singular writing aesthetic—a personal, particular way of articulating the elements of the discourse that ties my whole body of work together—persists. To corroborate, here are two other technologically divergent pieces that also incorporate tuning forks: *strings.lines* [3] and *frequencies (a / fragments)* [4]. At the foundation of these fixed media works are similarities in the way the sounds are articulated. Despite diametrically opposed technological setups, *frequencies (a)* is conceived as an audiovisual performance where events are triggered in real time while the other two pieces are intended for listening without visual support. However, each work exemplifies my three main compositional techniques: intermittent layering of pure tones and complex sound matter; restrictive processing that maintains some of the acoustic qualities of the original sound material; clean-cut editing that puts forward dynamic intensities and disruptions.

On a conceptual level, these three works make use of a poetic contextualization of the tuning fork, which I use as a symbol that bridges the gap between centuries of acoustic instrumental music and the advent of electronic music; the sound tuning forks produce is close to a pure sine wave, the most basic element of early electronic music. For me this is a way to nullify the old/new technology dichotomy, done in the spirit of a synthesis rather than technological segregation.

These are some of the ideas that lead me to think that my interests, my questions and my aesthetic writing remain independent from the lightning speed of technological advancement.

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Convergent Technologies, Custom Aesthetics

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ABSTRACT

The author anticipates how technological advances in the 21st century will give musicians the tools to further control their craft, while giving listeners the ability to personalize and share their aesthetic experience.

We may have conquered the "infinite variety of noise-sounds" [1], yet "the machines we use for making music can only give back what we put into them" [2]. While theoretically we can generate any sound we imagine, implementation is often a laborious task. Toward this end, many musicians and sound artists exploit new technologies as soon as they become available. This frequently results in different aesthetic practices, and new forms often subsume older paradigms rather than replace them. New technology has strengthened the variety of musical communities and allowed more people to participate in music and multimedia practices. By looking at the current musical and technological landscape, I suggest that emerging technologies will allow humans to personalize their perception of environments through embedded technology and human-computer interfaces.

In 2002 the US National Science Foundation and the Department of Commerce called for transdisciplinary convergence of nanotechnology, biotechnology, information technology and cognitive science (NBIC) in order to create technologies for improving human health, cognition and physical abilities [3]. Subjects of a 2013 report [4] include ubiquitous, wireless, intelligent sensors; complexity science; human-computer interfaces; and technologies for telepresence and teleoperation. While this report aspires to create a new renaissance for humanity, and cites institutions inclusive of the arts (Media Lab, Bell Labs), there is little mention of art and music in regard to converging technologies.

Technology has always had an impact on music and aesthetics. Early musical instruments allowed for exploration of the natural resonance of reeds, bones and land formations. The monochord, an ancient string instrument, was used by Pythagoras to demonstrate simple number ratios and to develop his theories of music and the universe [5]. Twentieth-century technology affected the aesthetics of the Italian Futurists [6], musique concrète, Elektronische Musik, Plunderphonics [7] and Glitch music's "aesthetic of failure" [8], to name a few.

Electroencephalography (EEG) has been used in Lucier's *Music for Solo Performer* (1965) and more recently the *Brain Dreams Music Project* initiated in 2011 [9]. David Rosenboom pioneered the use of computers and biofeedback in musical contexts [10]. The Xth Sense is a biophysical technology for digital interactivity that captures mechanomyogram (MMG) signals for playback or use as control data [11]. The Hub experimented with networked music early on, and their current work extends the network, from performers to audience, with pieces such as *Glimmer* [12] and platforms such as MassMobile [13]. The BioSync interface merges network and biosensing paradigms by using biometric responses in audience members via a mobile phone [14]. Animated scores by composers such as Jesper Pedersen allow for real-time algorithmic composition realized by instrumentalists following animations [15]. Some video games, such as Otocky [16], are designed for simultaneous game/music playing while SoundCraft sonifies the gameplay of StarCraft 2 [17]. My own work includes rule-based systems for human and artificial agents [18].

