Mary Sherman
(with contributions by Florian Grond)

In Praise of Frozen Sound: Audifying Painting

Despite repeated cries of its death, painting endures. It is one of civilization's most resilient media, continuing to evolve and fascinate, informed and responding to the advances of its age. However, the study of painting most often focuses on its visual qualities: the things that one can see, its subject matter, form or compositional elements. From there, analysis typically extends to the context in which the work was made, the era in which it was created, the technical advances of the time, biographical quirks of its creator, etc.

I propose, however, that something more fundamental is being overlooked – that the enduring charm of a Cézanne painting of apples, for instance, is not due to its representation of a familiar subject. Nor is it because of its pioneering depiction of space and the aftermath of that breakthrough. Instead, it continues to attract its viewers due to its tactile, physical structure, its embodiment of process, its transcendent orchestration of surface incidents: some short, some long, some smooth, some rough, some delicate, some brutal, but all exquisitely composed, scored, and re-lived with each viewing.[1]

This frozen record of the act of painting – which, in the best of examples, is a masterful one – is what I believe makes painting so compelling. Beyond the dazzling ordering of colours and shapes, the enjoyment of visually surfing along a painting's structural incidents while at the same time that one cannot touch them, instantaneously creates desire. And that desire doesn't stop there. It is compounded by a similar tickling of the ear, the sense that complements the eye in our experience of time and space.[2] In this way, I argue that painting stimulates three senses: most

1 Interestingly, this alternative and multisensory way of engaging with paintings – reaching beyond visually recognizing objects and space and appreciating rhythm and process – bears many similarities to the way some people with macular degeneration (which can render them legally blind) or other forms of low-vision describe their experience of viewing paintings, as, for instance, Georgina Kleege notes in a number of her writings, see G. Kleege, *Sight Unseen*, New Haven, 1999.

2 The complementary potential of the sense of hearing to reveal structures in digital data has also received attention from the field of auditory display, where techniques such as sonification and audification have been developed and refined over the last 20 years. For reference textbooks see

overtly, the visual, more covertly and, perhaps, more indelibly, the aural and tactile. And it is this tease – this suggestion and refusal to be explicit – that allows the viewer's mind the pleasure of possible closure, while that possibility always slips beyond one's certain grasp… like any love.

Of course, many disciplines have studied how the senses complement, augment, and interact with each other.[3] Together – as sound in film so brilliantly exploits – they can be more efficient than alone, which neuropsychologists Dubois, Poeppel. and Pelli also note.[4] However, for my work, what is perhaps most thrilling is how the interplay between the senses can seem to resemble those between people. Like some of our interactions, they can at times complement each other, and at other times, deceive each other when integrating conflicting input.[5] Or, as Michel Chion notes, "we never see the same thing when we also hear; we don't hear the same thing when we see as well".[6] However, in many cases the senses are in mutual exchange, which Chion goes on to define as "trans-sensory perceptions".[7]

It was this multi-faceted and poignant exchange between the senses that fuelled my and my collaborator's, the sound artist and researcher Florian Grond's, work *Delay*: to exploit the senses' relational interactions, to make concrete painting's latent "music", to make tangible its touch through the audible, to bring painting into the twenty-first century, into the realm of time with sound.

G. Kramer ed., *Auditory Display: Sonification, Audification, and Auditory Interfaces*, Boulder, 1994; T. Hermann, A. Hunt, J. Neuhoff eds., *The Sonification Handbook*, Berlin, 2011.

3 For an overview that integrates perceptual and phenomenological perspectives on the interplay between sound and sight see G. Daurer, "Audiovisual Perception", in: *Audiovisuology Compendium: See This Sound – An Interdisciplinary Survey of Audiovisual Culture*, eds. D. Daniels, S. Naumann, Cologne, 2010, pp. 329–337; M. Chion, *Film, a Sound Art*, trans. C. Gorbman, New York, 2009; as well as H. Beller, "Between the Poles of Mickey Mousing and Counterpoint", in: *Audiovisuology 2 Essays*, eds. D. Daniels, S. Naumann, Cologne, 2011, pp. 102–119. For an historic overview of the relation of painting and music, and the predominance of the discussion of shape and form in relation to sound, see A. Gottdang, "Painting in Music", in: *Audiovisuology Compendium…*, pp. 247–257.

