himself approved of this change and included it in his own future revisions of the work (Stillinger 20).⁸⁷ Lest these be dismissed as minor changes, let us remember that the poem under discussion is only 14 lines in length, and that poetry, especially well-defined forms such as the sonnet, is particularly sensitive to formal considerations.

Repunctuating a poem to change its division into sentences is itself a significant change. "Lords" into "hordes" is another major change and noticeably alters in the meaning of the work. This is not an isolated case. Throughout his study, Stillinger carefully demonstrates multiple authorship for the works of such putatively individual figures as Coleridge, Mill, Wordsworth, and Pound, all of whom actively sought to advance the myth of Solitary Genius.

The myth of the lone creative genius is also prevalent in the history of technological innovation. Prior to about 300 years ago, inventors typically did not receive much credit for their work (Basalla 59). However, the sweeping changes of the Industrial Revolution resulted in numerous inventors coming to the public eye and receiving sole credit for their accomplishments. Basalla observes: "Raised to the status of the military or political leader, the nineteenth-century inventor was presented as a *romantic hero* who battled social inertia and confronted powerful natural forces in order to bestow the gifts of technology upon humankind" (Basalla 59, emphasis added).⁸⁸

These trends are only intensified by nationalism and patent law, both of which thrive on

⁸⁷ In much the same vein, Gracyk dismisses the privileging of soul authorship as an artistic ideal. Gracyk is particularly critical of Adorno, whom he derides as being transparently Eurocentric in his views. See Gracyk 165.

⁸⁸ Adding to the mythic weight of this conception is its obvious connection to Prometheus in Greek Mythology.

the narrative of single inventors who can be credited with discrete, legal and economic authority over their innovations. Such narratives can, correlatively, justify multiple, alternate myths of creation. For instance, the lone inventor of the incandescent light bulb varies by which nation celebrates him. American technological history assigns the invention to Edison, the British insist that the light bulb's inventor is Sir Joseph W. Swan, and the Russians favor A. N. Lodygin (Basalla 60–61). In the modern regime of patent law, inventors have every interest in propagating and solidifying the Heroic myth. Despite plain evidence to the contrary, Eli Whitney claimed on his patent application that he had never seen the short staple cotton rollers that influenced his designs for the cotton gin (Basalla 60-61). In fact, Basalla's entire argument for the evolutionary, continuous progress of technology contradicts the narrative of solitary, heroic inventors because important inventions must in nearly every case build on the work of predecessors. In this and in our conception of the Romantic Genius, our notions of authenticity are tied up in ideas concerning heroic figures bravely striving alone to advance the human condition. Unfortunately, these ideas are almost always unfounded.

Our notions of the “break” as an organic event are also predicated on ideas of authenticity. This authenticity requires media objects to be new and revolutionary. We imagine innovators as existing somehow apart from the commercialized mass culture in which the rest of us work and play. This notion is also problematic. First, innovators live in the same world as those who make use of their inventions, and their work is clearly influenced by conventions and technical practices of the fields in which they work.

Gracyk observes of musical innovation:

Personal expression presupposes a community that shares a common vocabulary. If that community consists of millions of one's contemporaries

(and not the thousands of a middle-class concertgoers who supported classical composers in their heyday), the basic vocabulary is going to be rooted in materials afforded by mass media. At the same time, personal expression requires a personal or signature style, which in turn exists only as an individual's variation on a more general style (152).

This viewpoint is supported by what we already know about media production. New objects are recognizable because they trade on, reappropriate, and sometimes repurpose, known conventions. These objects are exciting because of their ability to deftly vary the traditions the audience is familiar with. In order to be successful, any media practitioner must be steeped in the very mass culture we often imagine the practitioner to be separate from.

The idea of the “break” also supposes that it is latent (and then realized) audience demand that drives distribution. But we must understand that the “demand” for any particular object must be *created* because it cannot predate distribution along established, commercial lines. In “The Culture Industry: Enlightenment as Mass Deception,” Theodor Adorno observes that “The standardized forms, it is claimed, were originally derived from the needs of the consumers: that is why they are accepted with so little resistance. In reality, a cycle of manipulation and retroactive need is unifying the system ever more tightly” (95). Adorno’s assertion still holds true today. Turning again to popular music, Gracyk observes:

. . . rock musicians do not make music in a context that provides them with many noncommercial sources of art. . . and they have very few noncommercial avenues for reaching an audience. . . Groups form in emulation of the rock music they hear on records and see in videos, then reach a level of success where further success demands managers and serious financial investment in order to make their music known to a broader audience, and then they can attain reliable distribution of their recordings as the primary showcase for their music (Gracyk 184).

Commercial distribution networks do not directly yield to audience demand. Rather, demand is articulated in relation an object or performer that has already been selected by the distributors themselves, who, while concerned to promote the object or performer successfully with its audience, are not directly beholden to the audience's existing interests. As Adorno asserts, "The talents belong to the operation long before they are put on show; otherwise they would not conform so eagerly" (96). This point applies to essentially any musical act. These performers must be pre-selected before they can receive exposure through industry-controlled networks like radio and television. Even for media forms without "performers," the selection occurs long before the public is exposed via distribution. For instance, anime has been popular in America for least two decades, but most Americans became familiar with the form only after programs like *Sailor Moon* were dubbed into English and syndicated on American television.⁸⁹ Media industries have worked this way for a long time. As far back as the Great Depression, record companies viewed audiences as being generally ignorant of music and needing to be "guided" to appropriate choices (Kenney 161). Throughout the history of the recording industry, various economic factors worked to make it prudent for record companies to create and promote "stars" backing "hits," rather than any quaint notion of directly responding to the public taste (Frith 235). Demand originates not with audiences, or not wholly with audiences, but (also) with the financial and institutional needs and prejudices of distribution networks.⁹⁰

⁸⁹ Certainly Astroboy was popular in America in the 1960s, but this program failed to create widespread interest in Japanese animation as a form.

⁹⁰ Nowhere is this perhaps more clearly seen than in contemporary reality television shows devoted to "discovering" the next great musical talent (American Idol, The X Factor, The Voice).

In general, the “break” that we formulate as a verb corresponds to a myth, perhaps promulgated by industries of distribution to focus on the audience’s conviction that it is the driving force in artistic success. But let us return to the other formulation: “When I get my big break.” This break-as-received-noun may reflect the workings of the culture industry more accurately. Consider the column “Big Breaks” in the American music trade paper *Billboard*. The piece discusses a Christian rock group called Fireflight, and the article’s subtitle reads: “Fireflight Cements Audience Bond.” The subtitle proposes that the band is the active agent; forming a bond with the audience is something they *do*. However, the text of the article relates a different story. The first line reads: “Fueled by network TV exposure and an innovative Web site that ties into its hit single, Fireflight’s sophomore set, “Unbreakable,” is off to a fast start for the Florida-based quintet” (Price 43). Note that the discussion centers not on things that the group actually does, like make records or perform, but rather on things that are done on their behalf, by parties interested in promoting their success: network TV appearances and a savvy website tie-in. Later, the author notes, “Fireflight’s momentum should continue thanks to being the first act spotlighted in the Gospel Music Network’s new Listen Up promotion” (Price 43). Note the passive voice of this sentence. The act of deliberate selection is subtly effaced. The “spotlight” falls on the group, ostensibly because of their innate talent and ability. But who controls the spotlight? This sentence is written from the group’s perspective, rather than from the viewpoint of the Gospel Music Network, whose producers clearly chose them to receive this exposure. What is most interesting about the article is that qualities of the band’s *music* are never mentioned. *Billboard* is, of course, a trade paper; its readership may be most interested in the industry’s

perspective and the rise and fall of record and ticket sales, not the (relative) aesthetic achievement of a recording group. But even in this context, the myth of the band's (exclusive) agency in its commercial success appears to hold sway, when in fact that success appears to be more the result of others doing things *for* the band.

Since the break seems to be a force that comes from outside or above, an action on behalf of the performer, let us now consider the "break" from the perspective of a practitioner. The magazine *Dance Spirit* also runs a column titled "Big Breaks." In it, the author interviews five dancers who reflect on moments of career advancement that they consider pivotal. Even though dance is not a central focus of this project, the language and perspectives of the interviewees in this article are instructive. In their own language, the dancers are always recognizing their "big break" in retrospect. As ballerina Dana Genshaft says, "Some of the biggest changes are the ones that no one sees. Those are the ones that people just sort of notice months down the line and wonder what happened" (quoted in Diana 126). These moments are, she proposes, not obvious in the present. Rather, artists discussing their "big break" select one moment out of many in their careers. Equally important, the break is represented as a moment of being selected by a higher power with authority to guarantee the continued success that follows the break. After being singled out by a choreographer for a good performance, Genshaft reports, "To have someone notice you like that is incredible!" (quoted in Diana 126). In discussing her own break, ballerina Catherine Precourt recalls, "Artistic Director Stanton Welch came up to me the night before the dress rehearsal and said that I would get to do it [perform in the principle role]. It would be a test to see if I could step up and do the part" (quoted in Diana 128). Like the *Billboard* piece, the language here also

tends to be centered on narratives of personal agency. Dancers stress their effort in rehearsal and intense solitary preparation. Still, the break is always a retrospective moment of being *chosen* by a powerful director or choreographer, who is able to discern the dancer's potential. In reviewing the perspectives of both industry insiders and practitioners, we can see that the break-as-received-noun is probably quite real. But rather than being an organic moment driven by personal agency, it is a retrospective moment of being selected by the people who have the actual power to decide the qualities that correspond to artistic excellence and success.

Until now, I have focused mainly on performers and media objects. The reader might justifiably wonder if the same rules apply to media forms. Does a whole form like hip hop not break suddenly and forcefully to a wide audience? This is a fair question, but let us not forget that the names of media forms may also function as brands within the systems of exchange that determine the break; they may be just as constructed, therefore, as the brand names of other kinds products, though on different registers of distribution. As a form is first entering the public consciousness, it is often known by multiple names. As Chuck Berry notes in reference to the musical genre he helped define, "It used to be called boogie-woogie, it used to be called Blues, used to be called rhythm and blues. . . It's called rock now" (quoted in Szatmary 1). The important thing here is that these are not multiple names for a single, well-defined form of practice. Any study of popular music reveals that sharp distinctions we may imagine to operate between purportedly discrete genres are in most cases illusory, or of trivial significance. In his parsing of names, Berry is not showing that these are all different names for the same well-defined musical practice. Rather, he is demonstrating how numerous stylistic

variations, each with some shared characteristics, were eventually subsumed under a more generic heading of “rock,” which continues to remain diverse and inconsistent in its practices. We might similarly note that early hip hop was also known as Disco, Rap, Urban, and RnB. The fact that these names appear to accrete into a single, broadly accepted term is not evidence of a unified style. Audiences accept a single name for a set of stylistic practices because of a cognitive consistency that follows successful branding and the tendency of mere repetition of a single label to divergent practices to appear over time to justify that label. Each of the media forms I have discussed in this thesis is known by a very effective, and seemingly wholly appropriate brand name.

