The Tubular Groaning of Galactic Refrigerators
Noise in the Age of its Mechanical Reproducibility

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In 1975 Lou Reed, former guitarist and front man of rock group The Velvet Underground, released *Metal Machine Music*. His previous studio album, the R&B-tinged *Sally Can't Dance*, his first and only album to enter the Billboard Top 10, was enjoying tremendous commercial success, and in the wake of that success, his record company, RCA, was pressuring Reed to release a new album as soon as possible and capitalize on his growing popularity. The new record was promoted widely; the cover featured Reed in a leather jacket wearing dark sunglasses, playing the part of the archetypal rock and roll musician, and the title was stamped on the cover in a typeface evocative of both metal machines and masculine rock and roll. Barely two weeks after the record was released, many fans were returning their copies to stores, claiming them defective, and RCA reportedly was forced to buy back thousands of copies from record stores. A reviewer in *Rolling Stone* compared the double-LP to "the tubular groaning of a galactic refrigerator" (Wolcott), critic Lester Bangs described it as "aural flagellation" (196), and to this day *Metal Machine Music* consistently places near the bottom of "Worst Record of All Time" lists. Lou Reed's newest hit album was a complete failure.

What did Lou Reed do? *Metal Machine Music* seemed from the outside to be a standard two-disc LP; each side is marked as lasting for sixteen minutes and one second,

except for the last side, unusually marked "16:01 or ∞." In a list of "Specifications" on the back of the record sleeve, Reed appears to catalog the standard equipment he used in the studio: three tape recorders, at least seven amplifiers, and a variety of sound effect units. The list continues, however: "avoidance of any type of atonality," "drone cognizance and harmonic possibilities vis a vis Lamont Young's Dream Music," "no synthesizers," "no arp," "no instruments?," "no panning," "no phasing," and, simply, "no." In his largely incomprehensible liner notes, Reed writes "this is not meant for the market" and "I'm sorry, but not especially, if it turns you off" (Reed). Even Reed's cryptic warning, however, does not give away the sound of *Metal Machine Music*.[1]

The record begins abruptly with a searing, distorted, electric wail and continues similarly, without interruption, for over an hour. The last side of the album ends in a repeating locked groove, so the record does not stop until the needle is manually removed from the record. Reed's specifications suggest one possible description of the sound: "Combinations and Permutations built upon constant harmonic Density Increase and Melodic Distractions" (Reed). Lester Bangs describes it differently:

> Let me briefly explain here that what we have here is a one-hour two-record set of nothing, absolutely nothing, but screaming feedback noise recorded at various frequencies, played back against other various noise layers, split down the middle into two totally separate channels of utterly inhuman shrieks and hisses, and sold to an audience that was, to put it as mildly as possible, unprepared for it. (184)

And later in the same article:

> ZZZZZZZRRRRRRRRREEEEEEEEEGGGGGGGGGGR
> RRRRAAAAARRRRRRRGGGGGGGGGGHHHHHN
> NNNNNNNNNNNIIIIIIIIIIEEEEEEEERRRRRRRRR
> RRRRR (188)

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[1] CD Track 1, excerpt from *Metal Machine Music*.

Some critics thought Reed was trying to break out of his contract with RCA or his relationship with adoring fans; others assumed *Metal Machine Music* was an art-rock joke. Bangs, in spite of his descriptions of the record, called *Metal Machine Music* "The Greatest Album Ever Made" (196).

In 1980 Masami Akita, a 24 year-old Japanese recording artist who recorded under the name Merzbow, released his debut record, *Metal Acoustic Music*,[2] a noise composition titled after Reed's *Machine Music*. *Metal Acoustic Music* was noisy like *Metal Machine Music*; the clattering of household items, electrical bumping, and whir of anonymous devices replaced guitar feedback. Merzbow had no record contract to escape (he released his recordings himself), and he had no fans to alienate. While *Metal Machine Music* was a departure from Lou Reed's usual aesthetic, Merzbow's musical output continues to be atonal, largely arrhythmic, and, many might say, unmusical. Whatever Reed's intent was, he clearly made a statement of difference: *Metal Machine Music* confronted expectations, alienated his listeners, and stood out from the rest of his catalog: it was not *Sally Can't Dance*. Merzbow's recordings, on the other hand, have become arguably more and more difficult to listen to than *Metal Machine Music*; his oeuvre includes cassette tapes packaged with violent pornography, unprintable titles, and jarring technological experiments, yet his listeners avidly seek them out. Lester Bangs quotes Reed as saying of *Metal Machine Music,* "anybody who gets to side four is dumber than I am" (194). A Merzbow record, on the other hand, is meant to be listened to.

Both *Metal Machine Music* and *Metal Acoustic Music* are commonly referred to as noise records, but they seem to invite different kinds of attention. If we are supposed to

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[2] CD Track 2, excerpt from *Metal Acoustic Music*.

listen to Merzbow and be frustrated by *Metal Machine Music*, what does it mean to call a record "noise?"

Acoustic Ecology: Rock and Roll is (not) Noise Pollution

In the late 1960s, R. Murray Schafer, a Canadian composer and environmentalist, founded the "World Soundscape Project," an academic program which studied the sounds of the environment and humankind at Simon Fraser University, outside of Vancouver. In 1970, the Project published a book, *The Book of Noise*, defining the term "noise pollution" and providing a guide and rallying cry for civic action against it. Schafer systematized the ideology of the World Soundscape Project and *The Book of Noise* in his seminal 1977 work, *The Soundscape: Our Sonic Environment and The Tuning of the World*. In it, he describes the risk of not carefully designing the sonic impact of society around the fundamental order of the natural soundscape: "It would seem that the world soundscape has reached an apex of vulgarity in our time, and many experts have predicted universal deafness as the ultimate consequence" (3).

In a chapter of *The Soundscape* adapted from *The Book of Noise*, Schafer suggests four answers to the question "What is noise?":

> *Noise* has a variety of meanings and shadings of meaning, the most important of which are the following:
> 1. *Unwanted sound*
> 2. *Unmusical sound*
> 3. *Any loud sound*
> 4. *Disturbance in any signaling system* (182)

Unwanted sound is subjective: there is no universal standard for sonic desirability, but Schafer presumes that a community will agree in a general sense about the sounds it wants and does not want, allowing for "qualitative" legislation against noise pollution (183). Unmusical sound is even more subjective: "One man's music may be another

man's noise," he concedes, and people are less likely to agree on what counts as music (183); Schafer takes the view that "all sounds belong to a continuous field of possibilities lying *within the comprehensive dominion of music*" (5), so he would not support the conventional separation of sounds into musical and non-musical. Loud sound, on the other hand, seems more objective: volume can be measured in decibels, and legislation can be written that "sets decibel limits to specific undesirable sounds" to prevent hearing damage (183). For the legislative agenda of the World Soundscape Project, this definition is the most effective. Unfortunately for Schafer, as he acknowledges, "not all irritating noises are necessarily loud," but "the quantitative measurement of sound is tending to give noise a meaning as 'loud sound'" (183). While legislating decibel limits is a relatively simple matter, it seems that finding the unified, irritated public Schafer needed to pass qualitative legislation was more difficult than he expected.

In 1980 AC/DC, a rock and roll band from Sydney, released the song "Rock and Roll Ain't Noise Pollution" on their seventh album, *Back in Black*. The second verse begins,

> Heavy decibels are playing on my guitar
> We got vibrations coming up from the floor
> We're just listening to the rock that's giving too much noise
> Are you deaf, you wanna hear some more?

And the song ends with the chorus,

> Rock and roll ain't noise pollution
> Rock and roll ain't gonna die
> Rock and roll ain't no pollution
> Rock and roll is just rock 'n' roll.[3]

Remarkably, AC/DC seem to address Schafer's quantitative legislative agenda point by point. Their music is loud ("Heavy decibels"), disturbs their environment ("vibrations

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[3] CD Track 3, "Rock and Roll Ain't Noise Pollution"

coming up from the floor"), and potentially causes hearing loss ("Are you deaf?").

However, while Rock and Roll might be loud, AC/DC are adamant: it is not noise. It

seems that even Schafer's quantitative definition of noise can be subjective. Acoustic

ecologists, faced with this denial, might then return to the qualitative definition of noise:

for the parents and neighbors of AC/DC fans, the band's "heavy decibels" are unwanted

sound. In spite of Schafer's assumption that "in a given society there should be more

agreement than disagreement as to which sounds constitute interruptions," this

agreement does not seem to bridge the generation gap (183).

　　　　Rock and Roll was not the first challenge to traditional ideas of noise and music.

The Italian Futurists argued on behalf of noise decades before *Metal Machine Music*;

Marinetti's famous futurist poem "scRABrrRrraaNNG" is

echoed in Bangs' evocative synopsis of *Metal Machine Music*.

