
Kim Cascone

anechoicmedia
748 Edgemar Ave.
Pacifica, CA 94044, USA
kim@anechoicmedia.com
<http://www.anechoicmedia.com>

The Aesthetics of Failure: “Post-Digital” Tendencies in Contemporary Computer Music

The digital revolution is over.

— Nicholas Negroponte (1998)

Over the past decade, the Internet has helped spawn a new movement in digital music. It is not academically based, and for the most part the composers involved are self-taught. Music journalists occupy themselves inventing names for it, and some have already taken root: *glitch*, *microwave*, *DSP*, *sincore*, and *microscopic music*. These names evolved through a collection of deconstructive audio and visual techniques that allow artists to work beneath the previously impenetrable veil of digital media. The Negroponte epigraph above inspired me to refer to this emergent genre as “post-digital” because the revolutionary period of the digital information age has surely passed. The tendrils of digital technology have in some way touched everyone. With electronic commerce now a natural part of the business fabric of the Western world and Hollywood cranking out digital fluff by the gigabyte, the medium of digital technology holds less fascination for composers in and of itself. In this article, I will emphasize that the medium is no longer the message; rather, specific tools themselves have become the message.

The Internet was originally created to accelerate the exchange of ideas and development of research between academic centers, so it is perhaps no surprise that it is responsible for helping give birth to new trends in computer music outside the confines of academic think tanks. A non-academic composer can search the Internet for tutorials and papers on any given aspect of computer music to

obtain a good, basic understanding of it. University computer music centers breed developers whose tools are shuttled around the Internet and used to develop new music outside the university.

Unfortunately, cultural exchange between non-academic artists and research centers has been lacking. The post-digital music that Max, SMS, AudioSculpt, PD, and other such tools make possible rarely makes it back to the ivory towers, yet these non-academic composers anxiously await new tools to make their way onto a multitude of Web sites.

Even in the commercial software industry, the marketing departments of most audio software companies have not yet fully grasped the post-digital aesthetic; as a result, the more unusual tools emanate from developers who use their academic training to respond to personal creative needs. This article is an attempt to provide feedback to both academic and commercial music software developers by showing how current DSP tools are being used by post-digital composers, affecting both the form and content of contemporary “non-academic” electronic music.

The Aesthetics of Failure

It is failure that guides evolution;
perfection offers no incentive for
improvement.

— Colson Whitehead (1999)

The “post-digital” aesthetic was developed in part as a result of the immersive experience of working in environments suffused with digital technology:

computer fans whirring, laser printers churning out documents, the sonification of user-interfaces, and the muffled noise of hard drives. But more specifically, it is from the “failure” of digital technology that this new work has emerged: glitches, bugs, application errors, system crashes, clipping, aliasing, distortion, quantization noise, and even the noise floor of computer sound cards are the raw materials composers seek to incorporate into their music.

While technological failure is often controlled and suppressed—its effects buried beneath the threshold of perception—most audio tools can zoom in on the errors, allowing composers to make them the focus of their work. Indeed, “failure” has become a prominent aesthetic in many of the arts in the late 20th century, reminding us that our control of technology is an illusion, and revealing digital tools to be only as perfect, precise, and efficient as the humans who build them. New techniques are often discovered by accident or by the failure of an intended technique or experiment.

I would only observe that in most high-profile gigs, failure tends to be far more interesting to the audience than success.

— David Zicarelli (1999)

There are many types of digital audio “failure.” Sometimes, it results in horrible noise, while other times it can produce wondrous tapestries of sound. (To more adventurous ears, these are quite often the same.) When the German sound experimenters known as Oval started creating music in the early 1990s by painting small images on the underside of CDs to make them skip, they were using an aspect of “failure” in their work that revealed a subtextual layer embedded in the compact disc.

Oval’s investigation of “failure” is not new. Much work had previously been done in this area such as the optical soundtrack work of Laszlo Moholy-Nagy and Oskar Fischinger, as well as the vinyl record manipulations of John Cage and Christian Marclay, to name a few. What is new is that ideas now travel at the speed of light and can spawn entire musical genres in a relatively short period of time.

Back to the Future

Poets, painters, and composers sometimes walk a fine line between madness and genius, and throughout the ages they have used “devices” such as absinthe, narcotics, or mystical states to help make the jump from merely expanding their perceptual boundaries to hoisting themselves into territories beyond these boundaries. This trend to seek out and explore new territories led to much experimentation in the arts in the early part of the 20th century.

When artists of the early 20th century turned their senses to the world created by industrial progress, they were forced to focus on the new and changing landscape of what was considered “background.”