It is widely reported that Alan Freed coined the term “rock ‘n roll,” as a replacement for the term “rhythm and blues.”⁹¹ However, the details of this name change are less widely known. In his biography of the pioneering disc jockey, John A. Jackson reports that Freed was forced to give up his trademark name “Moondog” due to a legal challenge from another performer. In trying to come up with a new title for his radio program, Freed finally settled on “Rock & Roll Party” because this term avoided the racial stigma associated with rhythm and blues (Jackson 82). Freed chose the name despite objections by one of his colleagues that the phrase was “widely considered a black euphemism for sexual intercourse” (Jackson 82).⁹² Freed clearly had branding on his mind because he attempted to copyright the phrase soon after adopting it for his show. Jackson asserts that “Rhythm and blues, the music Alan Freed now called ‘rock

⁹¹ There are various spellings of “rock ‘n roll,” including “rock and roll” and Jackson’s favored spelling “rock & roll.” In this chapter, I keep Jackson’s spelling when I am quoting him. Otherwise, I maintain the more common spelling “rock n’ roll”

⁹² Initially, “rock & roll” referred to Freed’s radio program, rather than any style of music and there is some controversy as to when the phrase was applied to the music rather than the program.

'n roll,' was entering a new era. Whoever held the copyright on the phrase 'rock 'n roll' would stand to collect royalties each time the phrase was used" (84). It seems clear that Freed was not interested in assigning an accurate name to a specific style of music so much as he was intent on creating a brand that he could control and from which he might profit.

Whatever Freed's motivations, "rock 'n roll" is an excellent brand name by any standard.⁹³ Researchers who study branding report that many effective brands take advantage of the semantic inferences inherent in names (Klink 28). While all words carry such inferences, some of the words that make up brands suggest strong meanings before they become brands; we might say that these words are "pre-loaded" with these meanings. At the time of Freed's coinage, "Rock & Roll" is made up of imagistic verbs that would carry meaning for any English speaker. Additionally, "race" records have been using the phrase's euphemistic sexual connotation since at least the 1920s.⁹⁴ Listeners who were in-the-know would have had presumably favorable associations with rock 'n roll and its risqué connotations even before it became a brand. Seen in this light, Freed's decision to use the term to name an emerging musical genre is revealed as a very smart marketing move. In just this way, the names of other media forms under discussion appear to be also fascinating brands.

As a brand name, "hip hop" is just as effective as "rock 'n roll." "Hip hop" is especially notable for its phonetic characteristics. "Hip hop" features a front vowel sound

⁹³ Even Freed's process in arriving at the name is surprisingly similar to methods used by major companies today. In arriving at the name "rock & roll" with his colleague, Freed made use of brainstorming. He also selected his name from a list of existing possibilities. Both of these are common practice in business (Kholi and LaBahn 70).

⁹⁴ "rock, v." 3rd ed. 2010. OED Online. Oxford University Press. 6 Feb 2012. <<http://www.oed.com.lp.hscl.ufl.edu/view/Entry/166701#eid160638157>>

in the I of “hip.” These front vowel sounds have been shown to create perceptions of lightness, especially compared to back vowel sounds that are associated “with attributes such as bigger, heavier, duller, and slower” (Lowrey and Shrum 408). It is also worth pointing out that the phonetics of the term strongly suggest a beat. “Hip” is much like a snare drum, while “hop” carries the deeper tone of the bass drum. Together, they sound like half a measure of quarter notes. The term also carries important semantic inferences that preexisted the coinage. “Hip” has long been a synonym for things that are cool or current, especially within popular musical genres. To “hop” is to jump or move, perhaps while dancing. Assembling these two words leads to a phrase filled with semantic potential. The phrase itself seems to have originated as a bit of scat singing in the Sugarhill Gang’s influential early hit “Rapper’s Delight.”⁹⁵ ⁹⁶ Nevertheless, its adoption and longevity point to its viability as a brand.

“Anime” works as a brand for entirely different reasons. Although it does not offer the sound symbolism of “rock ‘n roll” or “hip hop,” “anime” contains a piece of a morpheme,” which is the smallest unit of meaning in language.⁹⁷ Native speakers of a language can recognize pieces of morphemes and assign meaning. For instance, the “accu” in “Accutron” trades on the positive associations with the word “accuracy” (Klink 28). “Anime,” which appears to be a shortening of the Japanese term “animeshōn,” clearly signals its association with animation, but also truncates the familiar term and

⁹⁵ “Rapper’s Delight” Sugar Hill Gang. Sugar Hill Records, 1979. LP.

⁹⁶ “hiphop, n.” 3rd ed. 2010. OED Online. Oxford University Press. 6 Feb 2012. <<http://www.oed.com.lp.hscl.ufl.edu/view/Entry/243423>>

⁹⁷ The full morpheme in this case would be “animate.”

adds the flare of foreign pronunciation.⁹⁸ The word “anime” accomplishes all of this while remaining a word that can be easily pronounced by individuals who speak languages based on the Latin alphabet.

As a useful counter-example, let us consider ASCII, which appears to be a terrible brand name. “ASCII” is, for someone unaccustomed to the term, difficult to spell, pronounce, and perhaps remember. Explaining the term to someone not already familiar with it requires a description of its origins as an acronym and initial context of use (“American Standard Code for Information Interchange”). ASCII lacks any useful phonetics, built-in semantic associations, or favorable morphemes; its pronunciation is perhaps unclear (“as-KEY” or “as-CEE”?). But even though ASCII is in these respects a poor brand name, it makes no difference because there is nothing to sell. ASCII art has never been a commercial product and I am unaware of anyone ever profiting from it. If the reader has been curious about ASCII’s absence in this chapter, one must keep in mind that media forms without commercial potential do not “break” (in any formulation of the word). Rather, we might say that ASCII *defuses*; working its way slowly through certain subcultures until it is relatively well-known, but never generating any excitement or commercial hype.

At this point, the reader might wonder if I think any version of the break exists, or if all those things that we refer to as “breaks” are merely the work of culture industry puppet masters and collective mythologies of origin. To be sure, I am suspicious of any narrative where an object or form seems to burst forth to sudden, wide popularity. The facts clearly suggest that these moments are almost always carefully orchestrated, the

⁹⁸ “anime, n.” 3rd ed. 2003. OED Online. Oxford University Press. 6 Feb 2012. <<http://www.oed.com.lp.hscl.ufl.edu/view/Entry/248729>>

result of much planning and promotion, and trial and error. At the same time, when we refer to someone's "big break," we are describing a genuine phenomenon, a moment of selection where the culture industry selects a performer or object to travel on the pathways of distribution. Regardless of the details and the inconsistencies of the process, distribution and wide exposure *are* sometimes achieved. Entire industries of media production and affiliation depend on this. Media objects do at times exceed commercial expectations and media practitioners sometimes find that they have access to previously undreamt of resources. Can we not say that an innovator in this position has finally reached a point at which the influence of constraints are diminished? Do money and success not remove barriers to continued and even new forms of success? Or, does the process and culture of distribution and promotion itself lead to a new conditions of constraints that must be grappled with, and have their own, distinctive consequences for artistic practice and innovation? I will attend to these questions in the remainder of this chapter.

The Constraints of Distribution

Having discarded untenable notions of the break, we can no longer discuss media forms and objects "after they have broken." While the "break" is largely mythology there is a genuine distinction to be made between media that merely exists and that which is being actively distributed and promoted. Rather than thinking about media that "breaks," it is useful to consider media forms and objects *in distribution*, in a situation where they are receiving support from established industry organizations and deliberate promotion.

Traditionally, distribution of popular music, film and television have been solely controlled by entrenched industries with networks of physical duplication, distribution

and/or exhibition. The Internet and related digital technologies of publication and distribution have had significant effect upon this paradigm, and this will receive some discussion in this section. But a thorough discussion of these relatively new technologies and distribution systems is beyond the scope of this project. Much of the discussion of how the Internet is changing or will change the music or film industries is still speculative, and I will leave the majority of it to future projects. Instead, this section will focus on constraints imposed by the culture industry and systems of distribution that have existed for the last century, before the development and wide diffusion of digital (wired and wireless) technologies. Where possible, I will draw parallels between these systems and the emerging digital culture that may change or ultimately reify the dominant system.

At the risk of over-simplifying this obviously heterogeneous and inconsistent system, constraints of distribution are of two general types. The first are physical/pragmatic constraints stemming from entrenched technologies, systems of distribution, and a consequence of physical forms of reproduction. These are the constraints generated by the structure of whole industries and their reliance on a given set of technologies and practices that have proven effective over time. In this discussion, I will include the 45 RPM record, the dimensions of typical American television sets, and the distribution agreements between broadcast networks and their affiliate stations. Together, these circumstances form a web of constraint that even the most commercially successful practitioner must contend with.

The second category of constraint is principally ideological. In this case, I will be considering the effect of “community standards” and pre-conceived notions of public

taste on media forms in distribution. I will consider the effects of censorship, and the process of pre-selection that must take place before instances of a media form can be distributed. I will also discuss ideological constraints specifically generated by the economics of distribution. My focus will be on the “hit system” of the contemporary American recording industry and its analogues in other culture industries. I will discuss the way that economic realities and the need for a steady supply of dependably popular products creates another set of ideological constraints.

I will close this chapter with a brief discussion of the way that images, rather than objects or performers, can be commodified. In this final section, I will look at the way that the culture industry can take a form like hip hop and package it into an entire set of lifestyle products. I will also examine how the packaging of images and a constant anxiety over “authenticity” can produce significant barriers to entry for any aspiring practitioner.

The Physical/Pragmatic Constraints of Distribution

Even though ASCII has not featured prominently in this chapter, it is an excellent place to begin a discussion of the material realities of distribution. Typewriter Art is very flexible, but offers little opportunity for distribution. Each technical advance that made text-based art easier to transmit also introduced constraints that reduced its aesthetic flexibility. As I discuss in Chapter 1, typewriter art is the most flexible of ASCII’s direct precursors. Because of the artist’s ability to manipulate the carriage, smudge characters, and create shading with over-strike techniques, the final product may contain few recognizable characters or overt markers of its alphanumeric origins. At the same time, the typewriter itself offers little opportunity for wide distribution (Danet 203).

The extremely painstaking nature of the practice means that duplication with a typewriter is impractical, and the only realistic means for distribution is via traditional printing, or perhaps by small-scale forms of analog reproduction that are closely related to printing in these respects, such as photocopying. Newsletters and magazines devoted to typewriting were the major avenue of distribution for this art form.⁹⁹ Because period printing practices were good at reproducing the nuances of relatively clear work like typewriter art, distribution was effective but infrequent and inaccessible to the average artist.

In contrast, teletype art is by its very nature a distributed form and this distribution introduces its own constraints. Teletype was fundamentally a medium of military communication and the art that came from this apparatus could be quickly distributed and reproduced anywhere in the world where there was a teletype machine (Danet 203). At the same time, the teletype machine itself only allowed characters to be placed on a fixed grid, unlike manual typewriter art that allowed considerable shifting of character placement by manipulating positions of the paper and carriage with a much finer granularity.¹⁰⁰ Additionally, the teletype machine encoded characters in five-digit electronic codes, which allowed for only (in English) capital letters and basic punctuation ($2^5 = 32$). Even though the teletype machine is ostensibly more advanced in most respects than the mechanical typewriter, the distribution apparatus constrains the art form specific to the newer device, by requiring a fixed grid, fewer different characters, and less flexibility.

⁹⁹ See for instance *The Phonetic Journal*, which printed Flora Stacey's iconic butterfly picture in 1898.

