Chapter 3

Impulsive Synchronisation: A Conversation on Military Technologies and Audiovisual Arts

Aura Satz and Jussi Parikka

Aura Satz's technological art engages with mediated realities and historical pasts that are somehow still present. She completed her PhD in 2002 at the Slade School of Fine Art. Satz's work has been featured in various galleries and festivals in the UK and internationally, from FACT (Liverpool) to Tate and Whitechapel Gallery in London, the Victoria and Albert Museum to the Barbican as well as ICA, and internationally for example at the Zentrum Paul Klee in Switzerland. In 2014–15 she was a Leverhulme Artist-in-Residence at the University of Southampton (the Institute of Sound and Vibration Research, the Department of Music and the John Hansard Gallery) and an artist in residence at Chelsea College of Art, and she also teaches at the Royal College of Art.

Her various installation, audiovisual and performance projects have been able to summon a condition or environment in which one experiences the parallel existence of pasts and presents. Often through historical source work and engaging with past technological ideas, Satz creates poetic imaginaries of technologies, bodies and sonic realities. Indeed, sound technologies are one key theme that runs through a lot of her work, but in a way that engages with the wider vibratory aspects of nature that often become exposed through technological ways of making vibrations and waves visible. She was part of London Science Museum's 'Oramics to Electronica' project (2011) on the female inventor Daphne Oram's 1950s synthesiser. Sound visualisation comes out in projects such as *Vocal Flame* (2012) and the *In and Out of Synch* filmic performance (2012). Cultural

70

techniques of synchronisation are exposed in that specific piece and in others, including *Joan the Woman – with Voice* that was exhibited in 2013. Her interest in the history of automata is most visible in *Automamusic* (2008) and *Automatic Ensemble* (2009), a mixture of old and new automata that engage with surrealist and spiritualist ideas and explorations of automatic writing. Besides the agency of machines, the 'auto-' in the automata, Satz however is always meticulously aware of the human body as a vibratory 'medium' in itself. This body as medium is always, also, recognised as a gendered one, resulting in her historical excavations into specific moments of media history that result in a poetic and empowering relation to women that is often excluded from many projects and historical narratives. Pieces such as *Ventriloqua* (2003) reveal this interest in the close relationship between vibrations, the body and sonic media.

In a way, one could also characterise Satz's method as media archaeological: she is interested in the other stories of media history and sudden, surprising and exciting juxtapositions across temporal layers. Her interest in technological modes of sensing and experience also speak to this media archaeological theme. She is interested in archival material and forgotten 'minor' ideas of media history as a way of staging an audiovisual encounter with the past.

In this conversation Jussi Parikka and Aura Satz focus on her work *Impulsive Synchronisation* (2013) and its contexts in World War II, the later technological frequency-hopping applications and, more widely, the relation of war, art and media archaeological art. The conversation expands to other themes including embodiment, vibration and the importance of modern technological development to our modes of perception.

Jussi Parikka: Let's start with your work *Impulsive Synchronisation* that was exhibited at the Hayward Gallery in London. It's an installation that immerses the visitor in the audiovisual landscape of the 1940s of military technologies but also Hollywood film. The piece refers to a specific 'Secret Communication System' that was patented actually during the war by the Hollywood actress Hedy Lamarr and the composer George Antheil, and besides the immersive experience refers back to this world of 'frequency hopping' as a specific technique that was installed in torpedoes. Could you unpack the work a bit more, elaborate this setting in terms of the historical media technologies and the piece itself?

Aura Satz: I am very much drawn to the history of technology in its most unstable, wobbly moments, such as its inception or its demise