I now note that ordinarily I am concerned with, focus my attention upon, things or “objects,” the words on the page. But I now note that these are always situated within what begins to appear to me as a widening field which ordinarily is a background from which the “object” or thing stands out. I now find by a purposeful act of attention that I may turn to the field as field, and in the case of vision I soon also discern that the field has a kind of boundary or limit, a horizon. This horizon always tends to “escape” me when I try to get at it; it “withdraws” always on the extreme fringe of the visual field. It retains a certain essentially enigmatic character.

— Don Idhe (1976)

Concepts such as “detritus,” “by-product,” and “background” (or “horizon”) are important to consider when examining how the current post-digital movement started. When visual artists first shifted their focus from foreground to background (for instance, from portraiture to landscape painting), it helped to expand their perceptual boundaries, enabling them to capture the background’s enigmatic character.

The basic composition of “background” is comprised of data we filter out to focus on our immediate surroundings. The data hidden in our perceptual “blind spot” contains worlds waiting to

be explored, if we choose to shift our focus there. Today's digital technology enables artists to explore new territories for content by capturing and examining the area beyond the boundary of "normal" functions and uses of software.

Although the lineage of post-digital music is complex, there are two important and well-known precursors that helped frame its emergence: the Italian Futurist movement at the beginning of the 20th century, and John Cage's composition *4'33"* (1952).

Futurism was an attempt to reinvent life as it was being reshaped by new technologies. The Italian Futurist painter Luigi Russolo was so inspired by a 1913 orchestral performance of a composition by Balilla Pratella that he wrote a manifesto, *The Art of Noises*, in the form of a letter to Pratella. His manifesto and subsequent experiments with *intonarumori* (noise intoners), which imitated urban industrial sounds, transmitted a viral message to future generations, resulting in Russolo's current status as the "grandfather" of contemporary "post-digital" music. The Futurists considered industrial life a source of beauty, and for them it provided an ongoing symphony. Car engines, machines, factories, telephones, and electricity had been in existence for only a short time, and the resulting din was a rich palette for the Futurists to use in their sound experiments.

The variety of noises is infinite. If today, when we have perhaps a thousand different machines, we can distinguish a thousand different noises, tomorrow, as new machines multiply, we will be able to distinguish ten, twenty, or thirty thousand different noises, not merely in a simply imitative way, but to combine them according to our imagination.

— Luigi Russolo (1913)

This was probably the first time in history that sound artists shifted their focus from the foreground of musical notes to the background of incidental sound. Russolo and Ugo Piatti—who together constructed the noise intoners—gave them descriptive names such as "exploders," "roarers," "croakers," "thunderers," "burstlers," "cracklers," "buzzers," and "scrapers." Although the *intonarumori* them-

selves never found their way into much of the music in the Futurists' time, they did manage to inspire composers like Stravinsky and Ravel to incorporate some of these types of sounds into their work.

A few decades after the Futurists brought incidental noise to the foreground, John Cage would give permission to all composers to use any sound in composing music. At the 1952 debut of Cage's *4'33"*, David Tudor opened the piano keyboard lid and sat for the duration indicated in the title, implicitly inviting the audience to listen to background sounds, only closing and reopening the lid to demarcate three movements. The idea for *4'33"* was outlined in a lecture given by Cage at Vassar College in 1948, entitled "A Composer's Confessions." The following year, Cage saw the white paintings of Robert Rauschenberg, and he saw in this an opportunity to keep pace with painting and push the stifled boundaries of modern music. Rauschenberg's white paintings combined chance, non-intention, and "minimalism" in one broad stroke, where the paintings revealed the "changing play of light and shadow and the presence of dust" (Kahn 1999). Rauschenberg's white paintings were a powerful catalyst that helped inspire Cage to remove all constraints on what was considered music. Every environment could be experienced in a completely new way—as music.

Of equal importance to Cage's "silent piece" was his realization that there is, in fact, no such thing as "silence"—that, as human beings, our sensory perceptions occur against the background noise of our biological systems. His experience in an anechoic chamber at Harvard University prior to composing *4'33"* shattered the belief that silence was obtainable and revealed that the state of "nothing" was a condition filled with everything we filtered out. From then on, Cage strove to incorporate this revelation into subsequent works by paying attention not only to sound objects, but also to their background.

Snap, Crackle, Glitch

Fast-forwarding from the 1950s to the present, we skip over most of the electronic music of the 20th century, much of which has not, in my opinion, fo-

cused on expanding the ideas first explored by the Futurists and Cage. An emergent genre that consciously builds on these ideas is that which I have termed “post-digital,” but it shares many names, as noted in the introduction, and I will refer to it from here on out as *glitch*. The glitch genre arrived on the back of the *electronica* movement, an umbrella term for alternative, largely dance-based electronic music (including *house*, *techno*, *electro*, *drum’n’bass*, *ambient*) that has come into vogue in the past five years. Most of the work in this area is released on labels peripherally associated with the dance music market, and is therefore removed from the contexts of academic consideration and acceptability that it might otherwise earn. Still, in spite of this odd pairing of fashion and art music, the composers of glitch often draw their inspiration from the masters of 20th century music who they feel best describe its lineage.