¹⁰⁰ Unlike ASCII art, Teletype Art does allow for over-strike, so long as the two characters are in the same "cell" of the grid (Danet 203).

The computerized ASCII art of the early Internet is the most easily distributed alphanumeric art form, but it is also highly constrained by systems of distribution. For instance, the earliest versions of America Online (AOL) used Arial as the default font and added a layer of distribution constraint to ASCII art. Because of Arial's character-spacing properties, traditional ASCII art would not display correctly on AOL.¹⁰¹ Additionally, ASCII art created by AOL users would not display correctly in the user interfaces of other Internet Service Providers (Danet 232). The distribution system also set up a considerable barrier. Ironically, AOL was among the most commercially successful early Internet Service Providers in North America, bringing the Internet to literally millions of Americans, and specifically marketing itself as the ideal service for users who were not especially tech-savvy. From the perspective of ASCII art in the age of the early commercial Internet, the service that offered the greatest potential for connectivity and distribution was also the one that placed the greatest constraints on the media form. Because of its font specifications, AOL effectively ensured that any ASCII art created using AOL would only be viewable by its own customers and any other ASCII art would not.¹⁰²

If we consider now the case of a specifically commercial media form, popular music offers valuable insights into the importance of material constraints of distribution in the success of a media form. In ASCII art, there is little difference between the creation and distribution of media objects. In contrast, modern music is largely defined

¹⁰¹ Monospaced fonts like Courier New are best for reproducing ASCII accurately. Variable-width fonts like Arial introduce spacing problems that often make ASCII art unrecognizable. This is mainly a problem with reproduction between fonts. ASCII art that is composed in Arial can be transmitted effectively in Arial.

¹⁰² None of this is meant to suggest that AOL was deliberately hampering the efforts of ASCII artists. Presumably, ASCII art never factored into these decisions.

by the dichotomy between live performance and recorded product for distribution. Performance and recording are, as I have stressed, very different scenarios, and the constraints of recording in tandem with systems of distribution, which have emerged under and adapted to conditions of marketing, sales, shipping, etc., have an enormous impact on what is typical, and even on what is possible, in successful music production.

The recording process is neither transparent nor straightforward. As I discuss in Chapter 2, early recording techniques in particular imposed significant constraints on performers. Early mechanical recording technology strongly favored certain instruments, which were better suited to the narrow range of both the first phonographs and the early recording apparatus. Because these devices were better at reproducing only certain segments of the audio frequency spectrum, compositions were frequently rearranged for the instruments suited to these limits. The physical realities of recording and reproduction gave advantages to certain musicians simply by virtue of the instrument on which they performed. These advantages spring directly from the constraints of music distribution.¹⁰³

The physical media of music distribution have created significant constraints throughout history. Early phonograph records could only hold about three minutes of recorded music (Kenney 18). This absolute limitation in time forced musical genres to adapt, even typically long vocal forms such as Opera, in which long arias—elements developed with very different constraints of live theatrical performance in mind—had to be trimmed down or otherwise compressed to the three-minute length of the recording

¹⁰³ This trend continues even today, with the mp3 file format and small “earbud” and headphones becoming dominant vehicles for music listening. The frequency reproduction capabilities of these technologies are a source of sometimes heated debate among audio engineers, who are still working to develop a set of best practices.

(Kenney 29, 50). There was also an extreme tendency to replay single songs over and over again. This culture of repetition tended to place a great deal of weight on each individual song. Consequently, there arose an emphasis on making each individual song stand up to repeated listening (Kenney 18). Because of the one-song length of these records, there was no room for filler. This limitation had numerous effects on the level of the individual song as well. Popular songs tended to be recorded with one verse and two choruses *because this was all the material that could fit on the medium of distribution* (Kenney 41). It seems likely that this short, chorus-heavy format and tendency toward repetition helped push popular music of the early age of the phonograph towards short songs and the familiar verse-chorus-verse structure that is still evident in modern popular music.¹⁰⁴

Just as important as the physical objects of distribution are the entrenched networks along which media must pass in order to reach its target audiences. For example, the constraints of television as a medium of distribution generate some interesting aesthetic consequences for film. The TV as playback device imposes significant limitations. As David Bordwell and Kristin Thompson note in *Film Art*:

When television became popular in the 1950s, its image was rather unclear and very small, in some cases only 10 inches diagonally. Early TV shows tended to rely on close shots, which could be read easily on the small monitor. In the 1960s and 1970s, movie attendance dropped and theatres became smaller. As screens shrank, filmmakers began to rely more on close-ups in the TV manner. . . Now that most films are viewed on video and many will be watched on handheld devices, it seems likely that commercial films will continue to treat conversation scenes in tight close-ups. In this respect, *technology and exhibition circumstances have created stylistic constraints*. (Bordwell and Thompson 45, emphasis added)

¹⁰⁴ Although they have less significant length restrictions than their analog predecessors, modern digital formats like the CD impose their own sets of constraints, especially on end-users. See Chapter 2 and my discussion of the CD from the perspective of a vinyl DeeJay.

The authors note also that the cropping required to center the image of film on standard-sized televisions in the 1950s, 60s, and 70s meant that a significant portion of the shot was eliminated. Filmmakers began in many cases composing shots with a “safe area” on either side to anticipate eventual trimming for television distribution (Bordwell and Thompson 45). Effects of this fitting of the image to the screen are still detectable on modern wide-screen televisions, as classic films may not be easily available in their original theatrical formats, or the centering of the shot within the safe area is discernible in what is *not* centered on the wide screen, i.e., what is relegated to its margins.

The constraints of distribution networks are not limited to replay devices and pathways for distribution. These networks are also subject to an increasingly globalized web of legal agreements and permissions that constrain the distribution of media objects, within and across national boundaries. An excellent example here is Japanese anime distributed in the United States. When anime was first being imported to the US, many Japanese animated television programs would feature long story arcs with multiple connected episodes. However, this arrangement clashed with distribution agreements in the United States that permitted broadcast stations to air episodes in any order, potentially destroying connected narrative (Ladd and Deneroff 44). To work around this problem, studios that dubbed anime into English changed dialogue to make each episode seem self-contained and have a definite ending. In this instance, the constraint came not from any playback device or medium of distribution, but rather the business practices of a particular industry, which had been established on the basis of characteristics of earlier media. Even though these constraints were not physical in the

same respect as the capacity of a vinyl disc or the dimensions of the projection screen, they still resulted in barriers that required changing the original media specifically because the system of distribution would not accommodate the original media object. Like all the other examples I have discussed, we can see that the mechanism of distribution create significant constraints with clear aesthetic consequences.

Ideological Constraints of Distribution

For the moment, let us accept Adorno's claim that "[t]he talents belong to the operation long before they are put on show." Even to the extent that it is true, this assertion is probably an over-simplification. Just as "big breaks" are selected from many possible events, a practitioner's selection and integration into the culture industry is a process, not a moment; it is subject to, and demonstrates effects of, complex, inconsistent, and heterogenous influences. It seems unreasonable to suggest that practitioners are instantaneously subsumed into the culture industry and then function quietly in its confines. Just as there are negotiations between audiences and media producers, there are also negotiations between practitioners and distribution networks.¹⁰⁵ In addition to the physical constraints of distribution, we must also consider the ideological constraints that govern networks as they decide what media objects and forms are profitable or acceptable for distribution.

Pre-Selection

At the root of any distribution system is some method of pre-selection. Because audiences only experience media forms and objects through distribution systems,

¹⁰⁵ See Chapter 3 for discussion of negotiations between audiences and media producers.

someone must make the initial decision about what will be distributed. In a historical analysis of this issue, noted composer and musician Frank Zappa explains:

One thing that did happen during the Sixties was some music of an experimental nature did get recorded and did get released. Now, look at who the executives were in those companies at those times. Not hip young guys. These were cigar-chomping old guys who looked at the product that came in and said: "I don't know. Who knows what it is? Record it. Stick it out, and if it sells, fine." We were better off with those guys than we are now with the supposedly hip young executives who are making the decisions of what people should see and hear in the marketplace. The young guys are more conservative and more dangerous to the artform than the old guys ever were. (Zappa)

Zappa goes on to describe how observes that supposedly hip young men were eventually recruited into the industry, achieved positions of power and "the next thing you know, [the hip young man] has got his feet on the desk and he says 'Well, we can't take a chance on this because it's just simply not what the kids want, *and I know.*'"

Zappa finishes by advocating for a return to a situation where "the person who is in the executive chair may not be the final arbiter of taste for the entire population" (Zappa).

His assessment of the recording industry demonstrates that not only does a pre-selection process exist, but that it is driven by a pre-determined set of assumptions about public taste and marketability. Those in charge of the selection believe that they have some privileged information about what people want and what will sell. In writing about his work dubbing and importing Japanese anime into American television, Fred Ladd readily observes that his job was not simply to translate Japanese dialogue into English, but also to *Americanize* the entire program, thus making the program fit a pre-conceived notion of public taste (Ladd and Denneroff 25). Functioning as one of these pre-selection gatekeepers, Ladd changed cultural reference points and also edited out the violence and nudity that would have been unacceptable to an American audience—

or, more precisely, an American audience targeted by (imagined by) American television producers (Ladd and Denneroff 15). Upon hearing *Astroboy's* original title, *Mighty Atom*, Ladd knew instantaneously that this title (that had, it is worth noting, already been adapted to an imagined, *American*, idiom) would have to be changed. Crucially, he was able to make this decision *without* ever having seen the program (Ladd and Denneroff 10). The question was not whether or not the title was appropriate for the series, but whether it fit Ladd's ideological conception of what (the show's distributors imagined) the public would like.

Zappa's complaints also show that the pre-selection process tends to develop and tighten over time. As any culture industry changes and attempts to incorporate new forms and genres, there will always be early periods of adjustment, where ideological constraints of pre-selection are less rigorously defined. For instance, early Blues artists had significant freedom to make and record whatever kind of music they wanted. Since record executives were largely unfamiliar with rural, black vernacular music, they had no idea what would sell or how to influence music to make it more marketable (Kenney 132). As a more contemporary example, Captain Beefheart's 1970 music video for "Lick My Decals Off Baby"¹⁰⁶ (that never aired due to "objectionable" content) was able to make it through production precisely because there was no commercial music video industry at the time and the record industry had not yet set up controls to ensure the production of "acceptable" videos (Herzog 16). A similar video would be unlikely to be released today because industry controls stemming from an ideological conception of what will be marketable are much better implemented and more deeply entrenched. As I

¹⁰⁶ "Lick My Decals off Baby" *Lick My Decals off Baby*. Straight, 1970. LP.

discussed below, TV now has strict content standards that would keep such a video from being made—at least by conventional channels of production and distribution—much less aired.

Censorship

Much of the effect of constraint from pre-selection could reasonably be described as censorship. In seeking to ensure a steady stream of marketable products, the culture industry does not just select objects that are deemed to have appropriate aesthetics, it also trims away ideas or representations that might elicit controversy. When we think of censorship, we tend to imagine governments or other central authorities forcing practitioners or distributors to censor their product. In reality, much of this censorship is effectively voluntary; in many cases, such as self-policing policies like the rating systems of the MPAA (Motion Picture Association of America) and the ESRB (Entertainment Software Rating Board), forms of censorship may be considered frankly voluntary. Many industries willingly censor themselves. Controversy surrounding media content can be quite bad for sales, especially when it raises the ire of powerful pressure groups or alienates the buying public. It seems that these two risk factors regularly encourage industries to censor themselves with little or no prodding by the government or other central authorities.