4 M. DuBois, D. Poeppel, D. G. Pelli, "Seeing and Hearing a Word: Combining Eye and Ear Is More Efficient than Combining the Parts of a Word", PLOS ONE (2013), DOI:10.1371/journal.pone.0064803.

5 H. McGurk, J. MacDonald, "Hearing Lips and Seeing Voices", *Nature,* 1976, 264, pp. 746–748.

6 M. Chion, *Audio Vision: Sound on Screen*, trans. C. Gorbman, New York, 1994.

7 Trans-sensory perceptions, as coined by Chion, are "perceptions that belong to no one particular sense but that may travel via one sensory channel or another without their content or their effect being limited to this one sense[…] Everything involving rhythm may serve as an example. But other cases involve spatial perceptions as well as the verbal dimension. A word that is read or spoken belongs to the same sphere of language, even if the modes of its transmission [handwriting, vocal timbre] run in parallel sensory channels. Rhythm is the essential trans-sensory dimension, since we experience it before we are born. The foetus encounters rhythm in the form of variations in pressure on the body wall, parsed with the combined beats of the mother's heart and its own[…] Texture and grain are another category of trans-sensory perception". M. Chion, *Film, a Sound Art…*, p. 496.

First Step: Audifying a Painting: *Delay*

Working in collaboration with Grond, our collaborative piece *Delay* primarily uses sound as a direct exploration of the structural similarities between the auditory, visual, and tactile senses. *Delay* asks: What if you could hear a painting? What if, for instance, you could hear the fragment of this painting?

Fig. 1. A magnified detail of one of the 5 sections of my painting that was scanned using Fourier-domain Optical Coherence Tomography. Photo by Stewart Clements © Stewart Clements, 2014. Used with permission.

It would sound like this: (Sound file is available at: https://soundcloud.com/florian-grond197239776/fourth-shutter-binaural).

Such scanning of surface structures and topographic data along trajectories to be turned into sound is not new. This idea can be traced back to the writer Rainer Maria Rilke: he speculated about the sound of the sutures on the human skull, which reminded him of the grooves in gramophone records.[8] Later, in the early 1990s, Scot Gresham-Lancaster extensively explored the digital terrain of x/y/z

8 R. M. Rilke, "Ur-Geräusch", *Soglio, am Tage Mariae Himmelfahrt*, 1919.

Fig. 2. The painting that was used as the basis for the first investigation into the sonification of painting. Photo by Stewart Clements © Stewart Clements, 2014. Used with permission.

Fig. 3. The 5 areas of the same painting, shown in Fig. 2, with the 5 areas masked off that were scanned using Fourier-domain Optical Coherence Tomography. Photo by Yao Xiao © Yao Xiao, 2012. Used with permission.

values and how they can be translated into sound.[9] Paul DeMarinis translated the indentations on the surface of ancient pottery into sound for his work *The Edison Effect*; more recently, Jens Brand has translated the earth's topographic data along the paths of satellites into sounds.[10]

Likewise, to take advantage of the capacities of the auditory sense to bring about a deeper understanding of visual works, five one-inch sections of one of my paintings were scanned by the scientist Brett Bouma's assistant Martin Villiger, using Fourier-domain Optical Coherence Tomography, a rich imaging technique.[11]

This resulted in 5 sets of numerical data and corresponding black and white contour images of the same information, as for instance, seen below:

date
2010-06-07 00:00:00

sample rate
50000

latitude
–10 10

longitude
5

title

time	channel 1		channel 2						
1024	643	696	696	696	610	609	626	626	626
637	637	639	624	639	611	718	718	718	702
638	638	610	610	644	646	646	644	627	619
619	609	609	610	610	610	603	605	609	609
608	436	436	436	606	606	606	608	608	608
436	436	435	434	434	434	. . . .			