A Brief History of Glitch

At some point in the early 1990s, techno music settled into a predictable, formulaic genre serving a more or less aesthetically homogeneous market of DJs and dance music aficionados. Concomitant with this development was the rise of a periphery of DJs and producers eager to expand the music’s tendrils into new areas. One can visualize techno as a large postmodern appropriation machine, assimilating cultural references, tweaking them, and then re-presenting them as tongue-in-cheek jokes. DJs, fueled with samples from thrift store purchases of obscure vinyl, managed to mix any source imaginable into sets played for more adventurous dance floors. Always trying to outdo one another, it was only a matter of time until DJs unearthed the history of electronic music in their archeological thrift store digs. Once the door was opened to exploring the history of electronic music, invoking its more notable composers came into vogue. A handful of DJs and composers of *electronica* were suddenly familiar with the work of Karlheinz Stockhausen, Morton Subotnick, and John Cage, and their influence helped spawn the glitch movement.

A pair of Finnish producers called Pan Sonic—then known as Panasonic, before a team of corporate lawyers encouraged them to change their name—led one of the first forays into experimentation in *electronica*. Mika Vainio, head architect of the Pan Sonic sound, used handmade sine wave oscillators and a collection of inexpensive effect pedals and synthesizers to create a highly synthetic, minimal, “hard-edged” sound. Their first CD, titled *Vakio*, was released in the summer of 1993, and was a sonic shockwave compared to the more blissful strains of ambient-techno becoming popular at that time. The Pan Sonic sound conjured stark, florescent, industrial landscapes; test-tones were pounded into submission until they squirted out low, throbbing drones and high-pitched stabs of sine waves. The record label Vainio founded, Sähkö Records, released material by a growing catalog of artists, most of it in the same synthetic, stripped-down, minimal vein.

As discussed earlier, the German project Oval was experimenting with CD-skipping techniques and helped to create a new tendril of glitch—one of slow-moving slabs of dense, flitting textures. Another German group, which called itself Mouse on Mars, injected this glitch aesthetic into a more danceable framework, resulting in gritty low-fidelity rhythmic layers warping in and out of one another.

From the mid-1990s forward, the glitch aesthetic appeared in various sub-genres, including drum’n’bass, drill’n’bass, and trip-hop. Artists such as Aphex Twin, LTJ Bukem, Omni Trio, Wagon Christ, and Goldie were experimenting with all sorts of manipulation in the digital domain. Time-stretching vocals and reducing drum loops to eight bits or less were some of the first techniques used in creating artifacts and exposing them as timbral content. The more experimental side of *electronica* was still growing and slowly establishing a vocabulary.

By the late 1990s, the glitch movement was keeping pace with the release of new features in music software, and the movement began congealing into a rudimentary form. A roster of artists was developing. Japanese producer Ryoji Ikeda was one of the first artists other than Mika Vainio to gain exposure for his stark, “bleepy” soundscapes. In con-

trast to Vainio, Ikeda brought a serene quality of spirituality to glitch music. His first CD, entitled +/-, was one of the first glitch releases to break new ground in the delicate use of high frequencies and short sounds that stab at listeners' ears, often leaving the audience with a feeling of tinnitus.

Another artist who helped bridge the gap between delicate and damaging was Carsten Nicolai (who records and performs under the name Noto). Nicolai is also a co-founder of Noton/Rastermusic, a German label group that specializes in innovative digital music. In a similar fashion, Peter Rehberg, Christian Fennesz, and the sound/Net art project Farmers Manual are tightly associated with the Mego label located in Vienna. Rehberg has the distinction of having received one of only two honorary Ars Electronica awards in Digital Music for his contribution to electronic music. Over the past few years, the glitch movement has grown to encompass dozens of artists who are defining new vocabularies in digital media. Artists such as immedia, Taylor Deupree, Nobukazu Takemura, Neina, Richard Chartier, Pimmon, *0, Autopoieses, and T:un[k], to name just a few, constitute the second wave of sound hackers exploring the glitch aesthetic.

There are many artists who have not been mentioned here who contribute to pushing the boundaries of this movement. It is beyond the scope of this article to go deeply into the evolution of glitch music, but I have included a discography at the end of this article that will offer good starting points for the casual listener.