Luigi Russolo, the futurist painter and musician, inspired by

Marinetti's *parole in libertá* poetry, wrote in his *Art of Noises*

manifesto in 1913 that "it cannot be objected that noise is only

loud and disagreeable to the ear," suggesting that a category

of "subtle and delicate noises" exists as well (25). Unlike

Schafer, Russolo advocated for the expansion of industrial and

city noises into the concert hall and out into the natural world;

however, his "subtle and delicate noises" include natural sounds as well, such as "the

roaring of a waterfall, the gurgling of a brook" and "the rustling of leaves" (25), sounds

which Schafer would consider part of the natural soundscape. While Russolo desires noise

and assimilates natural sounds into that category, Schafer tries to use noise as a dividing
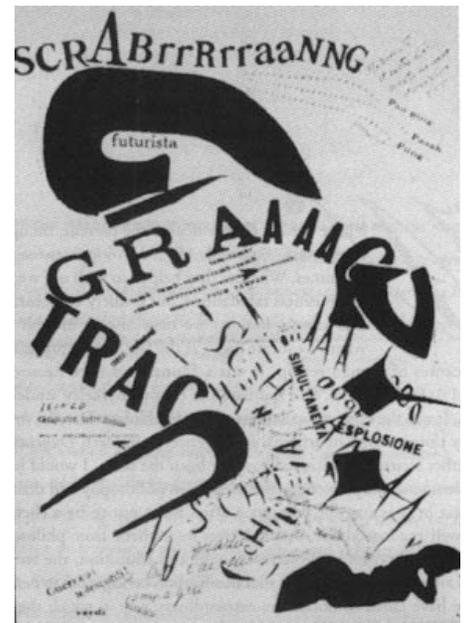
line between sounds that are harmonious with the natural soundscape and those that are not.

All of these examples point to a somewhat obvious conclusion: "Noise" is relative. One man's music is another man's noise, and a variety of social, cultural, contextual, generational, and other differences are to blame for disagreement over what constitutes noise. Schafer's definitions of noise as "loud" or "unmusical" are not always accurate; some loud sounds, in proper context, are not noise; there are unmusical sounds that are not noisy. "Unwanted sound," while a subjective definition, seems to most accurately track the shifting conceptions of what noise is. Merzbow's fans want his noise; Lou Reed's fans did not. AC/DC fans call it rock and roll; their parents call it noise pollution.

Schafer's fourth proposed definition of noise is a "disturbance in any signaling system." The signaling system for an acoustic ecologist might be interpreted as the natural soundscape; whatever interferes with this system would be noise. This definition comes from the field of information theory, where it is used with regards to communication: noise is signal interference "such as static on a telephone or snow on a television screen" (Schafer 182). Noise is the complement of signal: In the acoustic world, signals would be sounds that communicate to the listener; anything that disrupts that system of communication would be noise.

If noise is the complement of signal, then what is signal? We might start with the idea that signal is generally that which we focus on, the words in language, or the notes of a musical composition; extraneous sounds would then be noise. However, the realm of signal expands rapidly: the tone of voice adds a layer of meaning to language; the motions of a violinist add to the meaning of a musical performance. Details that might not be considered signal (thus, noise) at one level of inspection can communicate at another.

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What is signal to one, however, is still not necessarily signal to someone else: to a person who cannot discern meaning from tones of voice or someone who cannot see the motions of a violinist, these data are not part of the signal.

If what constitutes signal is simply what is focused on and various people are capable of focusing on a nearly infinite variety of things, then anything could potentially be (or not be) signal. For Lester Bangs, *Metal Machine Music* was worth listening to; for the fans who returned their records to the store, it remained noise. This attention connects the information-theory definition of noise to Schafer's first suggested definition: "unwanted sound."

Bangs' willingness to examine *Metal Machine Music* critically resulted in its becoming signal; to him, it was neither unwanted nor a disturbance but rather an object of inquiry. For the theoretician of noise, this poses a challenge. If one accepts that noise is culturally and even personally determined, how is noise to be investigated, when, by the act of investigating, noise is turned into signal?

Recording seems to offer a possible solution to this dilemma. While the critical eye (or ear) might alter one's relationship to a sound, it does not alter the material existence of sounds. A vinyl record of *Metal Machine Music* gives a fixed physical form to sound and produces the same sets of vibrations regardless of who is listening or how they are listening. "Noise" and "signal" are labels; they do not inhere in what they refer to, and can vary without what they refer to varying. An investigation into noise might perhaps begin by finding a way to deconstruct or abandon these labels.

Because interested interaction with noise turns it into signal, it seems possible that manipulating noise indifferently might allow it to maintain its status. After all, the fans who listened for a moment to *Metal Machine Music* and then returned it to the store seem

to be the only ones who were able to experience the record truly as noise. Yet the very existence of the recording causes a definitional problem: the *signal* the record communicated was "noise"—noise in opposition to both music and the expectations of the listener.

This paradoxical situation is enabled by fact that *Metal Machine Music* exists as a record. The recording is a communicative object; it is made to be listened to. Any possible sound can be held on a recording, regardless of what label might be applied to it, and when that record is played back, new labels can be applied, regardless of its prior status. Recording offers a stopping point for communication between raw sounds and human cognition, fixing sound in space and rendering it repeatable, but not processing it into categories.

In this state, noise operates uniquely. The definitions Schafer offered addressed noise only as it was listened to; noise was a state of communication (or lack of communication) between two things. Because the existence of noise on a recording is independent of a relationship with the listener, it may no longer be simply noise *or* signal. Whether recording renders noise into signal or into something else, the process and possibility of audio recording alter the definition and reception of "noise."

From Merzbau to Merzbow: Noise and Nonsense

Merzbow took his recording name from the Dadaist collaborator and Hanover eccentric Kurt Schwitters' bewildering home, which he called *Merzbau*. His house was filled with, and was itself part of, a series of *Merz* works, mostly paper collages, which took their name from a fragment of the trademark *Commerzbank* on one of the earliest pieces. The *Merz* pieces took fragments (of paper clippings, found objects, or three-dimensional

shapes, in the case of the *Merzbau*) and integrated

them into a new whole. The fragments, when

composed together with other fragments, begin to

take on meaning: headlines and train tickets form

narratives, and word fragments come to signify

anew. Just as noise becomes signal when attention is
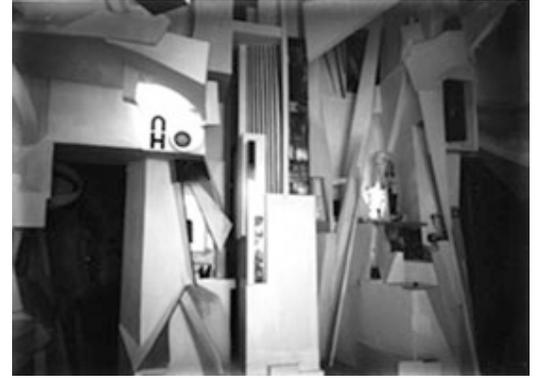
paid to it, so the seemingly senseless fragments of a *Merz* collage accrue meaning through

their recontextualization and framing as works of art.

In addition to his visual art, and more directly relevant to the topic at hand,

Schwitters was a poet and musician. He wrote a series of sound poems, consisting not of

words, but rather of discrete phonemes, the most famous of which is his *Ursonate*.[4] The

Ursonate took its structure from the traditional sonata form, repeating themes and

developing motifs using the phonemes of language rather than musical notation.

The third section of the *Ursonate* begins:

> Lanke trr gll
> pe pe pe pe pe
> Ooka ooka ooka ooka
>
> Lanke trr gll
> pii pii pii pii pii
> Züüka züüka züüka züüka

("Ursonate," accessed at www.ubu.com)

The syllables of the *Ursonate* reflect the *Merz* aesthetic in their fragmentary nature; they

are not recognizable words, but are recognizably parts of words. Their repetition in the

structure of the piece places them in relation to each other like the clippings of a collage;

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[4] CD Track 4, excerpt from *Ursonate*

certain sections sound like the sounds of nature, machinery, or some recognizable but indistinct foreign language.

In spite of their juxtaposition, the lines of the poem are nonsense. They do not denote as language does; they can only develop connotations, whether by echoing ordinary language or by trading on their repetition and relations to other sounds in the poem (e.g., the "oo" of "Ooka" versus the "üü" of "züüka"). This lack of signification parallels the noise of *Metal Machine Music*: the sounds of the *Ursonate* do not function within an existing signifying system, and thus only develop meanings when they become objects of inquiry. However, unlike *Metal Machine Music*, the individual phonemes of the poem are recognizable fragments of a language (in this case, German). The two pieces operate similarly, but at different levels of the communicative hierarchy: where *Ursonate* scrambles signal on the phonological level, *Metal Machine Music* breaks down meaning on a level even smaller than phonemes.

This distinction implies an even more expansive system of linguistic noise, which might be more familiarly referred to as nonsense. On the level of phonemes, *Ursonate* provides an excellent example of how language sounds may be reorganized to erase denotative meaning. Above that, we might find word-level, or morphological, nonsense: a sentence that consists of words that exist, but do not make sense together. Noam Chomsky's famous sentence "Colorless green dreams sleep furiously" is such semantic noise. The syntax of sentences could come next: abandoning the rules of grammar would strip sentences of some of their meaning. This pattern ostensibly continues up through

paragraphs, articles, entire journals, discourses and so on, at each stage making possible a particular kind of noise.[5]

Turning to smaller signifying systems, we might begin with the sounds on *Metal Acoustic Music*. Unlike Lou Reed's album, the sounds of *Metal Acoustic Music* are distinguishable from each other. There are hums and whistles and groans, electronic and otherwise, that can be separated and identified. Thus, while the piece exists not as a score but as a recording, one can imagine a potential transcription made at a certain level of precision that would approximate the sounds on the recording. The resulting score would be a set of instructions for how to produce the piece.