And as an example, consider the history of MTV, the cable network once devoted chiefly to prerecorded music video. From the network's inception, executives made a conscious decision to follow stringent content standards governing the depiction of drug use, drug paraphernalia, and violence (Banks 153, 166, 176). MTV's standards were not based on what was legal or illegal to depict on American television, so much as the network's anticipation of audience reactions, fear of the responses of content-minded

pressure groups (Denisoff 177), and reactions of lawmakers that might result in even more narrowly defined content standards. Since MTV is a cable network and thus immune from FCC regulations that apply to over-the-air television, its standards could have been very open and allowed a wide array of content. Instead, it deliberately chose a set of standards that the network assumed would make its content more palatable to a wide, but in some respects precisely imagined audience.¹⁰⁷ This is not to suggest that MTV was arbitrary or foolish in their decision to preemptively implement standards. Many groups within contemporary society exercise significant influence and make pre-selection constraint a smart idea for distributors, regardless of its effect on media practitioners.

In 1985 the Parents Music Resource Center (PMRC), a coalition of parents consisting entirely of the wives of prominent U.S. senators, successfully lobbied the Senate Commerce Science and Transportation Committee to begin hearings on the music industry, focusing on explicit lyrics, album artwork, and music videos. These hearings are interesting in that they proposed no legislation or governmental regulation, and yet attracted significant media attention and eventually forced media cooperation (Miller 138–140). After extensive debate, the industry enacted a set of voluntary labeling standards resulting in the “explicit lyrics” stickers still found on many record releases (Miller 151). Given the voluntary nature of this labeling system, it is easy to argue that no censorship has actually taken place. In fact, then-Senator Al Gore explicitly claimed that censorship had no part in these hearings (Miller 161). Yet Gore’s statement does

¹⁰⁷ As an example, this pre-imagined audience was almost exclusively white. RnB and Urban acts received little attention and the station was dogged by charges of racism throughout its first years. (Denisoff 46, 68, 69)

not stand up to scrutiny because the recording industry needed the government's cooperation on impending legislation. At the time of the PMRC hearings, the Recording Industry Association of America (RIAA) was in the midst of lobbying Congress to enact a "blank tape" tax and pay the proceeds directly to the recording industry (Miller 161). This legislation was intended as reparations for the supposed loss of revenue caused by the legal copying of record albums onto cassette tapes. The RIAA stood to make significant financial gains if the blank tape tax was enacted, and failure by the industry to acquiesce to the PMRC's demands could have easily jeopardized passage of this lucrative legislation. Although no direct government oversight of content was ever proposed, the connection between these two pieces of legislation suggests that behind-the-scenes government pressure did indeed result in *de facto* institutionalized censorship.

The PMRC example demonstrates how "community standards" are an integral part of ideological constraint. The PMRC effort was spearheaded by Tipper Gore, wife of the aforementioned senator. By her own admission, Gore was spurred to action after purchasing Prince's *Purple Rain* for her daughter and then being shocked that the record contained explicit reference to masturbation and other sexual acts (Miller 146). A key component of Gore's outrage was that the album in question had received a Grammy Award. In Gore's mind, this award certified that the record had been professionally judged to be of artistic merit, and thus up to a certain set of standards. The origin of these standards is explicitly ideological. Many pressure groups operate under the logic that "community standards" are free floating, naturally occurring, and implicitly understood by all groups involved. The reality is that supposed "community

standards” are specific to individual groups of people and can easily be interpreted differently by different groups. Fred Ladd’s discussion of anime shows how mainstream Japanese children’s programming allowed for depictions of violence and nudity that would have been considered unacceptable in America. Consider again that MTV enacted a set of standards *before* they aired their first video. This voluntary and preemptive censorship only reinforces the idea that community standards are easily understood and universal. By pre-censoring its content, MTV played into the notion that such standards are obvious and natural to any person. Thus, a deviation from these standards is seen as a deliberate act of rebellion and an attempt to coerce youth to unsavory behavior.¹⁰⁸ But in her analysis of the PMRC controversy, Miller asserts that such moves toward censorship never solve any particular problem. The “seduction of innocents by culture” is a recurring theme in American life and moves toward censorship are actually a “social ritual” conducted by those in power (Miller 138-140).

These ideologically based constraints of censorship enforce practical, material limits on the content and form of media that are distributed within predominant systems of practice. Even “voluntary” content labeling can easily prevent media from reaching an audience. The Motion Picture Association of America voluntarily assigns ratings from “G” to “NC-17” to all commercially distributed films. Even though it is entirely legal to distribute and show a film with an NC-17 rating, most distributors associated with major theater chains refuse to handle these films. Much like the music industry, these ratings are also effectively arbitrary and based on ideologically freighted “community

¹⁰⁸ Even industry insiders are frequently confused or frustrated by these supposedly universal standards. In his discussion of the importation of Japanese animated programming to America, Fred Ladd mentions significant difficulties producers of the programming had with the NBC Standards and Practices department. Despite literally decades working in this industry, even the author refers to this branch of the network as the “Department of Censorship” (Ladd and Deneroff 30).

standards.” For example, depictions of sexuality are strictly policed while acts of violence are less so; the depiction of homosexual sex acts are far more restricted than heterosexual acts.¹⁰⁹ In the American music business, some retailers effectively censor media by refusing to carry records with certain content. A prime example is the giant retailer Walmart, which refuses to carry any music with a “Parental Advisory” sticker. Walmart’s share of the retail music business is so large that some record labels create “sanitized” versions of records with different cover art or edited lyrics, specifically for distribution in Walmart stores (“Store Wars”). When one considers that Walmart is increasingly the only media retailer in many rural and small town American contexts, the company’s refusal of a recording that violates an often capricious standard amounts to a huge barrier to wide distribution.

This discussion of censorship is not intended as a simple indictment of the “evil and faceless” culture industries. If the foregoing discussion demonstrates anything it is that industry groups like the RIAA are not staffed by conservative ideologues as much as by cautious business people adapting to the economic and political realities of their world, while at the same time (as Zappa’s complaints observed) confident of their intuitive understanding of what will sell and what won’t. From the perspective of media producers, the important fact of censorship and of pre-selection in general is that these phenomena present real constraints that any media practitioner must contend with, if she or he, or her or h is representatives (producers, etc.) wish to achieve anything more than very limited commercial success. Not only must practitioners struggle to create their work and (should they seek wide distribution) get their work noticed by the culture

¹⁰⁹ For a thorough discussion of content standards and distribution practices arising from MPAA ratings, see the documentary *This Film is Not Yet Rated*. Dir Dick Kirby. IFC Films. 2006.

industry, practitioners who are selected for distribution must grapple with arbitrary constraints on how their work can be presented. It is ironic to consider that MTV's anti-drug content standards had to coexist with the network's heavy promotion of rap music in the 1980s. Given the impact of crack cocaine on American inner city neighborhoods in the 1980s and the fact that, regardless of their degree of personal involvement, the urban drug trade was a daily reality for many aspiring hip hop artists and their communities, it is difficult to imagine how these artists' music and music videos could possibly *not* include overt references to drugs. And yet, as Banks makes clear in his history of MTV, this was not a fight that aspiring artists could win. Clearly, if the daily realities of the practitioner's life cannot appear in their work, constraint is playing a strong role in the finished product.

Ideological Consequences of Economic Constraints

There is a useful distinction that can be drawn between different types of constraining ideologies. In my previous two sections, I discussed cultural ideologies relating to "community standards" and notional standards of "decency." Certainly these ideologies have an economic component, and are capable of generating significant economic influence, but they do not derive, directly, *from* the economics of distribution. There are wholly different constraining ideologies that arise from the economics of cultural distribution. In general, the economic realities of maintaining distribution networks have a powerful effect on the way distributors think about media objects and forms, and what may be possibly included among them. These ideologies create another set of constraints that affect media in distribution.

The American music recording industry provides an excellent example of the way that economic realities shape the exposure and production of new forms. On the profit

curve associated with the marketing of any new record, there is a “break-even point” after which production and promotion costs have been recouped and profit accumulates quickly (Frith 253). The pragmatic concerns of the break-even point are exacerbated by external economic forces. For instance, the Great Depression profoundly influenced the fledgling recording industry because of the reduced capital available to industry and the curtailed buying power of the listening public (Kenney 162–64). The new economic landscape produced a shift in the industry conception of the phonograph, then the dominant technology for reproducing music. Both during and after the Depression, the phonograph was seen less as a mechanism for preserving “immortal” and “timeless” music (as had often been proposed before) and more a vehicle for reproducing something popular and salable (Kenney 162, 165). At the same time, record manufacturers were acutely aware of the general musical ignorance of the public, who needed to be “guided” to specific records by helpful record store clerks (Kenney 161). These factors together made it prudent for record companies to create and promote “stars” backing “hits,” rather than any quaint notion of serving an existing public taste (Frith 235). The result was the production of recordings that offered the least challenge, either musically or emotionally (Kenney 168). This model of distribution favoring hit records is only exacerbated by periodic economic slumps that the industry must endure, not only as a consequence of external events like the Depression, but also industry-specific dips in sales caused by a delay in adapting to new technologies like radio (Kenney 116; Reiss and Feinmann 18). These periodic economic hurdles reinforce an industry culture centered on hit records that generate large and predictable sales and eschewing risk-taking; a paradigm that is still at work today.

Other culture industries are similarly oriented by the hit model because initial production and promotion are the most costly aspects of media production. Reproduction and distribution costs tend to be relatively low. The more units of a given title are sold, the more profitable each individual unit becomes. The film industry initially seems quite different, especially given the relative anonymity of film directors and the fact that films are unlike recorded music in some crucial respects. Except for sequels, films tend to be single-occurrence media events. Audiences do not seem to associate their favorite films with the studio or director that made them. Advertisements for new films often proclaim: "From the director of. . ." rather than using any names, specifically because general audiences are only dimly aware of who has directed even wildly popular films. Popular music is different in this respect because musical performers can build a name over time and considerable hype can be generated in advance of their new releases. In response to the seemingly self-contained nature of individual films, Hollywood developed a dependence on a "star system." As early as the period from 1907 to 1912, individual actors, rather than writers or directors, were given the role of drawing audiences to their films (Thompson 108-109). A similar logic is at work in contemporary broadcast and cable television. Writer and producer David Simon recently remarked that the central force behind essentially all television programs is the drive to "maintain the franchise" and that this drive is responsible for what Simon sees as the vapid nature of most television programming (Simon). The star or hit-based system perpetuates predictability and repeatability.