Power Tools

Computers have become the primary tools for creating and performing electronic music, while the Internet has become a logical new distribution medium. For the first time in history, creative output and the means of its distribution have been inextricably linked. Our current sonic backgrounds have dramatically changed since 4'33" was first performed—and thus the means for navigating our surroundings as well. In response to the radical alteration of our hearing by the tools and technolo-

gies developed in academic computer music centers—and a distribution medium capable of shuttling tools, ideas, and music between like-minded composers and engineers—the resultant glitch movement can be seen as a natural progression in electronic music. In this new music, the tools themselves have become the instruments, and the resulting sound is born of their use in ways unintended by their designers. Commonly referred to as sound “mangling” or “crunching,” composers are now able to view music on a microscopic level. Curtis Roads coined the term *microsound* for all variants of granular and atomic methods of sound synthesis, and tools capable of operating at this microscopic level are able to achieve these effects. Because the tools used in this style of music embody advanced concepts of digital signal processing, their usage by glitch artists tends to be based on experimentation rather than empirical investigation. In this fashion, unintended usage has become the second permission granted. It has been said that one does not need advanced training to use digital signal processing programs—just “mess around” until you obtain the desired result. Sometimes, not knowing the theoretical operation of a tool can result in more interesting results by “thinking outside of the box.” As Bob Ostertag notes, “It appears that the more technology is thrown at the problem, the more boring the results” (1998).

“I looked at my paper,” said Cage. “Suddenly I saw that the music, all the music, was already there.” He conceived of a procedure which would enable him to derive the details of his music from the little glitches and imperfections which can be seen on sheets of paper. It had symbolic as well as practical value; it made the unwanted features of the paper its most significant ones—there is not even a visual silence.

— David Revill (1999)

New Music From New Tools

Tools now aid composers in the deconstruction of digital files: exploring the sonic possibilities of a

Photoshop file that displays an image of a flower, trawling word processing documents in search of coherent bytes of sound, using noise-reduction software to analyze and process audio in ways that the software designer never intended. Any selection of algorithms can be interfaced to pass data back and forth, mapping effortlessly from one dimension into another. In this way, all data can become fodder for sonic experimentation.

Composers of glitch music have gained their technical knowledge through self-study, countless hours deciphering software manuals, and probing Internet newsgroups for needed information. They have used the Internet both as a tool for learning and as a method of distributing their work. Composers now need to know about file types, sample rates, and bit resolution to optimize their work for the Internet. The artist completes a cultural feedback loop in the circuit of the Internet: artists download tools and information, develop ideas based on that information, create work reflecting those ideas with the appropriate tools, and then upload that work to a World Wide Web site where other artists can explore the ideas embedded in the work.

The technical requirements for being a musician in the information age may be more rigorous than ever before, but—compared to the depth of university computer music studies—it is still rather light. Most of the tools being used today have a layer of abstraction that enables artists to explore without demanding excessive technical knowledge. Tools like Reaktor, Max/MSP, MetaSynth, Audiomulch, Crusher-X, and Soundhack are pressed into action, more often than not with little care or regard for the technical details of DSP theory, and more as an aesthetic wandering through the sounds that these modern tools can create.

The medium is no longer the message in glitch music: the tool has become the message. The technique of exposing the minutiae of DSP errors and artifacts for their own sonic value has helped further blur the boundaries of what is to be considered music, but it has also forced us to also to examine our preconceptions of failure and detritus more carefully.

Discussion

Electronica DJs typically view individual tracks as pieces that can be layered and mixed freely. This modular approach to creating new work from pre-existing materials forms the basis of electronic music composers' use of samples. Glitch, however, takes a more deconstructionist approach in that the tendency is to reduce work to a minimum amount of information. Many glitch pieces reflect a stripped-down, anechoic, atomic use of sound, and they typically last from one to three minutes.

But it seems this approach affects the listening habits of electronica aficionados. I had the experience of hearing a popular sample CD playing in a clothing boutique. The "atomic" parts, or samples, used in composing electronica from small modular pieces had become the whole. This is a clear indication that contemporary computer music has become fragmented, it is composed of stratified layers that intermingle and defer meaning until the listener takes an active role in the production of meaning.

If glitch music is to advance past its initial stage of blind experimentation, new tools must be built with an educational bent in mind. That is, a tool should possess multiple layers of abstraction that allow novices to work at a simple level, stripping away those layers as they gain mastery. In order to help better understand current trends in electronic music, the researchers in academic centers must keep abreast of these trends. Certainly, many of their college students are familiar with the music and can suggest pieces for listening. The compact discs given in this article's reference list form a good starting point. More information can be obtained by reading some of the many electronic mailing lists dedicated to electronica, such as the microsound, idm, and wire lists. In this way, the gap can be bridged, and new ideas can flow more openly between commercial and academic sectors.

We therefore invite young musicians of talent to conduct a sustained observation of all noises, in order to understand the various rhythms of which they are composed, their principal and secondary tones. By comparing

the various tones of noises with those of sounds, they will be convinced of the extent to which the former exceeds the latter. This will afford not only an understanding, but also a taste and passion for noises.

— Luigi Russolo (1913)

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