When discussing the signs of language in relation to sound, we might consider them as a sort of instruction. In practice, the written signifier refers primarily and as if directly to its signified: the "meaning" of the word, the tree that "tree" indicates. However, a written word also indicates pronunciation in a system of language-specific instructions (the sounds evoked by "t," "r," "e," and "e"). The word may be the smallest intelligible linguistic unit, but the phonemes indicated by orthography reveal a substratum of parts that support language. The large-scale levels of signal and noise outlined above still operate in the realm of language; even if we take the scale of discourse-order noise as a possibility, these various levels of signaling still consist of linguistic signs. But the semantic level is not the lowest relevant level that can be distinguished by humans. Below the morphological or phonological levels, written linguistic signifiers cease to indicate sounds with sufficient precision (one could not write the words to *Metal Acoustic Music*), and this necessitates a different system of signification.

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[5] cf. Gleick, *Chaos* for a description of self-similar systems envisioned in chaos theory.

Several possible signifying systems might be imagined. One option is the type of score that might be transcribed from *Metal Acoustic Music*, a description of the qualitative features of its sounds. If one knew the equipment Merzbow used to record *Metal Acoustic Music*, another, perhaps more accurate, type of transcription would consist of instructions for manipulating certain machines to produce certain sounds. Both of these possible signifying systems use language, but unlike standard language, they signify sounds that are not limited to their own pronunciation.

A second potential option for representation is Western musical notation. Musical notation avoids some of the complications that arise from written linguistic signification: a note on a staff directly signifies nothing but sound, avoiding much of the baggage of language. The set of signs on a sheet of music function together as the blueprint for sonic production, but they are by no means complete in their specification of the sound to be produced. Some variables of a musical performance cannot be notated (e.g., the precise style in which a string is bowed on a violin), and others are notated imprecisely, allowing for a wide range of interpretations (*allegro non troppo*). Like the written linguistic signifier, musical notation focuses sonic signification around a set of specific variables to be defined. Just as the [b] of language is defined through its distinction from [p], so the Do of a musical scale is significant in not being Re.[6]

Returning to the task of transcribing *Metal Acoustic Music*, it becomes clear that Western musical notation is also insufficient for transcription. One might approximate the rhythms and pitches of the various sounds in the piece, but the resulting score would not indicate how to reproduce the Merzbow recording in the same way that the score to Beethoven's Fifth Symphony enables any individual performance of it.

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[6] The signs of musical signification also have intrinsic relations such as the scale that organize their use.

Moving from *Metal Acoustic Music* to *Metal Machine Music*, the transcriber encounters another problem: while the sounds of *Acoustic Music* are discrete, offering themselves as units to be described and potentially notated, in *Machine Music*, no obvious demarcations present themselves. The entire record weaves together textures of noise, resisting separation into discrete parts.

A specialized notational system might be imagined to accommodate some of the sonic peculiarities of *Metal Acoustic Music*; for *Metal Machine Music*, this seems nearly impossible. The system of musical notation, like linguistic signification, relies on difference. This difference (Do is not Re) necessitates boundaries between sounds (the line where a note ceases to be A and the line where it becomes A#). As such, the score to Beethoven's Fifth does not indicate the total sum of frequencies produced by the orchestra; it simplifies them into a core set of signifiers that, when followed, will produce a set of waveforms, focused around those specific sounds indicated by notes, that can be referred to as an instance of the piece. There are few units of sound in *Metal Machine Music* to suggest a possible notation system.

The resistance of *Metal Machine Music* to transcription suggests an additional definition of noise: Noise is not only that which does not signify, it is also that which cannot be signified. It resists signification from both sides; it is definitionally extra-systemic, residing outside the realm of intelligibility. This relationship is dynamic: the boundaries of what can and cannot signify are constantly shifting as do the methods of signifying new types of sounds

Representation and Reproduction

The exercise in transcribing *Metal Acoustic Music* raises a fundamental question: What does it mean to represent something? While this larger issue is far too complex to

address satisfactorily in such a small space, it is possible to set up some outer limits and establish a working definition that will suffice to discuss musical notation and recording.

In this context, the function of representation is reproduction. The written signifier serves to reproduce the concept of the signified in the mind of the reader; the score serves to reproduce the content of a musical composition. Conceived in this way, a representation is any set of instructions that enables reproduction: a qualitative description of the sounds in *Metal Acoustic Music* is a representation, as are a technical guide to operating the machines that produce those sounds and a specially developed system of signs to accommodate the particular details of Merzbow's equipment.

This definition bypasses one significant question: How can we evaluate a system of representation? The three options for representing *Metal Acoustic Music* presented above all refer to different referents. The qualitative description more directly refers to the ultimate sound, but it is probably the least effective for reproducing it accurately; the technical descriptions may provide no indication of the ultimate sound whatsoever, but they will likely instruct a more accurate reproduction. In the latter case the signified is a process rather than a sound, *per se*; while it seemed that a transcription that referred to process rather than sound was imperfect, such a transcription may indeed allow for more accurate reproduction.

Converting Signal into Noise: I am sitting in a room

In 1969 Alvin Lucier, an American experimental composer, recorded "I am sitting in a room."[7] The 15 minute long piece begins with a recording of the composer speaking:

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[7] CD Track 5, "I am sitting in a room"

I am sitting in a room different to the one you are in now. I
am recording the sound of my speaking voice and I am
going to play it back into the room again and again until
the resonant frequencies of the room reinforce themselves
so that any semblance of my speech, with perhaps the
exception of rhythm, is destroyed. What you will hear,
then, are the natural resonant frequencies of the room
articulated by speech. I regard this activity not so much as a
demonstration of a physical fact, but more as a way to
smooth out any irregularities my speech might have,

("I am sitting in a room," accessed at www.ubu.com)

and then proceeds as described over a series of iterations. The piece itself is a set of

instructions penned by Lucier (the example here is from the original 1969 recording),

which allow for variations in the text, language, and number of iterations to

accommodate a variety of potential performances.

Over the course of the piece, Lucier's voice degrades into a metallic whine, slowly

becoming unrecognizable as it is fed back through the recording apparatus and the

acoustic space of the room. At certain points, it sounds much like *Metal Machine Music*, a

harsh texture, without clear delineations between sounds. At the moment where his

speech becomes unrecognizable, the listener may remember the words from previous

iterations, ascribing their meaning to the pulsing noise, but there is no clear moment

when the words cease to signify.

Lucier's text characterizes the room as a sonic actor: "the resonant frequencies of

the room *reinforce themselves*," finding their own form in the recorded sound and destroying

all others. Lucier, however, denies the primacy of the room in his further description of

the work, focusing on the smoothing results of his process instead of the "physical fact" of

acoustic resonance. The "irregularities" of his speech seem to be a stutter that manifests

itself on the word "rhythm." In this light, the piece takes on a personal importance:

Lucier is going to use the recording apparatus to erase his speech impediment. The rest of Lucier's text complicates this reading; he predicts that "any semblance" of his voice will be "destroyed" by the process, with the only exception being "rhythm." A process that destroys his voice completely and leaves only rhythm, the locus of stuttering, would be a rather poor way to erase a stutter. The listener is left among the decaying repetitions of Lucier's voice to wonder: what "irregularities" is he smoothing out?

It would seem that Lucier smoothes out not his stutter, but the irregularities of language itself, the differences between sounds and words that enable them to function as signal. By the end of the piece, linguistic difference is eradicated: the sounds have a vague rhythm, but are indecipherable as any sort of meaning-imbued signal. The iteration of the recording process breaks apart his words, reworking their constituent sounds into semantic oblivion.

This breaking down of words occurs at a different scale than in Schwitters' *Ursonate*: Schwitters reorganized phonemes into non-signifying patterns; "I am sitting in a room" dissolves words into a finer grain of noise, non-signifying and seemingly incapable of being represented by a system of written signifiers.

The progression of the piece is striking when considered in terms of transcription. The first iteration of the piece is easily represented in writing (see the block quote above for an example); subsequent iterations, taken individually, might also be represented in writing, ignoring the increasing presence of obstructive noise. It is clear, in any case, that the final iteration of the piece cannot be represented in this fashion; it has become noise, defying signification.

Unmotivated Signifiers, Indifferent Recordings

While *Metal Acoustic Music* and *Metal Machine Music* were both composed in recordings, "I am sitting in a room" was composed as a written score and explicitly focuses on recording as a *method* for interacting with sound.[8] In it, the recording is simultaneously the literal record of the piece and the means through which it is created. The written words of the piece might represent the sounds of its first iteration, but it is the recording of those words that enables them to be disintegrated and represented past the phonological level. Written words can only reproduce some of the signal that can be conveyed by spoken words; the recording can transmit all of the sonic information of speech.

Theorist Friedrich Kittler, in *Gramophone, Film, Typewriter*, cites this manipulability of recordings as evidence of their position in the Real: "If the phonographic playback speed differs from its recording speed, there is a shift not only in clear sounds but in entire noise spectra. What is manipulated is the real rather than the symbolic" (35). Symbols, the stuff of linguistic representation, cannot be stretched in time in this way. Kittler refers to "noise spectra" as evidence of the presence of the Real—the ineffable "true" state of the world. In the system of increasing specificity outlined above (from words, to phonemes, to waveforms, and so on), the goal was an increasingly accurate representation of the sounds present on a recording. The ultimate stage of this process is hypothetically indistinguishable from the Real: all of the sounds of *Metal Machine Music* would be reproduced exactly as they were originally produced.

But *Metal Machine Music* is, in fact, already reproduced regularly. Any re-pressing of the original record recreates the piece exactly, and this process can occur over and over

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[8] Of course, even in cases where it is not explicit, recording is *always* a method for interacting with sound.

again. The same can be said of *Metal Acoustic Music*: there is no need for a transcription; any recording of the piece will suffice to reproduce the sounds of the piece exactly because the piece *is* the record, in a sense.