As opposed to ascribing a sound to each number, starting at the upper right corner and proceeding line-by-line through the rows of numbers, Grond, instead, extracted surface profiles from the data, following predefined paths that are reminiscent of both drawing and the way the eye scans a painting.

9 B. Thibault, S. Gresham-Lancaster, "Experiences in Digital Terrain: Using Digital Elevation Models for Music and Interactive Multimedia", *Leonardo Music Journal*, 1997, 7, pp. 11–17.

10 P. DeMarinis, J. Brand, *BOOK,* Heidelberg, 2009.

11 B. J. Vakoc, R. M. Lanning, J. A. Tyrrell, T. P. Padera, L. A. Bartlett, T. Stylianopoulos, L. L. Munn, G. J .Tearney, D. Fukumura, R. K. Jain, B. E. Bouma, "Three-dimensional microscopy of the tumor microenvironment in vivo using optical frequency domain imaging", *Nature Medicine*, 2009, 15, pp. 1219–1223. DOI:10.1038/nm.1971.

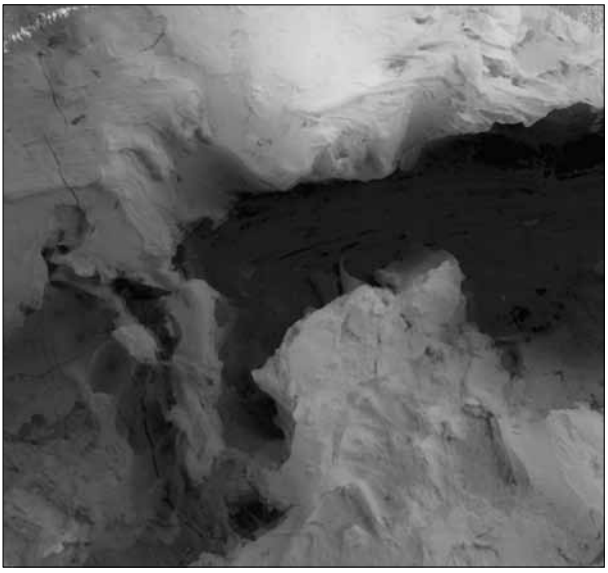

Fig. 4. The visual mapping of the scientific data derived from the masked square, labelled number 1 in Fig. 3. Scan image by Martin Villiger © Martin Villiger, 2011. Used with permission.

Fig. 5. The visual mapping of the scientific data derived from the masked square, labelled number 1 in Fig. 3, which is laid over the actual area of the painting from which the data was derived. Scan image by Martin Villiger © Martin Villiger, 2011. Used with permission. Photo by Stewart Clements © Stewart Clements, 2014. Used with permission. Composite Image by Florian Grond © Grond, 2014. Used with permission.

The first graph shows the contour of the painting's surface – its hills and valleys. The second graph is derived from the first and shows the rate of change on the painting's surface regardless of whether the change is in a so-called hill or valley. The third graph represents how sharp the edges of this change are on the painting's surface and provides the signal from which the audification is made. Thus, for each