Although the foregoing survey is not exhaustive, it shows that most culture industries focus on popular brands and their ability to generate predictable sales. This

economic model has ideological consequences that function as another source of constraint for media objects in distribution. One of the ideological constraints generated by the economics of distribution might be called “everything new is old again;” the tendency of culture producers to see the new in the context of the familiar. In popular music, how often has a new artist been described as “the new Michael Jackson” or “the next Bob Dylan”? This tendency is equally prevalent in broadcast and cable television. Fred Ladd describes two series imported from Japan, *Kimba The White Lion* and *Astroboy*. Both series are conceptualized by executives in terms of existing properties. *Kimba* is described as “another” *Bambi* and *Astroboy* is seen as “another” *Pinocchio* (Ladd and Deneroff 52). *Kimba's* Japanese creator Osamu Tezuka originally saw the white lion as a character who would gradually grow up over the course of the series, but because American animated characters conventionally always stay the same age, *Kimba* also could not grow up when broadcast in America (Ladd and Deneroff 52). American audiences would never see Tezuka’s original vision for his character because it was conceptualized as the new version of something already familiar. The economics of distribution generated an ideological constraint that directly interfered with an already existent media object.

We can also observe that hit-centric economics of American media distribution create an interesting tension between novelty and familiarity in new media objects. The trend described above extends beyond attempts to see the new as simply updated versions of older ideas. There is a strong tendency in culture industry to adapt new forms to well-established landscapes and to thereby strip them of some of their novelty. A certain irony is at work here, because culture industry also thrives on novelty—or at

least its appearance. Thompson points out that although early cinema was thoroughly dependent upon novelty to sell its product, novelty eventually ceased to drive cinema and was replaced by mechanisms of the star system and a focus on (in mainstream cinema) notional realism (108). And yet, newer technologies like computer animation and 3-D suggest that in the film industry, as in other culture industries, aesthetic novelty is always a desirable method for selling product. Thus, a need for novelty and the drive to reduce the newness and unfamiliarity of an emergent form are always to some degree in conflict with one another. In the record industry, for instance, the repeatability of records (as opposed to live performance or broadcast) eventually drains a record of its perceived novelty and leads—in the ecology of radio and television distribution—to a constant demand for novel-sounding hits (Kenney 158).¹¹⁰ At the same time, a given “sound” can come to be regarded as the new sound and thus novel by definition, regardless of how many recordings to which it has been applied. Noted recording engineer Steve Albini has remarked that an entrenched community of sound engineers and record producers can easily foist a certain aesthetic on every group that passes through their studios.¹¹¹ In Albini’s view, this is exactly what happened in the 1980s, when a fascination with emergent synthesizer and drum machine technologies, combined with over-confidence on the part of recording engineers, led to the dominance of a mechanized, processed sound that is now as instantly identifiable with that decade as the characteristic big hair, Spandex, and leg warmers of music videos of the period

¹¹⁰ Here, the reader might wonder about “Classic Rock” radio and other outlets for nostalgia media. Obviously, these are a force in the contemporary media landscape, but in new music, in particular, their financial impact is minor. Consider that out of the 20 best selling recordings of 2011, exactly zero were released before 2011. All are contemporary hits (Caufield).

¹¹¹ In much the same way, we may assume, as a film editor can put her or his stamp on a director’s work.

(Albini). Obviously, many eras in popular music are associated with a given sound. The point here is that identifiable qualities of a sound are frequently a product of that era's recording culture. Performers' work are often fitted to the dominant aesthetic, with a conscious disregard for their innovations in other respects. Again, these phenomena are a direct result of the need to replicate hits and the economics of culture distribution.

Selling Images

The culture industry does not just sell media objects and forms; it is also the primary vehicle for distributing information *about* new forms. For instance, if hip hop is a brand, then an industry marketing "hip-hop records" also has to explain what hip hop is to its consumers. There are obvious questions that need to be answered in order to create a compelling product. Aside from "What is hip hop?" other inevitable questions would include "Where did hip hop come from?" "Who are the people who make hip hop?" and "What type of instruments do they use?" For the culture industry, these potential problems of representation and image become an opportunity. A style of music or genre of animation can easily become a lifestyle. For the fan, there are all manner of opportunities to purchase clothes and other accessories signaling participation in a sub-culture. For the aspiring practitioner, there are a whole set of practices and techniques to be consumed, and physical objects like musical instruments. In creating a convincing and marketable image of the media form, the culture industry offers constructed if not downright fictitious notions of "realness" that the consumer can pursue endlessly. These constructed ideas generate yet another set of constraints that an aspiring practitioner must contend with.

In its fast rise to mass commodification, hip hop provides a good example of how *image* can be a product just as much as any media object. For instance, as their reach

extended past music to fashion, advertising, and other taste-making activities, the owners of Tommy Boy Records quickly realized that they were no longer simply in the music business, but in the “lifestyle” business (Chang 419). Chang describes how companies like the clothier Gap, which had no previous association with hip hop culture, were cleverly marketing hip-hop fashions to a wide audience (Chang 447). It was not only record labels and clothing companies that were marketing a hip-hop image: “The biggest artists were brands themselves, generating lifestyles based on their own ineffable beings. Sean ‘P-Diddy’ Combs leveraged himself across music, film, television and high fashion. Jay-Z peddled movies, clothing, shoes, and vodka” (Chang 447). But all of this marketing was directly founded on potentially problematic notions of authenticity. Hip hop had started in New York, and as it became a nationwide and then worldwide phenomenon, questions arose about whether hip hop from other places could be considered “real.” As Mark Anthony Neal observes, “At the core of the East Coast versus West Coast conflict was a fundamental belief that the experiences of those on one coast marked them as more authentic—more gangsta, more ghetto, more hardcore—than those on the other. In other words, one hood was deemed more authentically hip hop, and by extension more authentically black, than the other” (58). The unanswered question in Neil’s discourse is: deemed more authentic *by whom*, and under *which specific conditions of production and consumption*? Here again, authenticity serves the purpose of those who have something to sell. That which is more authentic is perceived by an audience in search of an experience of authenticity as more desirable; it is therefore more saleable. None of this is to say that hip hop artists

themselves were not complicit or even enthusiastic about the authenticity debate, but regardless of the feelings of artists, authenticity is most valuable to the culture industry.

Paradoxically, the most valuable concept of realness is that which can never be obtained by the consumer. Neil notes that even in the late 1990s, “it was an open secret that hip hop’s most visible consumers were young white kids” (57). And even today, it is a simple fact of demographics that hip hop’s continued financial success depends on the buying power of middle class, white youths; most of whom can never be considered part of authentic hip hop culture (even to themselves) because they are not black. A similar trend has been associated with anime, although it is expressed somewhat differently. Rather than an obsessive interest in the biographical details of a given star, fans of anime are interested in the *authentically Japanese*. Non-Japanese Fans immerse themselves in Japanese culture, often learning the language to various degrees, and producing extensive lists of Japanese terms and cultural associations so that anime audiences can better understand what they are watching.¹¹² Similarly, fans become upset if they realize that the editing or censoring of one of their favorite shows has resulted in a loss of content. Fred Ladd describes a significant controversy that was caused when content restrictions forced him to combine two episodes *Sailor Moon* into a single episode. Fans were incensed at the idea that they were being robbed of portions of the “authentic” show (Ladd and Deneroff 102). Interestingly, this episode contradicts Ladd’s earlier assertion that American audiences were not concerned with the narrative or visual aesthetics of anime, so long as they were given a compelling story (23). Fans in this case wanted the authentic—or an authentic object that they

¹¹² See for instance *The anime companion : what's Japanese in Japanese animation?* by Gilles Poitras.

conjectured to exist. Anime fans are so interested in direct contact with “authentic” Japanese animation that an entire cottage industry has sprung up around homemade English subtitling of imported anime. These “fan-subs” often feature very accurate translations that may be technically superior to English dubbing because subtitling does not require matching a character's mouth movements. Fans dedicated to the spread of accurately subtitled anime often sell their product at break-even costs and make no profit; the removal of profit from the equation is a further hallmark of the translations’ authenticity. Others only produce fan-subs until commercial equivalents become available (Levi 46–47). In all of these cases, it is the desire for an *imagined* authenticity that drives fan activity.

If the selling of images and the drive towards constructed authenticity affects fans and consumers of media forms, it affects practitioners more profoundly. The images attached to a given form tell the public who is “allowed” to be a practitioner and, just as importantly what materials and equipment that practitioner needs. Just as (authentic) hip hop is conventionally a vinyl medium, and rock 'n roll requires electric instruments,¹¹³ all forms are associated with images that determine what physical objects are necessary for authentic practice. After a form has become identified with a particular style of play or type of instrument, manufacturers keen on sharing its profitability typically rush to capitalize on the emerging market. Intuitively, it would seem that having a profusion of mass-produced instruments geared towards specific genres of performance could only help potential practitioners by making tools more plentiful, more accessible, and easier to acquire. But as Paul Théberge points out in his history of the

¹¹³ Unless one is allied with a sub-genre like “acoustic rock.”

commercial synthesizer, technological innovation is not simply a response to the needs of musicians, but also a force that they must contend with (Théberge 4). First, there are problems created by the actual design of instruments, which make certain assumptions about how technology can or should be used. Electronic musician Matthew Herbert, for instance has lamented the number of commercial samplers that do not include a microphone input (Herbert 44). This deliberate choice by manufacturers assumes that anyone using a sampler would be interested only in sampling pre-recorded music from commercially released recordings. The absence of a mic input precludes the possibility of sampling live sounds from the producer's own environment.

Significant hurdles are also generated by the culture that springs up around musical instruments that are favored by enthusiasts of a new musical form. As Théberge points out, a shift in musical performance has taken place in the last century, from artisan-crafted heirloom instruments to a focus on the renewed consumption of goods (10).¹¹⁴ In a culture of mass-produced, commodity instruments, manufacturers work to create a constant deferral of pleasure into the future where the musician is always looking forward to the next purchase that will somehow make her musical life more creative and more complete (Théberge 119).

Just as instrument culture generates a constant lust for the new, there is also the vintage market, driven by a fetishization of older instruments, which allow a symbolic connection to an earlier era of somehow more authentic music (Théberge 120). This trend is perhaps most evident in the vintage guitar market where old instruments are so

¹¹⁴ This is a statement that requires some nuance depending on context. Classical musicians are clearly still invested in heirloom instruments, and as I will discuss below, the vintage guitar market becomes more inflated by collector value with each passing year.

prized, that even broken components are routinely left unreplaced because anything that detracts from the “original” character of the instrument is seen as a negative and reduces the guitar's value. Here, the fetishization of the vintage is so complete in its power that even the functionality of the object as a playable musical instrument can be sacrificed to the status and pleasure attained by simply owning a prized instrument from a bygone era. Of course, this trend also inflates the value of vintage instruments to the point where they are permanently out of reach for practicing musicians. It is a regrettable truism that most desirable vintage guitars are owned not by professional musicians, but by dentists.

The advertising culture associated with musical instruments poses additional challenges for the aspiring artist. Instrument advertising tends to be resolutely misogynist, assuming that males are the primary market for instruments, and advertising often falls back on a rhetoric of control and domination that conflates instruments with women and promises the user unprecedented control over the objects of his desire (Théberge 120–26). The company “Damage Control,” which produces various electronic gadgets for guitar players recently created a new distortion-creation device and christened it “The Womanizer.”¹¹⁵ As one might expect, this name is not in any way descriptive of the device’s musical functions. One must assume that the name was chosen for its appeal to the device’s projected customer base—heterosexual men—but in the process, the name also appears to exclude women as a target audience.