Having spoken about the signs of musical notation as a kind of instruction for reproduction, we might look at the record in the same way. When actualized using the proper equipment and technique, the record functions much like a score: when it is not played, it is inert, but it contains information that can be used to reproduce a set of sounds. Its own reproduction functions similarly to the score as well: a record can be duplicated, like a score, without any regard for the sounds it signifies.

It is this indifference to content that enables the recording to function so effectively in representation. Kittler writes: "The phonograph does not hear as do ears that have been trained immediately to filter voices, words, and sounds out of noise; it registers acoustic events as such" (23). The same physical record form can contain a Beethoven symphony or *Metal Machine Music*; it can contain both the linguistic beginning of "I am sitting in a room" and the disintegrated end. A recording can contain both signal and noise, privileging neither over the other.

However, recording is not the only system of representation and reproduction that is indifferent to content. Roland Barthes writes in *Elements of Semiology*: "in human language the choice of sounds is not imposed on us by the meaning itself" (50), and "the sign is not arbitrary in the language, but it is in fashion" (51). The relationship between the sounds of words and the meanings they carry is unmotivated; nothing in the system of signification necessitates that the conceptual signified correspond to a particular permutation of phonological elements, except for historical precedent. In the case of language, this historical precedent is significant, as one cannot simply claim a word within

a language as arbitrary and replace it with another; Barthes paraphrases Claude Lévi-Strauss: "the linguistic sign is arbitrary *a priori* but non-arbitrary *a posteriori*" (51). Keeping this historical restriction in mind, one can still see that the representative ability of the linguistic signifier is not founded on the basis of a mutual exchange with the signified. Just as the record is indifferent to the sonic content it conveys (we might instead say that the relationship between the record and the sounds it represents is *arbitrary* or *unmotivated*), the linguistic signifier is indifferent to its conceptual signified.

In referring to the record as indifferent, one gives primacy to the medium in a way the description of signs as unmotivated does not. It is the *relationship* between signifier and signified that is unmotivated or arbitrary, but the record itself is indifferent to its content. This shift is the result of the physical existence of the record as a signifying object: we are considering signifiers that indicate an instructional signified, and that sign pair in turn manifests itself in sonic content; the signified appears to be inscribed on the record itself, conflating the record's surface with the sound it produces. Unlike the technical transcription of *Metal Acoustic Music*, the instructions for reproduction of the recording seem to exist in the real, inscribed grooves of the record. It is this appearance that allows the record to be comfortably described as indifferent to the content that resides on it.

Analyzing comparatively, we can see that the signified of the record is not in its grooves: it is in the cultural and social practice of playback. There is nothing in the record that inherently says, "Place me on a turntable and play me with a needle." Our hypothetical instruction sheet for *Metal Acoustic Music* does not refer to the sounds directly, and neither does the record. The record as an object functions within a system of cultural object that directs its use in reproduction; it is that system of interaction to which the signifier of the recording refers.

Aura, Authenticity, and Forging the Mona Lisa

In spite of these structural similarities in representation, there are obviously many differences between the recording and the linguistic signifier, the most significant being that the record is a form of mechanical reproduction that can function independently of human intervention.

Walter Benjamin's 1936 essay "The Work of Art in the Age of its Mechanical Reproducibility" addresses just this theoretical issue. The article, while primarily about visual arts, proved to be foundational for much criticism related to the reproduction of sound. In it, Benjamin develops the concept of "aura," which can be loosely (and only loosely) defined as the characteristic a work of art has by virtue of being its original self in its original form and context. Benjamin writes: "Even the most perfect reproduction of a work of art is lacking in one element: its presence in time and space, its unique existence at the place where it happens to be" (220). There is no physical test for aura: it might be the case that the Mona Lisa in the Louvre has been replaced by an exceptional forgery; for those unaware, the forgery would possess the same aura as the original it was mistaken for. [9]

Benjamin continues:

> What is really jeopardized when the historical testimony is affected [as in the case of a Mona Lisa forgery] is the authority of the object. […] that which withers in the age of mechanical reproduction is the aura of the work of art. (221)

The replacement of the true Mona Lisa with a forgery does not only threaten the physical primacy of the original, it also threatens the very status of the original as such, its aura. If

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[9] This example is also developed in Rothenbuhler and Peters, "Defining Phonography," 257.

the quality of reproduction becomes so high that it is indistinguishable from the original, then the authenticity of the original is threatened significantly.

This threat arises out of the peculiar and difficult task of defining aura. In relation to a poor reproduction, the aura that it lacks might be seen as residing within the skill and virtuosity of the original piece. This conflation of aura with the craftsmanship or genius of the artist is mostly unproblematic for these cases of poor reproduction. Indeed, it is entirely possible that the distinction between the real Mona Lisa and a poor forgery is a result of Leonardo da Vinci's skill as a painter. However, the hypothetical copy that is completely physically indistinguishable from the original exposes the flaw in this logic. Such a precise copy would still be a copy, but, for those aware of the substitution, the aura of the original could no longer seem to reside in the transcendent aptitude of the artist.

It is such a copy that threatens the concept of aura most directly; if the two objects are visually indistinguishable (and maybe indistinguishable on the chemical and microscopic levels), why is a distinction made between them at all? The only way aura can accrue to one of those objects is if its historical status is corroborated by physical location: if a molecule-for-molecule reproduction of the Mona Lisa existed and both the original and fake were thrown together out of sight, the aura would effectively be destroyed; neither painting could claim authority on the basis of any discernable criteria.

This difficulty in pinning a definition onto the idea of aura echoes our continuing difficulty in defining noise: both are defined negatively (noise is *not* signal; aura is that which mechanical reproduction destroys), and when they are examined too closely, they

both seem to vanish. Noise ceases to be noise upon inspection, and once a work of art can be analyzed so closely as to be perfectly reproduced, the aura disappears.

Although aura seems to be destroyed by mechanical reproduction, aura relies on reproduction for its own existence. An original cannot exist until there might be a copy, and an object cannot have authority unless there are other objects for it to have authority over. The possibility of reproduction is necessary to establish the originality of the original. For example, one would not refer to the "original" Paul McCartney unless there was the potential for a "false" McCartney,[10] and before the existence of audio recording, the live performance of a piece of music was not "original," but rather of a specific historical moment.[11]

Benjamin acknowledges that "in principle a work of art has always been reproducible" (218), from before the advent of mechanical reproduction. Following the logic above, this entails the idea that "in principle, a work of art has always had aura": even the rudimentary possibility of reproduction enables a rudimentary sort of aura. The unique contribution of mechanical reproduction is a class of art objects that exist only as reproductions, without an authoritative source.

Aura in the Age of Mechanical Reproduction?

Again, *Metal Machine Music* provides an example of this class of objects: no one copy of the record is the original; they are all equally instances of the album. Looking for aura, we encounter a strange phenomenon: the means of production for each record are also the means for its reproduction. That is, the possibility of reproduction that generates

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[10] With the advance of virtual reality technologies, such a distinction may become necessary; indeed, to the conspiracy theorists who believed that "Paul [was] Dead" and replaced with some sort of animatronic double, such a distinction was already necessary.

[11] Benjamin briefly suggests this in a footnote of his own: "To be sure, at the time of its origin a medieval picture of the Madonna could not yet be said to be 'authentic.' It became 'authentic' only during the succeeding centuries" (243).

aura is present at the moment of production. Because the existence of the record entails its own possible reproduction, we might imagine that aura would inevitably develop. However, the subsequent copies of an original record can be discussed in much the same way: each successive generation of copies potentially has the aura granted by the possibility of reproduction. This distribution of aura in effect negates the aura as sole source of authority or conceptions of authenticity. The authority of the object is diffuse, spreading across all of the reproductions: any original vinyl recording of *Metal Machine Music*, for example, has more aura than a CD version of the album, because the records are all identical copies of each other, while any CD is essentially a copy of any original record. The relation of reproduction exists between the entire classes of mechanically reproduced objects, the "original" reproductions gaining authority by virtue of their reproduction into a distinct type of object.

Vinyl Machine Music

In the discussion of the Mona Lisa above, the means of reproduction were superfluous to the effect of the reproduction on the original. At issue in that example was the accuracy of a reproduction; whether that reproduction was made by hand or machine was irrelevant to the threat an indistinguishable copy posed to the authority of the original.[12] For works such as *Metal Machine Music*, which exist only in mechanical reproduction, the nature of that reproduction is significant: the fact of mechanical, rather than manual, reproduction enables the indifference of the record to its content.

Earlier, I connected the structural role of the record to that of the score: both act as instructions that do not themselves contain sound, but rather signify a process through

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[12] Of course, the source of the reproduction, mechanical or manual, has other ramifications for the nature of the work of art in general.

which they can be read to produce sound. In the case of the score, the signified reproductive process is a manual one: machines may print the score, but in each instance, it is actualized by human hands, interpreted by a musician. The record itself is reproduced mechanically, pressed by machines, but it is the mechanical playback that qualifies its reproductive process as mechanical. A record, once placed on a turntable, can reproduce sounds without any human intervention.