into obsolescence. War is an unfortunate catalyst and accelerator for new developments in technology, and in particular during World War II in America the National Inventors Council (NIC) was set up, soliciting inventions and ideas from the general public towards the war effort. Lamarr and Antheil submitted their patent in June 1941, and it was granted to them the following year. The patent of a technological invention is full of the potentiality of its future applications: one doesn't quite know where it will lead to, just as Lamarr and Antheil's invention of frequency hopping was initially conceived for military purposes but then migrated to the realm of telecommunications, wifi and wireless telephony. Their invention was designed to protect radio-controlled torpedoes from enemy disruption by distributing the signal over many frequencies and synchronising the transmitter and receiver in rapidly changing patterns. The idea, which rather bizarrely drew in part on Antheil's unsuccessful attempt to synchronise sixteen pianolas in his 1924 avant-garde masterpiece *Ballet mécanique*, suggested the use of eighty-eight frequencies (the number of keys on a piano), and the use of perforated paper rolls to keep the frequency hops in sync with each other. I am interested in this collision of unlikely technologies: radios, pianolas, torpedoes, implausibly invented by a Hollywood actress and an avant-garde composer. Another key interest in many of my works is the question of the removal of authorship, either through the mediation of agency

Figure 3.1 Aura Satz, *Impulsive Synchronisation* (2013). Installation view. Courtesy of the artist.

in technology, or the nature of an encounter, oscillating in and out of synchronisation, tuning in and out in dialogue. I love the fact that they invented this together, collaboratively.

JP: It's about communication between humans but also about modern information theory: senders and receivers in the presence of noise, as Shannon and Weaver coined it in the 1940s, right?

AS: Yes, this communicative nature of the invention is echoed in the concept of transmission and reception – the secret communication system is intended as a narrow channel connecting two agents, excluding unwanted enemy interception. It is about a signal moving efficiently between two elements, shrouded in apparent noise, but effectively in sync. Ironically Antheil was supposedly unable to synchronise his pianolas in his music performances so instead he rewrote the numerous scores compressed into one, for a single pianola. For the purposes of this invention the perforated paper strips of transmitter and receiver would have had to have been synchronised in order to operate successfully. The patent states:

> The two records may be synchronized by driving them with accurately calibrated constant speed spring motors, such as are employed for driving clocks and chronometers. However, it is also within the scope of our invention to periodically correct the position of the record at the receiving station by transmitting synchronous impulses from the transmitting station. The use of synchronizing impulses for correcting the phase relation of rotary apparatus at a receiving station is well-known and highly developed in the fields of automatic telegraphy and television.

The patent implicitly addresses the difficulty of synchronisation. Having worked extensively with acoustic devices and sound technologies which explore sound and image synchronisation, I realised that in fact the most interesting moments occur when things fall out of sync, when there is a slippage, a gap, a misalignment, allowing the viewer to inhabit a space between signal and noise. This slippage features both conceptually and materially in the piece, which in a sense conveys the impulse towards synchronisation, effective secret communication, a perfect fit between transmission and reception, but also allows for receiver and transmitter to collide, obscure and misread each other.

The film and sound installation consists of a scrolling screen made from five specially commissioned pianola rolls from Antheil's *Ballet mécanique* (Figure 3.1). The screen is in constant motion so that the film creates a complex light play from the encoded musical score, as

the perforated strips of paper interact and produce patterns on the surrounding walls. In addition, a light located behind the screen – a kind of imageless echo of the projection lamp – flashes in systematic intervals, flattening the film-screen and highlighting the materiality of the pianola paper. At times the conflicting light sources overlap and cancel each other out. The pianola paper perforations on the screen slide across each other so that occasionally the holes will overlap, allowing for a peep-hole of sorts, and at other times the screen appears almost to breathe between flatness and sculptural depth, light play and obscurity.

The film projected on to the scrolling screen is a very short extract from *Come Live with Me*, starring Hedy Lamarr and James Stewart. In this romantic comedy – premiered in 1941, the year she submitted the patent for her invention – Lamarr uses the metaphor of the flashlight, like a firefly, to attract a mate. In the installation, the torch footage signals in flashes according to Morse code (the text is an extract from the patent description) (Figure 3.2). The soundscape is composed of vintage underwater recordings of submarines and torpedo explosions from the 1940s, punctuated by the siren sections from *Ballet mécanique*.