¹¹⁵ <http://damagecontrolusa.com/products/womanizer/>

Instrument advertising also dovetails neatly into the mythology created around pop music stars. Even though pop music is almost entirely a studio phenomenon, pop musicians are rarely ever pictured in the studio. Photographs of live performances overwhelmingly dominate the visual depiction pop stars (Gracyk 75). Similarly, instrument manufacturers, especially those who make samplers and synthesizers, actively create a mythology of solitary musical production, where the lone genius works tirelessly outside of the domestic space, away from other people and family concerns (Théberge 125). For any aspiring practitioner, the drive for authenticity and the selling of images can form significant constraints and barriers to entry. The images surrounding a given form or media object send unambiguous messages about who was authorized to be a part of this culture or work in this genre. It is likely that many people interested in a given form may never even attempt its creation because they do not fit into marketed notions of who is allowed to. One might be troubled to think about people who may believe that they are insufficiently “real” to participate in a form that excites them.

For those who do feel authorized to work within the conventions of a given genre, their tools present an entirely new set of constraints. Not only does the advertising around equipment and musical instruments suggest an idealized and exclusionary vision of a practitioner, the tools themselves are “scripted” to encourage certain behaviors and discourage others. Matthew Herbert observes

I think software is an absolute disgrace at the moment. I think it's incredibly powerful, and I depend on it in so many different ways. But it's disgraceful really, when you think of the possibilities that electronic music and electronic studio have offered. Software is telling you the story, and it's telling you which stories to re-tell. So for example, you call up Logic or you call Reason, and it has a built-in drum machine. . . and it's encouraging you to work in blocks of four, and it's encouraging you can record at a tempo

that doesn't shift, it's encouraging you to record without distortion – all these different things, leading you down a very particular way. (Herbert 44)¹¹⁶

Regardless of the profusion of “affordable” equipment for musicians and other artists, the very tools of the trade encourage and even require certain decisions on the part of the practitioner. As Herbert makes clear these are not simply circumstances, these are problems that the practitioner is often consciously aware of and actively grappling with as she goes about her work.

Conclusion

This chapter has a somewhat different function than earlier chapters of this project. Like my first chapter on locating the sources of constraint, this chapter is explicitly concerned with examining the myths and suppositions that surround media and popular culture. My goal here has been to show that our notions of “big breaks” and wide exposure are largely constructed and retrospective. Audience demand can never predate distribution and thus pre-selection is an essential part of any manufactured “break.” But even if the break is a myth, a qualitative difference is affected between media that is widely distributed and media that is not. My second major goal in this chapter has been to demonstrate that distribution itself contributes its own particular set of constraints. No matter an artist's popularity or access to resources during the creation phase, the constraints of distribution are often linked to entrenched networks of physical objects, distribution systems, economic realities, and unexamined ideologies, which frame every aspect of the work's diffusion and consumption. All of these factors will

¹¹⁶ It is interesting to note how Herbert's comments aligned with the novelty tension I described earlier. See in particular his comments on retelling stories.

determine how the work is distributed and received, and may prove to be immutable obstacles to a practitioner releasing the work they envision or create.

Throughout this chapter, I have alluded to the Internet and the potential (often cast in utopian terms) it offers for media distribution. The Internet does offer a potential for dramatically reconfiguring systems and constraints of production and distribution, but it also quite limited by just the sort of ideological constraints I have been discussing. For instance, YouTube, the largest video hosting and streaming site on the web has content standards that do not allow nudity or depictions of sex. One must also sign into an account and verify one's age to view content with coarse language. YouTube's own "community standards" page urges users "Don't cross the line" and "don't post videos showing bad stuff."¹¹⁷ Ultimately YouTube's standards are quite similar to broadcast television with respect to sex, violence, drugs, and language. These facts are particularly ironic given that Internet users of any age can access all manner of hardcore pornography without any age barrier. It is fascinating to note that ideological constraints, at least, are clearly not being circumvented by the ease of digital distribution.

This chapter is somewhat less directly concerned with aesthetics than the others. Certainly, there are aesthetic consequences for many of the constraints I discuss. The relatively limited capacity of early 45 RPM records has probably contributed significantly to the short form popular song and the dominance of the "hit," even long after the constraint of that capacity no longer applies to the privileged distribution media (CDs and streaming files) of present-day music publishing and playback. The dimensions of

¹¹⁷ http://www.youtube.com/t/community_guidelines

early television screens clearly influenced the trend towards close-ups in Hollywood cinema. Because relatively small TV screens reproduced close-ups much better than long shots or panoramic landscapes, film directors eventually began composing their shots with eventual television distribution in mind. Other constraints do not have such obvious aesthetic consequences. What are the formal consequences of the quest for authenticity in hip hop music? This might be an excellent question for further research. Do the ideologies of “decency” and “community standards” generate novel aesthetics beyond the television with a notable lack of swear words and naked bodies? Again, I see this question as a potential avenue for further study.

One interesting feature this chapter is its trajectory. It begins with an explicit concern for media in distribution, rather than my earlier focus on media forms at their inception and practitioners struggling with early innovations. And yet, in discussing the advertising and image consequences of distribution, this chapter inevitably loops back around to the practitioner just beginning work. This trajectory hints at an interesting feedback cycle between commercially distributed products and the first attempts of new practitioners. I will explore this connection in my conclusion.

CHAPTER 6 CONCLUSION

This project makes a compelling case for constraint as a force for shaping many of the most distinctive elements of popular media genres. My principal goal was to discover what function constraint has in generating novel aesthetics, and what role constraint plays in the invention, production, distribution, and reception of specific popular media. As the project has developed, I have been able also to measure and revise many of the most commonly held creation myths of contemporary popular music, animation, and visual art.

In the final analysis, each of the media forms I discuss reveals itself to be shaped by at least one specific constraint. The Japanese animation industry is a situation where the known and accepted set of tools was hobbled by constraint. In the absence of adequate funding, previously accepted techniques for portraying character motion had to be discarded and a new aesthetic was forged, partially because of this constraint. Similarly, visual art made with the American Standard Code for Information Interchange (ASCII) reveals itself to be a media form decisively contoured by constraint, even though the constraints in this circumstance are more numerous and sometimes more ephemeral than in my other case studies. The conditions of ASCII art can operate as a deliberate constraint, an adaptive technology, or a generative environment where visual art is possible in an aesthetically distinctive way.

The historical developments of American rock 'n roll and hip hop also yield to a constraint hypothesis, although to varying and differing degrees. Rock music, with its focus on timbre and reliance on the electric guitar has a special relationship to audible distortion, which itself is the result of limited technologies of sound reproduction being

pushed to the point of “clipping.” Early amplifiers could not generate enough volume without being pushed into distortion and thus the distorted sound became a common, and soon an essential, element of the Rock musical vocabulary. Hip hop too, bears the marks of constraint in its practice, particularly where the limitations of technologies like the early sampler are concerned. The ostinato nature of hip hop is partly attributable to a durable musical culture that predates the forced repetitions of sampling technology, but this tendency is only reinforced by a set of technologies that require short, ostinato loops.

Over the course of this project, technology emerged as a much more powerful force than initially seemed possible. At first, technology is likely to appear as simply another, if clearly determinate, source of constraint, essentially equal in its influence on invention as personal or economic limitations. In fact, technology has more than one function in the relationship between media and constraint. Technology can be a powerful constraining force, but it can also be an adaptive resource, a source of encoded solutions and an agent that suggests possibilities. I have already discussed how the sampler can constrain the practice of music creation, but equally important is that same technology’s tendency to suggest its own future trajectory. In suggesting the possibility of phrase sampling, the sampler also implies the potential for ever longer loops of music. At the same time, the sampler withholds this potential because of the limitations of its very nascence; the novelty of the technology means that its promise would go unfulfilled for some time after it was suggested.

Perhaps more surprising is the extent to which the constraints of a technology can, contribute decisively to distinctive traits of an artistic work or genre. Even as

economic circumstances effectively crippled traditional cel animation in Japan, the animation apparatus itself suggested the possibilities of a limited frame rate as a viable alternative to traditional smoothness. Certainly, early animators were surprised by the functionality of basic “pencil tests.” They were shocked at how well the action could be “read” from this bare-bones animation. It is technology’s remarkable tendency to do the unexpected that makes it perhaps an equal player in media creation. Even in this project, technology leaves its mark. Due to hand injuries, I write with a dictation program that turns my speech into text on the computer screen. This program regularly makes small mistakes that need to be corrected. Yet it also inserts articles and prepositions that I have not spoken. Often, I attempt to “fix” these insertions only to find that they are desirable; my text, edited (invented?) by the voice recognition software is in some respect improved over what I had intended to write. Technology has surprising agency when it participates in the creation of any text.

The aesthetics of constraint are surprisingly consistent and durable, even between media forms. For example, the media objects under discussion all bear a tangible trace of clipped and missing information. The choppy motion and explosive transitions of anime, the pixilated structure of ASCII, the ostentatious truncation of hip-hop samples, and the flattened peaks of audio distortion all testify to the material influence of constraint on media. The theory of the durable aesthetic is also consistent. In the cases I have discussed, the clipped aesthetic persists even when the initial constraint is removed. Perhaps most interesting, the durable constraint can even be observed in forms like digital typography that are not the main focus of this project. Observe Zuzana Licko’s Lo-Res font, created in the highly constrained environment of

early personal computers. Not only have this font and others that resemble it continued to be used, they still carry the mark of technology itself, of the bleeding edge of newness, an aesthetic that is still highly desirable.

Finally, this project makes strong claims about effects of distribution on media. Here, we must work most strongly in opposition to mythologies of how media objects are promoted and distributed. This project spends a great deal of time debunking the popular myth of the “break.” Rather than discussing works that have “broken,” it is more appropriate to consider media objects “in distribution.” And in the condition of distribution, we find evidence of some of the most underreported and underappreciated constraints at work. Physical media, networks of transmission, and ideologies of economics and “community standards” all play important roles in determining how media objects can eventually end up in the hands of the audience, and what the audience makes of them, potentially generating new uses and new genres from them. And even though the concept of “pre-selection” was long ago articulated by Adorno, his formulation appears reductive in the cases under discussion. We cannot rightly say that media producers are seamlessly integrated into systems of distribution. There is a well-documented tension between the aims of media practitioners and the requirements of the distribution networks that can guarantee that their work reaches a wide audience. Some of the conclusions in this chapter are perhaps the most surprising and most useful for evidence-based understanding of the economic and technical conditions of popular media in contemporary American culture.

This project has several implications for future work in media studies. First, while constraint may not play the same roles in other media forms as in those I have identified

here, the function and influence of constraint are often under-reported. Prevailing narratives concerning innovation, even long after the Romantic myth of the solitary genius has ceased to apply, tend to center on personal ability and the “break;” we seem disinclined to look at accomplishments as a product of constraint. Such myths and our disinclination have obvious roots in contemporary legal structures and economic practices and in postindustrial ideologies of individual agency and the accomplishment of women and men of unusual talent and foresight. But, this project devotes considerable time to investigating and debunking these myths, and to demonstrating that the determinate factors of artistic innovation are limiting of the individual’s ability to invent—indeed, that limits are the primary determinate factors of invention.