Because the signifying chain from the inscribed grooves in the record to the sound waves in the air is never broken by human intervention, the information that is conveyed never has to be broken down into component parts for the sake of a human mind. The score does not proceed directly to sound waves; in fact, due to the relatively small amount of information contained in the score, the interpretation of the manual reproducer (or musician) completes the score in a sense. For an example of why this is so, one might imagine a computer-generated MIDI file from a score of Beethoven's Fifth; the resulting audio file would play the computerized score exactly, but in doing so would be unsuccessful at actualizing an acceptable performance of the piece. To better approximate what the piece "should" sound like, the computer would require more information than is contained strictly within the score about traditional musical interpretation; with this data from outside the score, the computer could become better at reproducing what the piece "should" sound like. The mechanical process ensures that the signifying instructions are carried out without any regard for the sound they will ultimately produce.

Acousmatic Listening: Sounds Without Source

In 1948 Pierre Schaeffer, a French radio technician for *Radiodiffusion Française*, recorded a piece called "Étude aux Chemins de Fer."[13] The "Étude" contains no traditional instrumentation and was composed without any system of musical notation. The piece was made by splicing together tape recordings of trains in the studio, rearranging their sounds according to Schaeffer's artistic vision.

"Étude aux Chemins de Fer" is widely considered to be the first piece of *musique concrète*, a term coined by Schaeffer to refer to compositions made using recordings of sounds that were not traditionally musical. In contrast to the abstract sounds of the musical scale, the recorded sounds were complete, real, concrete sounds. Schaeffer's discussion of his own work refers to "sonorous objects" as the sounds which, removed from their natural context, are available for artistic manipulation (78). Such sounds, divorced from their sources are called "acousmatic," after the followers of Pythagoras who listened to his teachings from behind a curtain, separated from the source of his words.

Schaeffer praises the benefits of acousmatic listening in his writing:

> what we are aiming at […] is the most general musical situation that exists. […] Deliberately forgetting every reference to instrumental causes or preexisting musical significations, we then seek to devote ourselves entirely and exclusively to *listening*. (81)

The purity Schaeffer finds in recorded sound enables an unprecedented focus on sound as physical phenomenon, a reconceptualizing of sound waves as objects to be handled. Acousmatic listening provides a variety of benefits, according to Schaeffer: "we listen to the sonorous forms, without any aim other than that of hearing them better," and "it

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13 CD Track 6, "Étude aux Chemins de Fer"

gradually brings the sonorous object to the fore as a perception worthy of being observed for itself […] it progressively reveals to us the richness of this perception" (78).

Schaeffer rejects the idea that the sonorous object is the magnetic tape on which the sound is recorded, claiming rather that the sonorous object is a result of listening, "contained entirely in our perceptive consciousness" (79). While the guiding principle of *musique concrète* is a separation from the notes of the scale (what Schaffer calls the "do-re-mi"), this abstraction of the sonorous object into the relationship between listener and sound brings *musique concrète* closer in structure to the "do-re-mi" of twelve-tone Western tonality.

The significance of the *concrète* sound object is explicitly not its status as an artifact of the real world; its significance arises from our complex interaction with recorded sound, divorced from any superficially explanatory context. With this in mind, we might refigure the sound object as *concrète* not by virtue of its being a found sound in the soundscape of everyday life, but rather as a result of its presence on a recording. The recording localizes the sound into a physical container, severing it from its original source. Of course, it is a physical reality that every sound must have a source in the most literal sense, but for Schaeffer, the indifference and generic quality of the recording displace the notion of a source entirely.

He asks, "if someone plays us a tape which records a sound whose origin we are unable to identify, what are we hearing?" (79). This question is much more (or maybe less) problematic than Schaeffer would indicate: if someone plays us a tape, we are hearing a tape. The media source displaces the original source quite literally, even if the "origin" is recognizable (e.g., the train whistle in the "Étude aux Chemins de Fer"). This answer is simple; it bypasses the notion of acousmatic listening Schaeffer constructs. But

in another sense, it renders the process more complex; rather than hiding the original source, the recording effaces it, claiming the sonorous object as its own. Unlike Pythagoras behind the curtain, the record player and its reproductive process are in plain view. The complicated production process that results in the record itself may be obscured, but the immediate source of the sound one hears is never in question. Schaeffer, for whatever reason, is more concerned with the separation of sound object from its original source than with the introduction of a new source.

R. Murray Schafer refers to the process Schaeffer calls acousmatic as "schizophonia," "the splitting of sounds from their original contexts" (88). He coins schizophonia after schizophrenia, intending it to be "a nervous word," and "to convey the same sense of aberration and drama" (91). Schafer is concerned with protecting a "natural" state of sound in the world, unrepeatable and localized. Recording and long-range transmission give sounds "an amplified and independent existence" (90); this is problematic for Schafer as it enables the further encroachment of careless human sound practice upon the unamplified soundscape of nature.

Schafer seems to prefer the state of sound prior to the first schizophonic/acousmatic moment, when "all sounds were originals" and "Sounds were then indissolubly tied to the mechanisms that produced them" (90). This concern reveals a similarity between Schaeffer and Schafer: neither seems to regard the recording as a viable source in its own right.

Modes of (Re)production

In 1967 The Beatles released the song "Strawberry Fields Forever" on their album *Magical Mystery Tour*.[14] "Strawberry Fields Forever" begins with a flute trio. Of course, the listener does not hear the flutes directly, but rather, acousmatically. If you put your copy of *Magical Mystery Tour* on your record player, tape deck, Discman, or iPod and press "play," what you actually hear is not a flute. You hear the *reproduction* of a flute.

This distinction, between the flutes that produce sound and the record that *re*produces sound, seems to be at the heart of both Schafer's and Schaeffer's conception of the record and the acousmatic/schizophonic process. Since the record is strictly a reproducer, it cannot supplant the original source; the process by which it generates sound must be fundamentally distinct from sound-producers.

We might summarize that process as follows: Your record player is a sound-machine (avoiding the terms reproducer and producer for the moment). You, having read the manual, are a trained sound-machine operator. You operate the sound-machine and it produces sound.

The interaction of the original flautists and their flutes that produced the sound you reproduce at the beginning of "Strawberry Fields" is very similar: their flutes are machines that produce sound. They are trained flautists. They operate their sound-machines according to their operating rules, and they produce sound. This functional similarity admittedly does not change the fact that a recording almost always[15] plays sounds that another sound source has played before; in the Benjaminian sense, even the best recording cannot attain the originality of the original flautist.

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[14] CD Track 7, "Strawberry Fields Forever"

[15] The exceptions to this generalization, being the ultimate destination of this argument, will be addressed later.

Having looked rather extensively at the record's sonic reproduction, we might focus on production for a moment, if only to glimpse some of what distinguishes it from our main focus. How does the sound production of a flute work, in a cultural sense? We might imagine Pythagoras on the other side of the curtain, but instead of lecturing, he is playing a flute for his students. When asked, "What instrument is Pythagoras playing?," the students, if familiar with the instrument, would easily answer that it is a flute. This recognition entails an interesting conclusion: Pythagoras, playing his instrument, is *reproducing* the sound of a flute; if he were not reproducing the sound a flute makes, his students would not be able to recognize it.[16] The parallel techniques of flute and record playback outlined above also have parallel results: the reproduction of a sound.

Of course, this reproduction occurs at different levels of detail. R. Murray Schafer writes of vocal reproduction: "it is physically impossible for nature's most rational and calculating being to reproduce a single phoneme in his own name twice in exactly the same manner" (90). Just as the person cannot, and does not have to, repeat his vocal interpretation of a written signifier in exactly the same way, the flautist does not necessarily play the same note the same way every time. The record is much more accurate in this sense; however, there is no reason to think that the recording does not vary somewhat in playback.

This problematizing of production sits well with the idea of representation outlined above: the score, coupled with the instrument meant to perform it, functions quite similarly to the record, coupled with the equipment to play it. Such a similarity

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[16] Schaeffer argues that acousmatic listening reveals that certain instruments actually do sound alike when their shape is hidden; nonetheless, a flute that sounded like a piano would not really be a flute at all.

demands a further investigation of the relationship between sonic producers and reproducers—how these categories overlap and interact with each other.

"Nothing is Real:" Sound Behind the Curtain

In 1950 Alan Turing, one of the founding thinkers of Computer Science, published the essay "Computing Machinery and Intelligence" in the philosophy journal *Mind*. "Computing Machinery" posits a method for determining whether a computer can be said to think, bypassing the philosophical question "Can machines think?" in favor of a concrete test. He operates from the point of view that a machine that *appears* to think effectively does think. The only reason we believe that other people can think is because they appear to think and we assume their brain processes mirror our own. Thus, if a machine appears to think, we can say that it thinks with about as much certainty as we can say that our next-door neighbor thinks.

The test Turing proposes is a modification of the parlor "imitation game." In the game, there are three players: a man, a woman, and an interrogator. The man and the woman are isolated behind a wall (like Pythagoras from his students); their only communication with the interrogator is through a teletype machine, so as to not reveal their identities by vocal characteristics or appearance. The goal of the game for the interrogator is, through a series of questions, to determine who, on the other side of the wall, is the woman. The woman's goal is to convince the interrogator that she is the woman. The man's goal is to fool the interrogator into thinking that *he* is actually the woman. Understandably, the result of this game is that there is no way to distinguish a male from a female strictly by what they say: both the man and the woman can make remarks such as "I am the woman, don't listen to him!" without helping the interrogator figure out the correct answer (Turing 441).

Turing suggests that replacing the male player with a computer offers an experimental setup to test machine intelligence. If the machine succeeds as frequently as the man at fooling the interrogator, then it might be said to think, since it functions as effectively as the man. It appears to think just as our neighbor appears to think, and this is the most certainty one can have. This similarity is of course limited to the ability to form sentences and form rational answers to questions; it is a linguistic similarity which implies thought if "thought" is considered to be a linguistic phenomenon.