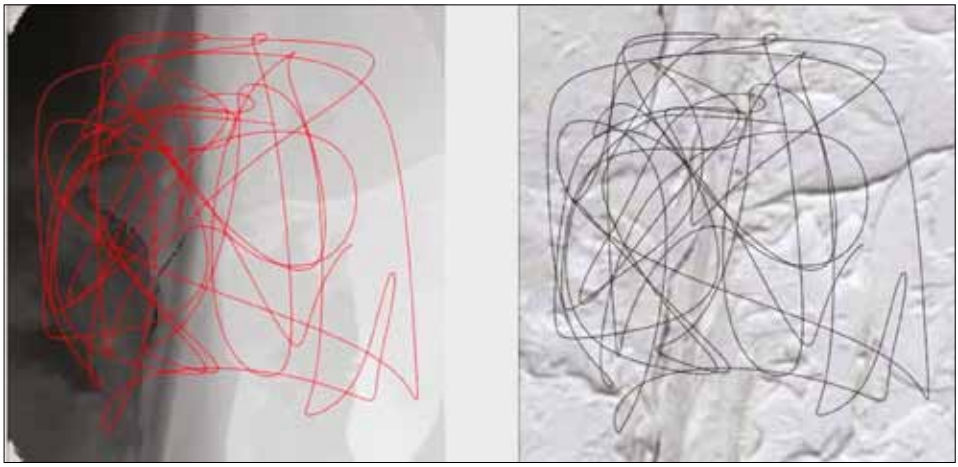

Fig. 6. The trajectory of the path through the scientific data Grond used as the basis for sonification of the masked square, labelled number 4 in Fig. 3. Image/Photo by Florian Grond © Florian Grond, 2012. Used with permission.

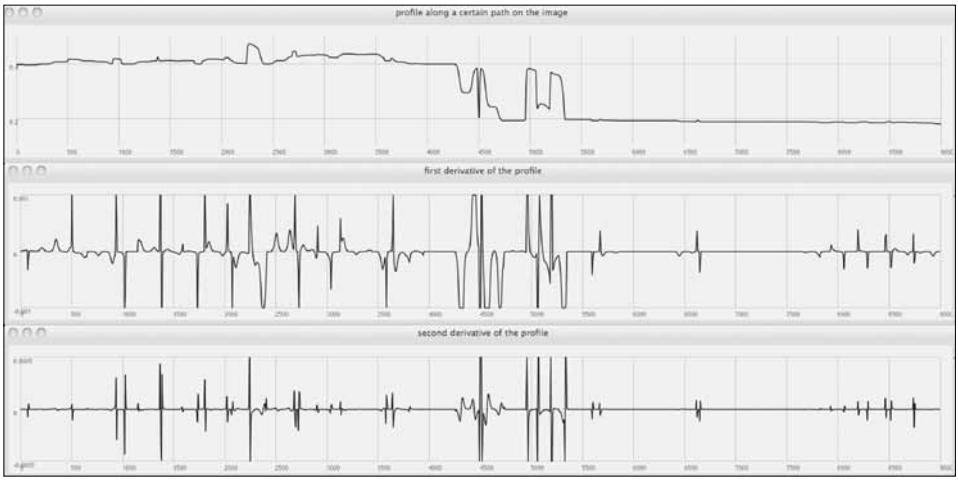

Fig. 7. The contours of the scanned painting along the trajectories of Fig. 6 and the derivatives of the scanned painting as described in the text. Image/Photo by Florian Grond © Florian Grond, 2012. Used with permission.

point that corresponds to a structural event on the painting (caused by the way it was painted, scored, and relieved and, also, indicated in the data), a click with a distinct sonic timbre was created.

Grond then took the clicks derived from the painting and manipulated them further. To give a sense of whether the click "resides" in the hills or valleys of the

paint surface, reverb was added; the reverberant clicks would now be rather dry in the areas closer to the viewer (the hills) or wet and resonant when further away (in the valleys). Next, to connect these sounds of the surface structure to the colours in the painting (mostly white), the painting's RGB/colour frequencies were mapped to spectral envelopes that would be close to human vowel-like sounds. This made the initial clicks a bit less harsh and less immediately bound to an identifiable sonic source. Finally, to make the sounds even less source-binding, they were stretched out a bit more (through granular re-synthesis), which made them even more curious and suited to so many aspects of *Delay,* the title and content of the piece inspired by this research.

The sounds then are not directly identifiable as something concrete. Nonetheless, in their creation, they allude to the idea of the painting's "voice". Or, to directly quote Grond, "The irregular occurrence of surface incidents now became repeated articulations of various forms and lengths – all of them at the brink of speaking out, without saying something, but asking for further exploration of the perceived".