There is also a final point to be made about the nature of constraint itself. Though I have taken great pains to separate the general field of constraint into several strains, it seems that all constraint is ultimately a product of specific cultural and ideological forces. As I wrote in the introduction, it will be most productive for investigations such as this one to focus on problems that practitioners themselves identify as roadblocks. We must avoid the tendency to ascribe constraints externally, based on our historically situated notions of what tools or knowledge are necessary for a given practice to begin and to flourish. If the problems are located within practitioners’ imagining of their practices, then we must place constraints there as well. It is true that the early sampler imposed real, material-technological constraints on what music could be made with the device. But the device itself is, in another sense, neutral. It has only a set of characteristics, and these traits only become constraints in the mind of the practitioner who has a set of preconceived notions about what is appropriate, necessary, or

expected. If an early sampler only had an internal memory of 1.2 seconds, why is that too little time? Probably because early hip-hop musicians had culturally situated expectation concerning the appropriate length of a loop or a drum break. We can examine the case of a musician who cannot read standard notation with a similar kind of skepticism concerning initial expectations. Does this lack of notation skill mean they cannot create or disseminate complex music, which could by another artist be notated? No. Does the lack of notation skill mean that collaborative work is impossible? Again, no. What it does mean is that vernacular music coming into contact with traditions of complexity inherited from European music might absorb certain standards regarding harmonic content for pre-arranged composition (as opposed to complex group improvisation.) An inability to read music is only a constraint if the practitioner is aware of and desires the effects that standard notation can have on her music. The constraint, thus, is framed within her own mind.

As this ideological/cultural dimension of constraint comes into focus, this project could be extended by exploring the ways that traditions of practice among media producers generate or sustain ideological constraints of practice. In his discussion of hip-hop producers, Schloss enumerates a long and complex set of rules that govern “ethical” sampling. Schloss discusses what records may be sampled from, how often, and by whom. He also describes a system of ridicule among producers that has a normativizing effect, keeping practitioners from straying outside of these ethical systems. These sorts of highly enforced cultural rules clearly create new sets of constraints, but we could take these conclusions even further by examining the ways that the material characteristics of a given form are also a source of constraint. The

cultural/ideological constraints I discuss above are surely formed by the defining traits of the form in question. Animation is an excellent example. Because the cultural and economic success of the Walt Disney Company had made its imitation of cinematic realism the ideological standard by which the success of animated film was judged, any deviation from that norm was considered, in comparison, to be undesirable. The distinctive “jagginess” (as I have used that term, as a measure of a departure from notional realism) of anime was, initially measured against the Disney norm. This elevation of one aesthetic over others ensured Disney’s dominance of the market for decades, but it also enforced the very constraint that restricted experimentation with frame-rate. Animators themselves tended to see cinematic smoothness as a marker of quality and were not inclined to push against these boundaries. Crucially, these constraints were understood to be standards that one would not wish to fall below. The widely accepted definitions of “good” animation became the foundation for economic and technological constraints that would come to define, in contrast, anime. As this project moves forward, it should continue to explore ideology as a source and location of constraint.

Like all doctoral dissertations, this one has limitations. Hip hop, in particular is challenging to write about with historical precision. My theories offer one explanation for some of the features of hip hop. And yet, many theories can be made to explain a set of circumstances. If I assume that hip-hop musicians are fundamentally similar, in most respects, to musicians working in other vernacular genres, and that they have similar needs regarding display, virtuosity, and individuality, then this project is a valuable addition to hip-hop studies. Similarly, I believe my discussion of the sampler and its

technological constraints is well supported by the available evidence. Still, this one constraint sometimes seems insufficient. Even Schloss, who argues passionately against the “poverty thesis” of hip-hop innovation, still remarks that “certain elements of hip-hop culture, such as b-boying or b-girling, graffiti writing, and emceeing may well have been the products of economic adversity” (27). And yet, Schloss explicitly exempts hip-hop production and deejaying from direct effects of poverty because of the cost of the equipment used by artists. Schloss’s arguments are compelling and seem thorough. But it does seem doubtful that all the other elements of traditional hip-hop culture might be direct products of financial constraint while deejaying and production are not.

I am left wanting something more. Our cultural notion of hip hop is suffused with ideas of constraint, and most theorists seem to want some global constraint they can point to as being formative or even determinate of most of hip-hop practice. Maybe our instincts are justified and there is a unifying theory of constraint that will allow us to make more useful observations about hip hop. Maybe we just can’t let go of the fact that individuals who were generally economically disadvantaged produced some of the most dominant music of late twentieth century American culture. (Of course, much the same could be said regarding the roots of blues in the early twentieth century.) For whatever reason, critics appear to want poverty, or the desire to escape from poverty, to be the most important factor in determining the distinctive music and culture of hip-hop. For now, I am satisfied that I have been rigorous in dispelling important myths. Even if the unifying theory of constraint in hip hop is not to be found, having a clearer picture of its history and the conditions of its invention is surely worthwhile.

This project presents numerous directions for future study. For instance, there is room for (at least) one more chapter, focusing on the “hack;” the moment where a practitioner realizes her limitations and generates a specific, opportunistic fix to circumvent them. (We may think of the hack as the correlative moment of the “break,” but more directly bound to the generative effects of constraint.) The act of “hacking” tools and materials can be observed throughout all of the media forms under discussion. When hip-hop producers found that their samplers could not capture loops of a desired length, producers simply sampled at a lower rate to record longer loops and then sped up the resulting sound to retain the original pitch. When Japanese animators were confronted with the necessity for reduced frame rates, they found strategies to compensate for the resulting absence of smooth character motion. By using the multi-plane camera, explosive transitions, and an emphasis on multi-plane composition and apparent camera motion, these animators invented a visual and narrative style that could even foreground reduced character motion without seeming in other ways particularly “limited,” and which could be understood to be aesthetically novel. In all of these situations there were moments of specific innovation in which tools or concepts were, sometimes very quickly, re-fashioned to suit the needs of a constrained reality.

Several worthwhile questions are generated here. Under what parameters are objects hacked? What is it about certain practitioners that allows them to see their tools as malleable and open to hacking? Obviously, many hacks are not, strictly speaking, technological. Just as often, the conventions of a given media form need to be hacked. As much as they were playing with technology, anime’s innovators were changing the ways that they dealt with audience expectations for what animation was supposed to

look like. Is it reasonable to see these two things as equivalent? Are hacking technology and culture the same, or analogous things? Even if they aren't, might we see useful parallels between the two? As this project expands, it should take on these questions.

Additionally, though this project touched on the effects of Internet distribution in Chapter 4, this is an area of inquiry that obviously demands fuller consideration. Although my discussion of Typewriter and ASCII art demonstrates that the Internet is hardly a utopian site for unlimited distribution, there are a number of questions to be asked about how digital distribution will ultimately generate additional constraints. In the age of iTunes, we can already see how the materiality of recorded music as an object has been fundamentally altered. The physical/tactile experience of an LP or a CD is, increasingly, unfamiliar to the most recent generation of music consumers. With the disappearance of "cover art," an interesting link between popular music and visual art is mostly gone. And these constraints are only those caused by new systems of distribution and new technologies for listening. If we venture into the realm of legislative constraints and the way the copyright and intellectual property law may constrain applications of Internet technologies to practices of music production and distribution, then it would be a long discussion indeed.

Beyond its effect on distribution, the shift from analog to digital forms of production and dissemination in popular media is a topic rich with potential for constraint-based historical analysis. Creation in the digital domain is fundamentally different. Music production is now possible with an essentially unlimited number of tracks and a previously unthinkable capability to "undo" recorded sounds or special effects. The net result, at least for musicians, is that decisions about a final take can be

delayed almost forever. Since data is rarely ever lost, and there is more than enough storage space to keep multiple takes, opportunities for dithering and procrastination are essentially endless. In a related area, digital production also expands possible options of production for any media object. Where previous practitioners in any media form might have felt constrained by their equipment's nascent capabilities, the modern computer-based media artist might be paralyzed by the seemingly *unlimited* options presented to her. Surely this is another kind of constraint, and we can already see a backlash against it. Many media producers refuse to work in the digital domain. In music as well as film, analog purists are active. Many of them cite the enormous editing possibilities of digital creation as a detriment to production, while others are justifiably concerned about digital media's potential for longtime archiving.

Even as technologies are introduced that are intended to remove barriers, new constraints are always appearing. Perhaps this is part of the phenomenon I address in Chapter 2: "the new technology is often inferior, in some respects, to the one it replaces." It seems impossible for technology manufacturers to present a new technology that solves some pressing problem without also introducing significant deficits or challenges in other areas. These questions should be discussed as this project is expanded.

Ultimately, this project demonstrates that constraint plays a larger, and a more determinate role than is generally understood. Not only are effects of constraint felt, in the invention, distribution, and reception of media, more often than we tend to believe, constraint reliably leaves its mark on finished media. Even further, the aesthetics influenced by constraint endure because they come to be thought of as valuable in their

own right. Audiences and producers simply prefer them. This project also shows the dangers of believing the stories we are told about media production. Great men (or women) and geniuses are actually in short supply, if they exist at all. The media that fill our lives is always the product of many forces moving at once, often heterogeneously, often in open opposition to one another. It is the human abilities to evade, conquer, and embrace these oppositions that make the forms of media and or their consumption distinctive and meaningful.

APPENDIX A
FIGURES

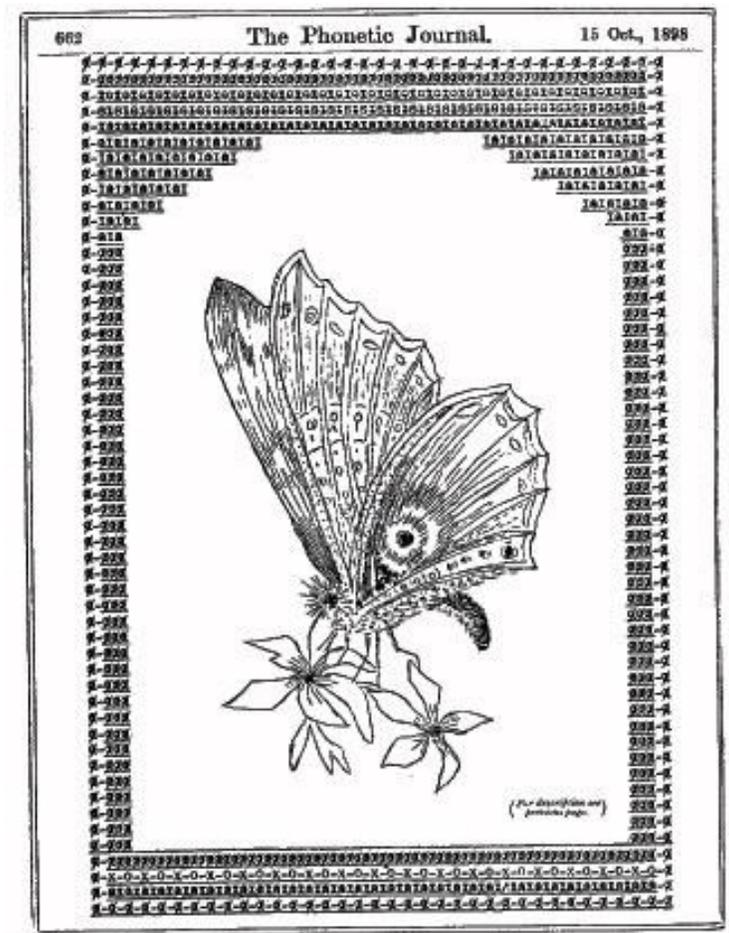


Figure 1-1. Flora Stacey's typewriter butterfly



Figure 1-2. "My Friend's Old Barn in Oregon" Paul Smith, 1987. © Paul Smith.