While we are clearly not trying to determine whether records have minds, the Turing test is relevant in our case because its logic is reproductive. The teletype machine reproduces the man and the woman to the interrogator; the man reproduces the woman; the computer reproduces the man reproducing the woman. We might imagine a version of the game where you are on one side of a wall, separated from a few flautists and a recording of "Strawberry Fields Forever." You have to decide which is the reproduction, and which is the original. The wall between you and the sound sources causes a schizophonic or acousmatic effect: the sounds are cut off from their sources (by a physical barrier rather than a media barrier like a recording), and you encounter them as sound objects, strictly independent series of vibrations.

If the recording of the flutes on "Strawberry Fields Forever" were of high enough fidelity, the sounds that the record and flautists produce would be indistinguishable, regardless of their provenance. Just as the man in the imitation game can reproduce anything the woman might say, so could a high fidelity recording reproduce any possible set of sonic waveforms. This is not to say that the flautists and the recording will sound exactly the same; this could only be the case if the flautists played first and the recording

recorded them live. Rather, both the recording and the live trio would sound alike in their resemblance to the sounds a flute trio is expected to make.

The concertgoer is typically not separated by a wall from the live musician (or from their own record player), and one might suggest there is a phenomenological difference between listening in the presence of the flute versus the presence of the record player. We can replace the parlor wall or Pythagoras' curtain, physical barriers, with recording, a media barrier. Instead of listening to a recording of flutes and real flutes through a wall, we might listen to them on another recording.

This new instance of recording acts as the teletype machine in Turing's original game. The teletype served to mask potentially revealing details about the players such as the pitch of their voices by limiting the conveyed data to written language. Schizophonia results in a similar limiting: the data about the presence of the original musicians, the aura of their performance, and the potential "presence" of live music is stripped, leaving behind only sound objects, two series of vibrations. Again, if the new mediating recording is of high enough fidelity, these sonic objects should be indistinguishable, and the possibility of the innate "presence" of live music should be erased.

A curious fact about the recording of "Strawberry Fields Forever" is that it involved no flautists whatsoever. The song is considered to be the first popular record to feature a keyboard instrument called the Mellotron. An ancestor to the modern sampler, the keys of the Mellotron were connected to a bank of magnetic tapes so that the pressing of a key triggered a corresponding tape, which would play whatever had been recorded on it. Any sound could be recorded on the tapes and played back. In the case of "Strawberry Fields," a flute had been recorded playing a pitch corresponding to each

key.[17] Paul McCartney, a bassist, not a flautist, performed the "Strawberry Fields" flute trio himself, playing chords on the Mellotron.

Sounding Boxes

The Mellotron problematizes the dialectic of production and reproduction: it is played like an instrument (a traditional producer), but operates on the principles of mechanical reproduction. In its physical appearance and use, it overcomes the illusion that a recording only holds sounds and does not produce them. Indeed, it invites the manipulation of reproductions as if they were sounds that originated from the machine itself. The Mellotron seems to have most clearly popularized a practice Pierre Schaeffer participated in but did not acknowledge: the performance of recordings as instruments.

Luigi Russolo, the futurist painter and musician mentioned earlier in this essay, performed his noise compositions not with recordings, but with a collection of self-designed instruments called *intonarumori*, or "noise players." These instruments imitated a variety of noises from nature and the city; most of them were operated by turning a crank or pulling a lever, and they would then produce sound out of a horn on the other side of the instrument. Russolo had commercial goals for his *intonarumori*: as more experimental compositions were becoming more popular, he wanted to sell his instruments, and as a result was quite secretive about how they worked. Even the performers were often unaware of the mechanism in the box that produced the sound. The instruments did not gain the popularity Russolo had hoped for, and most of them were destroyed; the result

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[17] Following its use on the *Magical Mystery Tour*, the Mellotron gained popularity as a way to musically trigger any sound recording, and has been used with recording banks of most standard instruments, people screaming, car horns, and a variety of other traditionally non-musical sounds. One might imagine the value to a *musique concrète* composer of such a machine able to call up concrete sounds on demand.

being that no diagrams or detailed accounts exist of what exactly was inside the anonymous boxes of the *intonarumori*.

By hiding their mechanisms, the futurist noise instruments effectively reduced the process of instrumental sound production to its structural core: the human hand operates the machine (in this case using a crank or lever), and sound comes out the other side (from a diagrammatically pleasing horn). Unlike the Mellotron, the *intonarumori* did not directly reproduce sounds, but unlike standard instruments, they did not only reproduce the sound of their type. The *intonarumori* specifically aimed to imitate a variety of noises, which Russolo carefully grouped into six categories ranging from "roars" to "whispers" and "screeching" to "puffing" (28). Imitation occupies a conceptual middle ground, between recordings that can be said to duplicate and acousmatic listening which aims to deny origins. The imitations of the *intonarumori* point to sources and origins, without supplanting them.
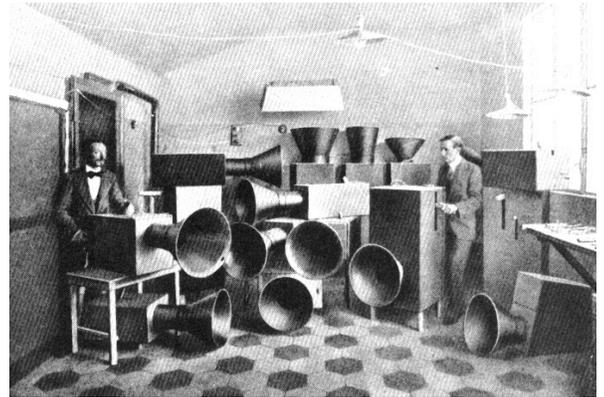
This imitation aligns the *intonarumori* with the musical score. Both refer to sounds that already exist, in a sense (e.g., the sound a flute is supposed to make or the sound of a screaming child), but they do not provide an exact copy of that sound. Instead, they refer to it, allowing for it to be recreated at a lower level of precision, but still recognizably. This is distinct from the process of playing back a recording: the recording produces the same sound as the original source, supplanting it as producer. But where the *intonarumori* point to one existing sonic referent, a recording points to a whole set of potential sonic and cultural referents.

The Wheels of Steel: Recordings as Instruments

In 1981, Joseph Saddler, recording as Grandmaster Flash, released "The Adventures of Grandmaster Flash on the Wheels of Steel,"[18] a seven-minute long piece that included samples from contemporary artists Blondie, Chic, Queen, and others. Flash, with his collaborators, the Furious Five, had been performing at underground parties for several years using two turntables and a newly developed style of playing them that he called "cutting." Flash would take two copies of the same record, one on each turntable; while one record played the break, or the recognizable beat at the center of a song, he would manually spin the other record to the start of the break, "cutting" back and forth between them to extend the break for as long as he desired. Moving the record while it was playing resulted in the now familiar sound that came to be referred to as "scratching."

The record having become the most familiar domestic sound producer, Grandmaster Flash took it as such and began to manipulate it, innovating in much the same way a classical innovator might find new sounds to coax from a violin. The record player was no longer the bourgeois furniture it was marketed as in its early history; it was taken as an instrument to be performed.

"Adventures on the Wheels of Steel" is known as the first recording to feature recorded scratching. Now, just as the recording had contained linguistic signal and cacophonous noise, the recording contained the explicit manipulation of other recordings. These are not the acousmatic sonorous objects of Schaeffer's theorizing; the original recordings contain popular songs of the time, clearly cut and scratched to repeat sections and create rhythms out of the rapid motion of the vinyl record. The listener does

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18 CD Track 8, "The Adventures of Grandmaster Flash on the Wheels of Steel"

not contemplate the nature of sounds divorced from source: the source is drawn into focus as a result of its manipulation. The typically passive listening experience is defamiliarized when a known song does not play as expected; it is physicality, the record as source in its own right, that presides in this process.

Bauhaus collaborator László Moholy-Nagy, in a 1923 essay, "New Form in Music: Potentialities of the Phonograph," suggested another way to manipulate records as sound producers: manually inscribing grooves into them. Unlike Grandmaster Flash's method that reappropriated the content of previous records into a new musical style, Moholy-Nagy's record etching would provide a way to generate sounds truly without prior referent; they would not be imitations of natural sounds or of traditional instruments, but unique to the record on which they were inscribed. Moholy-Nagy suggests that manual inscription would achieve this result as well as enabling the composer "to create his composition for immediate reproduction on the disc itself" so that "he will not be dependent on the absolute knowledge of the interpretative artist" (332). In this conception, the record literally displaces the score as the signifier of sound production; composers can avoid the interpretation necessitated by pre-recording scores by composing straight to record. In a sense, this is actually what recording artists such as Merzbow and Lou Reed do; their musical output is not a set of scores, but rather recordings that produce their pieces exactly as composed, without any necessary interpretation from another. Of course, once on a record, the sound is available for reinterpretation just as Grandmaster Flash did with popular dance records.

The Noises of Recording

The previous discussion of recording has relied on a particular structural understanding of recordings: they reproduce sounds, and these reproductions are no

different from their source in any way aside from their status as copies. The recording of

the flute from the Mellotron is taken to sound the same as a recording of an actual flute; a

recording of another recording is taken to be indistinguishable from the original. The

trouble with this model of reproduction is immediately apparent upon listening to the

flute trio in "Strawberry Fields Forever": it doesn't sound much like a flute trio at all.