Further convergence of the above practices will increase as technology gets smaller, less expensive and more abundant. In a world of ubiquitous technology, music and sound art will be constantly accessible and interactive. Wearable/embedded devices can serve as inputs to a networked, multimedia performance system involving other humans and artificial intelligences. The design of soundscape in both virtual and physical environments will be important for public infrastructure and private homes/businesses. Sonification of sensor data will be important for monitoring health, interfacing

with computers and understanding big data.

As users now customize technology, whether by changing their desktop image or modifying the source code of operating systems, humans will be able to craft their own subjective experience of the world. Individuals may be able to alter an advanced cochlear implant or choose between sonification mappings in a human-computer interaction. Emerging technologies will impact music and multimedia art by making personal experiences more customizable. The aesthetics of music in the future will be at once intensely personalized and shareable within a cybernetic network.

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Art and the Uncanny: Tapping the Potential

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Links to supplemental materials such as audio or video files are listed at the end of this article.

ABSTRACT

This article discusses the potential uses and benefits of "the uncanny." It begins with a historical definition and continues through existing uses within the author's body of work.

> *My mission in life is to make everybody as uneasy as possible. I think we should all be as uneasy as possible, because that's what the world is like.*
>
> —Edward Gorey [1]

Conversations about modern composition are often facilitated by an early definition of boundaries. Identifying one's niche discloses a great deal about artistic intent, perhaps most effective as a self-revelatory technique. Of primary interest to me are the niches created by the blurry dividing lines, by the unlikely merging of certain artistic practices that elicit feelings of discomfort and uncertainty in the viewer—an exploration of the uncanny. In this article I seek to examine possible definitions of the uncanny and their manifestations within my artistic output.

The definition of "uncanny" is understandably vague, as are many such words with powerful emotional attachment—"beyond the ordinary or normal" and "uncomfortably strange" do not begin to capture the true spirit of the word. There is a skin-crawling, not-quite-repulsive, impractically fearful state associated with the emotion that is impossibly complicated and wholly lost in the translation to language. Twentieth-century psychologist Ernst Jentsch explains the difficulty of capturing the essence of uncanny:

> the same impression does not necessarily exert an uncanny effect on everybody. Moreover, the same perception on the part of the same individual does not necessarily develop into "uncanny" every time, or at least not every time in the same way [2].

With this ambiguity in mind, we might still compile a list of factors that can contribute to the uncanny and the relevant symptoms, borrowing from experts in the field. It is a revolving door of terror between familiar nostalgia and uncertain memories. It arises when one begins to doubt the presence of life within an animate being, or the lifelessness of a still object. It surges when a mechanical process juxtaposes with the ordinary imperfection of human life [3,4].

Robotics expert Masahiro Mori cites an excellent example:

> One robot had 29 pairs of artificial muscles in the face (the same number as a human being) to make it smile in a humanlike fashion. . . . [A] smile is a dynamic sequence of facial deformations, and the speed of the deformations is crucial. When the speed is cut in half in an attempt to make the robot bring up a smile more slowly, instead of looking happy, its expression turns creepy. This shows how, because of a variation in movement, something that has come to appear very close to human—like a robot, puppet, or prosthetic hand—could easily tumble down into the uncanny valley [5].

Symptoms of one who has experienced an uncanny situation include disorientation, feelings of psychosis or insanity and mistrust of previously held beliefs [6].

While CGI and robotic developers are often seeking ways to overcome the negative effects of the "uncanny valley" [7] (Fig. 1), the usefulness of the uncanny as a positive artistic tool is apparent: one aspect of the tremendous appeal of great art is its ability to temporarily suspend and exploit one's sense of reality within visual, aural and written contexts. Working with the uncanny allows for manipulation of the audience from the standpoint of the ego, simultaneously embracing and ridiculing a sense of solipsism. By describing the very familiar and illustrating the blandly normal, one can develop a comfortable situation for the viewer that allows the uncanny effect to take place through subsequent decoration borrowed from the truly strange.