As previously mentioned, there is a long history of artists working with extra-sonorous data as a source and inspiration for their compositions and performances (e.g., John Cage, Alvin Lucier, and Sol LeWitt). As noted in the *Oxford Handbook of Sound Studies*: "Works like these brought natural and artificial systems to the fore by putting a process or phenomenon ahead of the artists' ostensibly personal 'vision'. What these works also implicitly proposed was that phenomena beyond the perception of the human senses might somehow be represented or reified".[12]

With *Delay,* the aim was to translate the scientific data of the painting in such a way that both revealed a relationship between the structure of the painting and the resulting sound, *and* such that experiencing them together would augment and complement (in the broadest sense of the word) the experience of both. The sound and visuals in this case are meant to be inexorably linked to the audience's experience of the work. On their own they may have their merits, but Ground and I were after something different – that their sum would be significantly enhanced by the coming together of the parts. This is supported by personal observation of viewings of my own works: the connections between sound and visuals is crucial to the works' success in engaging audiences.

In *Delay* there was also a conscious attempt, then, made to play with the notion of a "tease" – in this case specifically, which is the paper's argument – that a painting "teases" our aural and tactile senses, as revealed in the video for the piece, which can be seen at https://vimeo.com/118346045. Thus, when one enters the installation, the painting is presented as an artifact, spot lit, and suspended in the middle of a darkened room. When someone enters, a motorized aluminum plate with 5 small shutters swings in front of the painting, causing the shutters to slowly open

12 T. Pinch, K. Bijsterveld eds, *The Oxford Handbook of Sound Studies*, Oxford, 2012, p. 552. Another example is Andrea Polli's *Atmospherics/Weather Works*, which uses a 15-channel sound system to recreate significant storms in the New York/Long Island area, etc. For more information see http://www.andreapolli.com/studio/atmospherics/.

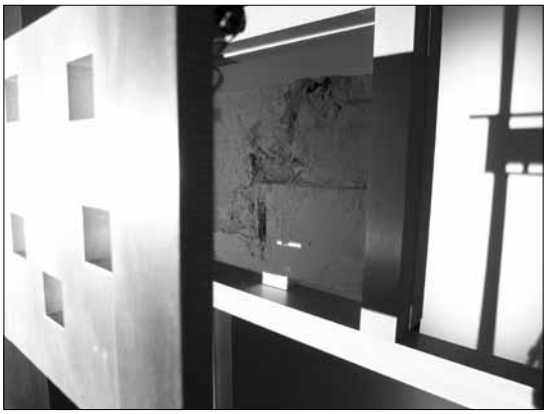

Fig. 8 and 9. Details of *Delay*. They depict the light shining through one of the shutters, slowly revealing one of the one-inch square patches of painting that was scanned, generating one of the sets of sounds heard on the speakers, arranged throughout the space. Photo by Florian Grond © Florian Grond, 2014. Used with permission.

Fig. 10. An installation shot of *Delay*. Photograph by Florian Grond © Florian Grond, 2014. Used with permission.

and close (one after another), revealing the areas that were scanned, a bit the way eclipses work. At the same time the sounds directly created from the corresponding scans are played on five speakers, placed around the room. (These are built as white boxes to visually disappear – e.g. to appear to be structural elements of the room's architecture.) The staging of speakers and the spatial orchestration of the sonic movements invite the audience to recompose the painting's surface texture through the sense of listening.

Thus, as the project started, so it ends: the piece is about love, the overwhelming desire to know everything about something (or someone) – in this case painting – and the impossibility to do so, but the nevertheless all too human quest to try. Hearing a painting does not take away from its mystery: it simply provides another point of entrée, fascination, and association. *Delay*, then, is meant to be a lure: to be seen, heard, and experienced, to delay people, as love does.

To see a video of the installation (combining the work's visuals, audio and haptic components), see http://transculturalexchange.org/marysherman/works/current/delay/vd.html .

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