There is some resemblance in tone, but no one listening to this record would mistake it

for a group a flutes. The attack and decay of the notes are uncharacteristically abrupt.

The flutes sound unusually grainy; they lack the signature pure tone of the flute, and their

sound warbles in frequency. For the Beatles, this ethereal quality contributed to the

psychedelic aesthetic of *Magical Mystery Tour*. For the listener and theorist, this quality is

evidence of a complication in theories of mechanical reproduction: reproducing machines

do not reproduce their sources perfectly.

According to two British acousticians writing at the beginning of sound

reproduction in 1879, "The phonograph is in reality a very imperfect speaker, and it

requires the aid of much imagination and considerable guessing to follow its

reproductions" (Gitelman 149). Twenty years later, a letter to the editor published in

Edison's newsletter *The Phonogram* and reproduced in Roland Gelatt's history *The Fabulous

Phonograph* comments in support of wax cylinders, "All of the flat records I have ever

heard have such a hissing, scratching sound, caused by the needle, that it is a wonder that

a dog, or even a man, could distinguish a voice" (158). This problem of noise continues

throughout the history of the phonograph; in 1927, Herman Hesse wrote in *Steppenwolf*:

> The devilish metal funnel spat out, without more ado, its
> mixture of bronchial slime and chewed rubber; that noise
> that possessors of gramophones and radio sets are prevailed
> upon to call music. And behind the slime and the croaking

> there was, sure enough, like an old master beneath a layer
> of dirt, the noble outline of that divine music. (Schafer 92)

Such complaints spurred the development of higher and higher-fidelity equipment, a continuous push to improve the resemblance of reproduction to the original, removing noise from the signal the records aimed to convey.

In spite of complaints like these, the reproductive ability of the phonograph was touted throughout its history of improvements in fidelity. Gitelman suggests that the cultural practice of listening evolved with the phonograph; thus, as the phonograph developed increasingly accurate reproduction, the listening practices of the audience grew to accommodate the increase in accuracy. Critics like those quoted above were unusual, and the existence of any sound reproduction at all was so marvelous that the noisiness of the early machines was only noticeable in comparison to later machines.

Jonathan Sterne, in his cultural and theoretical history of the phonograph, *The Audible Past*, comments on the "social genesis of sound fidelity" by presenting a series of historical phonograph advertisements. The ads place opera singers next to record players and proclaim that the audience will not be able to tell the difference. In spite of the obvious differences between the sound on the record and the sounds of real life, a rhetoric of fidelity emerged that purported to relate the sound on the disc to some live original. Sterne argues that "fidelity" as it was actually used referred more to the relationship between people and machines than between the reproductions and their originals. In the context of the noisy early recordings, the discourse of phonographic fidelity did seem to operate in a different arena than standard listening. Unlike Nipper, the dog in the famous RCA Victrola ad, who listened

to a phonograph recording of his dead master's voice as if his master were inside, a person would be quite stunned if a friend spoke with the same audio quality as a phonograph.

The advent of magnetic tape recording, which solved some of the problems with phonograph fidelity related to the needle and the disc, brought with it new types of noise: hissing from the magnetic particles on the tape, whirring from the mechanism that drives the reels, and wow and flutter, or variations in pitch that result from irregular playback speed. All of these types of noise are evident in the Mellotron recording on "Strawberry Fields." These noises get in the way of pure reproduction, and serve as the impetus for further technological developments to improve fidelity.

The commercial definition of fidelity trades on a promise of mimesis. The RCA-Victor dog cannot tell the difference between his master's voice and the phonograph, the public of the 1920s cannot tell the difference between Enrico Caruso and a record, and the contemporary audience cannot tell whether what they hear is live or Memorex. The word "fidelity" itself indicates faithfulness, a problematic faithfulness as Sterne notes, because the object of fidelity is ill defined. There does not seem to be a quantitative way to measure fidelity (hence the imprecise "high" and "low"). Does the faithful recording sound like the opera hall? Or does it sound like the recording studio, free from the ambient noises of the concert setting? If a record is made with electronic or synthesized instruments, does an original exist to engender fidelity? The rhetoric shifts regarding the precise object of fidelity but the notion of truthful reproduction (regardless of the original) persists in the discourse of fidelity. The more fidelity a record has, the better it is at being a record, at representing a truthful reproduction. Friedrich Kittler quips that fidelity is a promise that records "remain faithful to musical deities" (36).

R. Murray Schafer even adopts the technical language of fidelity for his discussion of the soundscape. "A hi-fi system," he writes, "is one possessing a favorable signal to noise ratio. The hi-fi soundscape is one in which discrete sounds can be heard clearly" (43). This definition equates fidelity with clarity; a soundscape is high fidelity if there is space around sounds so that they can be heard and addressed individually. In contrast, the low-fidelity soundscape is dense with "noise" that obscures individual sounds. This understanding of fidelity carries the same problems as Schafer's definition of noise: there is no real quantitative measure to determine "signal to noise ratio" in a meaningful way. This approach seems to reduce the overall amount of information transmitted.

The faithfulness the term referred to originally has dubious relevance in a situation where most music is produced in a studio, and the musical output of many artists is not songs, *per se*, but particular recordings of songs. If the artistic product is the CD itself, then there is no original for it to remain faithful to; the performance of the artist in the studio is part of the process necessary to create the recording, not an "original" instance of the piece.

Digital recording: The Art of Approximation

As fidelity improves, the hypotheses advanced in the body of this essay come closer to reflecting actual possibilities of recording. Describing the flute sound on "Strawberry Fields Forever" as realistically resembling a flute is methodological abbreviation: while the recording of the Mellotron could be distinguished from the recording of the flute, the advance of high-fidelity recording is creating a situation where such a distinction could not be made. As this quality of reproduction develops, recordings function more effectively in the ways outlined above.

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The development of digital sound reproduction has caused such a change in the rhetoric and practice of fidelity. The introduction of the compact disc severely reduced the amount of sound produced by the recording process itself; this recording noise had been, in the era of analog recording, the arbiter of fidelity. Digital reproduction displaced signal-to-noise ratio as the locus of fidelity; the process of digital encoding provided a new criterion for evaluation: the sampling rate.

The distinctions between the digital and the analog are explored in great detail in Anthony Wilden's *Systems and Structure*; the fundamental difference, however, is between the continuous nature of the analog and the discrete nature of the digital. In terms of recording, the analog has a contiguous physical relationship with the original sounds; the sound waves in the air are physical phenomena, and they are mapped directly onto a physical medium. The grooves of the record and the arrangement of particles on a cassette tape are physical analogs of the wave patterns of sound. Nelson Goodman, in *Languages of Art* defines the analog:

> A symbol scheme is analog if syntactically dense […]
> Analog systems are thus both syntactically and semantically
> undifferentiated in the extreme: for every character, there
> are infinitely many others […] a system of this kind is
> obviously the very antithesis of a notational system. (160)

This density recalls the density of sound we encountered in *Metal Machine Music*; it is undifferentiated, in a sense, and seems to be impervious to representation in a notational system.

The digital, on the other hand, is not directly connected to the physical phenomena of sound. Sound waves occur in the physical world as analog phenomena, continuously, not in discrete bursts; a digital recording takes the analog waveform and approximates it into a series of on-off distinctions. The size of these units determines how

closely the digital signal can resemble the analog original. Fidelity, rather than relating to a signal to noise ratio, can be pinned on the quantifiable level of precision with which the digital units represent the sound waves that enter the recording device.

The stair-step wave generated by this process must be an approximation. The vertical lines in the digital waveform diagram indicate a change in position without any change in time; the speaker cone cannot instantaneously jump from one position to another but must pass through intermediate positions first. The digital does not encode all the complexities of those intermediate positions that would make up a smooth waveform. Instead, the speaker that plays back a digital recording glosses over these gaps, producing a fluid waveform from stair-step data, but lacking the possible richness that might be found in the spaces between the digits.

As such, the CD contains no physical analog, either of the sound that is recorded (and recoded into digits) or the sound that is played back from the CD (and approximated back into the necessarily analog form of actual sonic waveforms). As Eric Rothenbuhler and John Peters argue in their essay "Defining Phonography," the CD merely contains "data," while the analog record, by virtue of being a continuous physical index, contains "music" (246). It seems, however, that progress in the field of digital reproduction would constantly push the stair-step approximation closer to the fluid curves of the analog to a point at which they would be almost entirely indistinguishable. Hypothetically, there
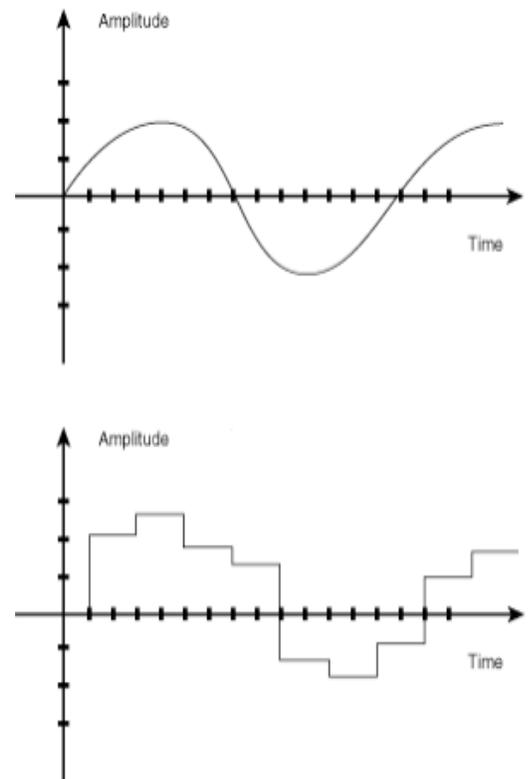
might be a point beyond which human cognition would be physically incapable of distinguishing between the two. Such a high-fidelity digital reproduction would clearly pass the Turing test outline above when compared to the analog original.