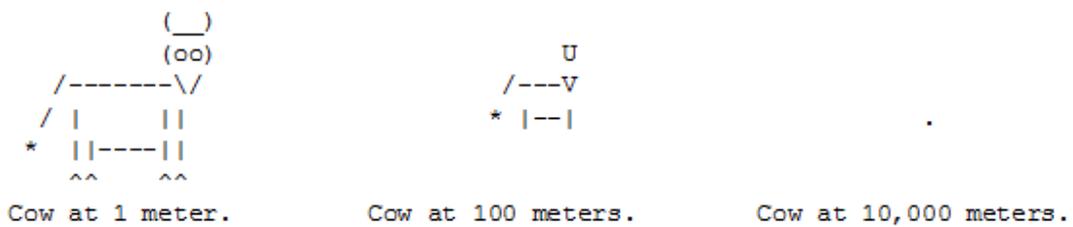


Figure 1-4. A lesson in ASCII perspective using cows.

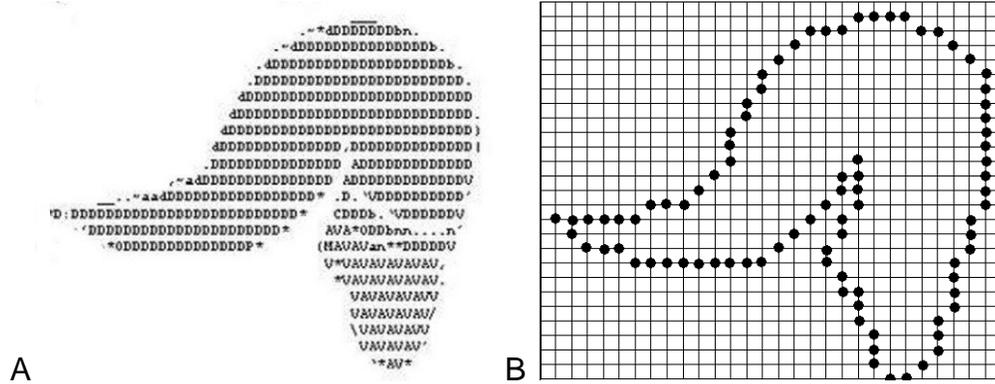


Figure 3-1. Comparison between ASCII curves and points on a grid. A) An ASCII curve. B) The same curve rendered as points on a grid.

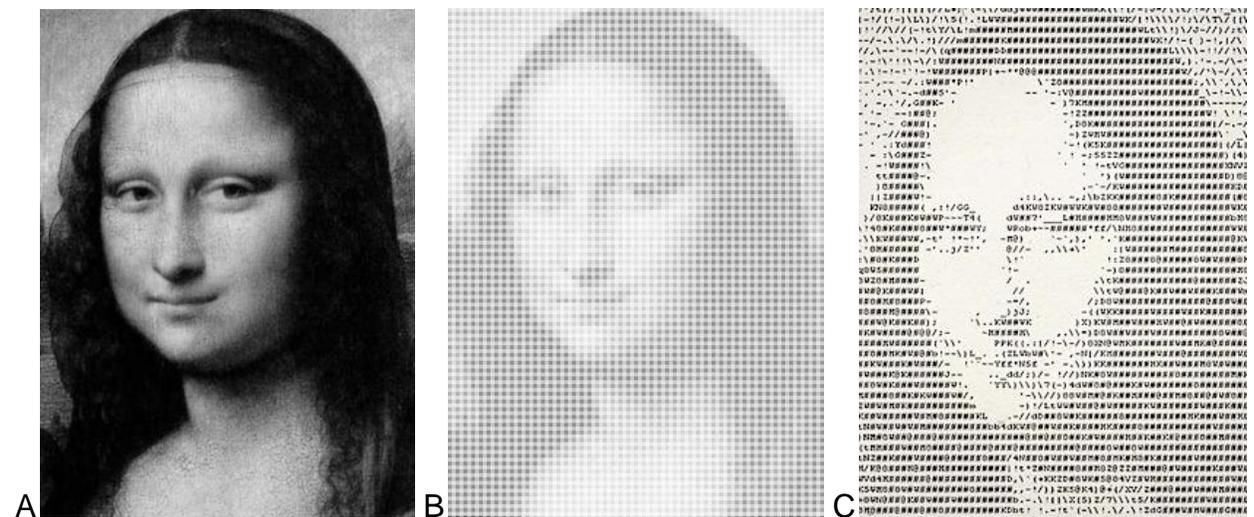


Figure 3-2. ASCII art as an analogue for “missing” data. A) A detail of the *Mona Lisa* by Leonardo da Vinci. B) The same detail with some data deliberately removed. C) The same detail rendered in ASCII.

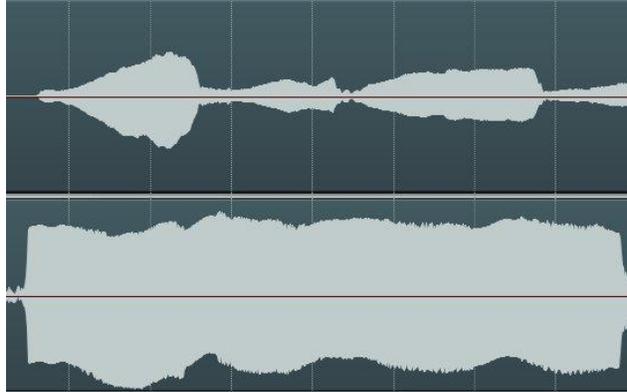


Figure 3-3. An undistorted waveform shows smooth and obvious peaks, while that same waveform shows flattened peaks when it distorts.

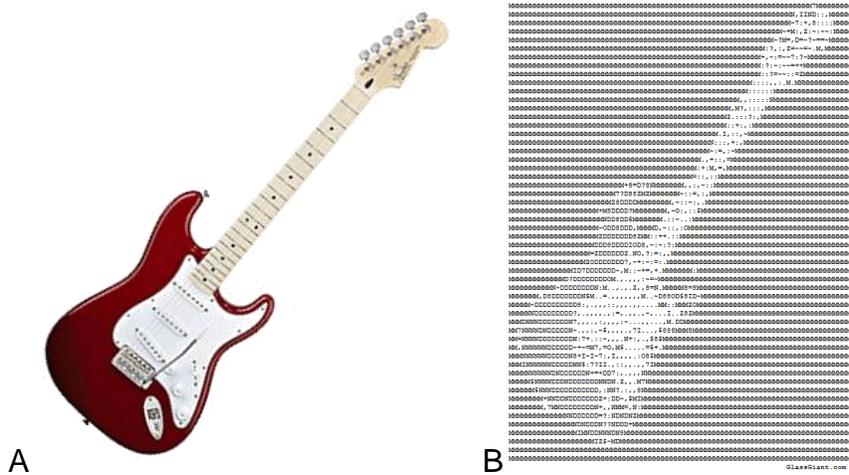


Figure 3-4. The use of automatic ASCII art generating software. A) A standard JPEG. B) The same JPEG rendered into ASCII art using an automatic online ASCII generator.



Figure 3-5. A sample of the Lo-Res font by Zuzana Licko. Image Copyright © 1995–2011, Emigre Inc.

```
19-Sep-82 11:44      Scott E  Fahlman           :-)  
From: Scott E  Fahlman <Fahlman at Cmu-20c>  
  
I propose that the following character sequence for joke markers:  
  
:-)  
  
Read it sideways.  Actually, it is probably more economical to mark  
things that are NOT jokes, given current trends.  For this, use  
  
:-(  

```

Figure 3-6. Professor Fahlman's original e-mail suggesting the use of the smiley face.

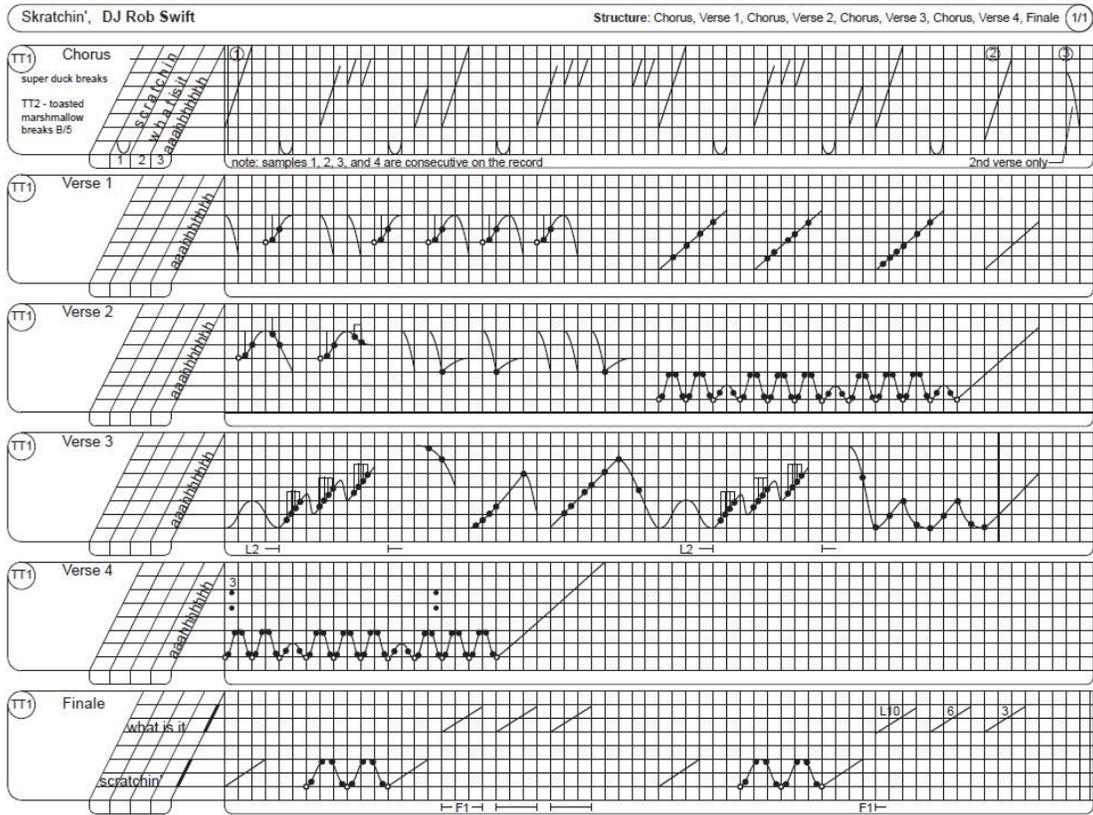


Figure 3-9. Rob Swift's scratch notation system. Image taken from www.audiofanzine.com © Rob Swift.

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BIOGRAPHICAL SKETCH

Rex Krueger received his bachelor's degree in English and creative writing from Southern Connecticut State University in 2002. After a brief career in social services, he enrolled in the University of Connecticut's master's degree program in English and graduated in 2007. After completing his master's degree in American Literature, he was accepted into the University of Florida's PhD Program, where he began a doctoral dissertation concerning the effects of constraint on the aesthetics of emerging media forms. Under the direction of Terry Harpold, Rex completed his dissertation and graduated in the spring of 2012.