Rothenbuhler and Peters take issue with just this argument in their article: "the problem with the Turing test is that the body is hidden" (257). The physical use of the media, they argue, provides a tangible criterion upon which to distinguish the digital from the analog. One knows the analog is the analog because he has to drop the needle himself; it is never played at a distance from behind a curtain. The distinction between the original Mona Lisa and its perfect double resides in the fact that one is remarkable for its "fetching smile," the other for its "amazing process" (157). Rothenbuhler and Peters argue that "meaning resides in historical networks," and the historical status of an object, while it can be questioned, cannot be objectively changed (157).

However, the nature of the recording process itself seems to negate this argument of historical practice: it is the role of the reproduction to remove the original from history—to supplant it in mass experience and essentialize its physicality. The hypothetical second Mona Lisa is certainly remarkable for the process that would create it, but its existence negates the historicity of the first. Once the exact duplicate has been made, the original cannot link its particular form and physical existence to any of the peculiar circumstances of its creation; the specific blend of paint arrived at partially by chance in the original becomes completely intentional in the reproduction, and there is no need for a historical context to justify any feature of the work's existence. The "history" of the object is a label; the simulacral double makes the application of this label impossible or at least insignificant.

The question then becomes whether distinguishing between the digital and the analog on the basis of "presence" and "body" has any validity. Rothenbuhler and Peters seem to assume that the process of playing the recording reveals the identity of its contents; thus, the person who knows they are playing a record understands that it is analog and the person playing a CD knows that it is digital. However, nothing in the process of playback exists to indicate such categories; there can be slot-feeding record players that appear to act as CD players, and there can be CD players that have a "needle" that is actually a laser on a playback arm. The distinction they propose does not reside in the process of reproduction, but rather in knowledge about the process of reproduction, just as aura does not reside within the physical object, but rather in the knowledge of certain facts about the physical object. When these facts are in doubt (as in the case of the identical forgery), the aura is in doubt, as is the reality of Rothenbuhler and Peters' "body" and "presence."

Ramifications of the Digital

If the difference between the code of the digital and the "musicality" of the analog becomes invisible to human perception after a certain level of digital precision, is there still something to be gained by conceiving of digital reproduction as fundamentally distinct from the reproductions that came before it?

Standard musical notation is largely digital; it consists of a set of discrete signifiers that do not operate over a whole continuum.[19] The twelve-tone system precludes in-between tones in its notation.[20] Wilden points out that language itself is digital in the sense

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[19] The imprecise signifiers in the score, such as tempo, suggest that some parts of the score may not operate exclusively as digital signals.

[20] The practice of playing such music may involve tones between those signified by the score; nonetheless, these cannot be directly indicated in the standard notational scheme.

that words occupy meanings with boundaries set by their difference from other words; the Saussurian conception of the linguistic sign is digital in this way.[21] Our qualitative description of the sounds of *Metal Acoustic Music* does not form an analog to the real sound; rather, it can only approximate the real sound through linguistic signifiers, just as the stair-steps of the digital waveform approximate the reality of the analog waveform.

Having just said that both musical notation and linguistic signifiers are compellingly digital, we might turn back to our focus, recordings. Recordings thus far have operated much like scores, so we might expect them to be digital as well. This expectation appears to be problematic: there are clearly both digital and analog recordings, as has just been discussed at length. However, what the digital nature of the sign and score imply is not that the *content* of the recording be digital, but rather that the recording as a unit operate digitally.

Any recording, whether it contains analog or digital content, is essentially a large digit. The record places a boundary (the domain of the digital) around its content, and as we have seen, the content of a recording can be digital or analog. Even the individual digits on a CD result in ultimately analog phenomena, the creation of a particular sound wave in time; the vinyl record, acting as a large digit, does the same for longer, more complex sets of sound waves. The distinction Rothenbuhler and Peters make between the digital and analog now seems to be a distinction of scale. The digital CD certainly operates within a code, each digit signifying only part of a sound wave; but even the vinyl record is a discrete unit that operates within a code on a larger scale, it must be played according to the code it is a part of.

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[21] Although again, there are certainly elements of communication and the everyday use of linguistic signs that operate in the realm of the analog.

The digits on a CD are its units of reproduction; they are the smallest unit that signifies the eventual creation of a corresponding sound. Any individual digit cannot signify noise by itself; the discrete units of the digital simply refer directly to quantities without regard for whether the sum of those quantities is noise or signal. The large-scale indifference of the record to content is repeated on the level of individual digital units. Just as the vinyl record is indifferent to the content it makes reproducible, the digit is indifferent to the particular waveform it helps to represent.

As we have seen, reproductive and representational schemata operate within a complex hierarchy of precisions; all of these methods of representation are, at some stage, digital. Even the analog record, with its continuous content, the physical index of real sounds in the world, operates digitally within the system of playback and exchange that results in its being played and replayed in a variety of contexts. Language and musical notation also show evidence of being digital systems. However, the reproductive schema outlined here also operate in the analog: the production of sound must ultimately occur in the analog realm, as continuous waveforms; even playback from a precisely digital source such as a CD results in sound waves that physically cannot behave like the stair-step wave that represents them.[22]

The Return of Noise

With this discussion of the digital, we return to the basic distinction in information theory that prompted this entire investigation: the distinction between noise and signal. Noise, it seems, is that which interferes in some way with signal; in order to interfere,

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[22] The vertical lines in the diagram of the digital waveform indicate motion without any change in time, a physical impossibility that only exists in the representation of the stair-step wave.

however, it must be potentially mistaken for signal. If noise were of some different type of data than signal, it would easily be eradicated. It is noise's fundamental similarity to signal that makes it able to interfere. This similarity necessitates the complicated attempts at definition we have seen from R. Murray Schafer and those who purport to produce noise intentionally; noise and signal do not distinguish themselves, their difference is projected on them.

The understanding of "noise" as a label contingent on a variety of cultural and social factors remains; it seems to be the only way to account for the varieties of noise we can encounter in daily life, from the transgressive tones of *Metal Machine Music* to static interference on the telephone. However, it has been the goal of this paper not to overturn this conception, but to move our understanding of noise past the socio-cultural arbitrariness of labels and to the exploration of new ways to *interact* with noise.

If focusing on noise renders it signal, the media barrier of recording offers a way to protect noise; no matter how much attention one pays to the noise produced from the record, it remains physically the same, rendered in vinyl or plastic and protected from any permanent attempt at labeling. The record avoids aura through its multiplicity; recordings are a set of copies without original and by virtue of their inherent reproducibility, a set of originals that can be copied again. These shifting copies discard and attract new labels constantly; their mechanical quality allows them to be introduced into any context, where any record could be noise, or any record could be signal. They are objects; they do not have the signifying baggage of language, because at any moment, they can be reproduced and recontextualized without regard for such signification. Alternately, they can be used with attention to their cultural and historical context;

Grandmaster Flash can replay a popular disco record in the context of the emergent turntablist movement, trading on its existing cultural signification.

The distinctions between noise and signal, reproduction and production, and original and copy are all problematic. If anything, this investigation has revealed that such seemingly clear distinctions are actually noisy; discerning the boundaries that might explain away these problems becomes more difficult as the notion of clear boundaries itself gets tied up in the same questions we want to answer. What seemed clear prior to investigation has turned out to harbor an incredible richness and complexity; ironically, it seems that by intensely focusing on signal, we have deconstructed it into noise. This breakdown of clear definitions results not in uncommunicative noise, but rather a potentially more communicative plenitude of shifting boundaries and self-similar patterns.

The vinyl copy of *Metal Machine Music* that sits in shrink-wrap on my shelf is neither noise nor signal. Were I to listen to it, its status would not change; its physicality resists my attempts at categorization. I would have to consciously apply the labels I know to be inaccurate to change my relationship with it. In the systematic exchange of cultural discourse, *Metal Machine Music* can become noise; protected inside the shrink-wrap and record sleeve, it exists independent of such distinctions. Within the system of inscription and playback in which the physical recording operates the record is not noise; it is the source of incredible complexity, richness, and possibility.

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Figures

P. 1 Metal Machine Music:
http://images.amazon.com/images/P/B000005S37.01.LZZZZZZZ.gif

P. 6 Futurist Sound Poem:
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P. 10 Merzbau:
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P. 22 Duchamp and Da Vinci, two Mona Lisas:
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P. 35 Intonarumori:
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CD Tracklist

1. Lou Reed, *Metal Machine Music* (excerpt)

2. Merzbow, "Balance of Neurosis," *Metal Acoustic Music*

3. AC/DC, "Rock and Roll Ain't Noise Pollution"

4. Kurt Schwitters, "Dritter Teil," *Ursonate*

5. Alvin Lucier, "I am sitting in a room"

6. Pierre Schaeffer, "Étude Aux Chemins de Fer"

7. The Beatles, "Strawberry Fields Forever"

8. Grandmaster Flash, "The Adventures of Grandmaster Flash on the Wheels of Steel"