JP: The piece itself connects to our theme of Cold War legacies and continuities in many ways. It's centrally concerned with overlapping
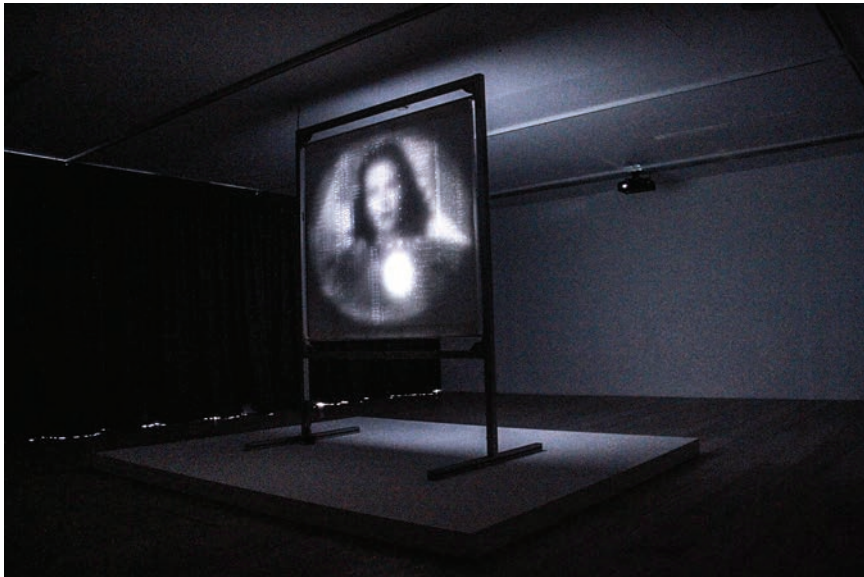

Figure 3.2 Aura Satz, *Impulsive Synchronisation* (2013). Installation view. Courtesy of the artist.

codes. It sets the stage for an investigation that many would attach to a certain Pynchonesque narrative of the twentieth century: the media spectacle worlds of Hollywood, scientific development and military technologies – an array of wild cross-connections that Pynchon employs into an atmosphere of paranoia as the defining 'mood' of the modern technological culture but for you is something else. One thing that stands out is an interesting array of connections relating to code and especially cryptography and signals as a theme that grows out of the Second World War and extends as part of the Cold War era into our current computational worlds. An interest in 'frequencies' is part of your different projects too (including *Ventriloqua*, 2003). This interest refers to the existence of the world of frequencies on which modern communications builds its own high-tech reality. How does that theme of frequencies, code, code-breaking, etc. broadly speaking get mobilised in your work?

AS: I am particularly drawn to codes or transcription systems which hover on the cusp of decipherability. Frequencies, as in recurring patterns of vibration, rotation or waves, are physical manifestations which we read and interpret as a code of sorts. Both *Ventriloqua* and *Theremin* feature the use of a theremin, which is an electronic musical instrument played without physical contact, only by proximity. Invented by the Russian Leon Theremin, who was investigating proximity sensors, it too is a strange case of technology migrating from alarm systems into music, and featuring heavily in Hollywood soundtracks of the '30s and '40s. It usually consists of two antennas, one controlling pitch, the other loudness, and the change in frequency is created by minute hand movements. When we see performers wave their hands about near the antenna, a code or notation system of sorts is suggested, but remains somewhat unreadable, and in turn the musical gestures also suggest some hidden sign language or melodramatic acting technique made music. Many of my projects have looked at forms of notation, scoring, writing, reinterpreting, playback, sonification, through the history of acoustics, music technology and sound reproduction technologies. My film about the unsung electronic music pioneer Daphne Oram not only addressed a little-known contribution of a woman inventor to music technology but also looked at notation and methods of encrypting/writing/composing for a machine. Though she drew on 35 mm clear film, she was less interested in the visuals than in the possibility of reversing an oscilloscope to create a machine that could play drawn sound and provide feedback to monitor immediately. Her Oramics machine, first developed in 1959, used a notation that was intended to provide an empirical pattern-drawing through 'visual-to-aural' means,

that would be both intuitive yet precise. Driven by a desire to 'humanise' the machine, Oram promoted the freehand quality of the hand-drawn shapes, which would be inaccurate, indeterminate, able to convey human error, and therefore a musical code full of rich individuality.

I had also made a previous project about mechanical music, with a similar interest in how one can encode music in the binary system of perforated paper, such as the kind used in pianolas (or, in the case of certain orchestrions, pricked barrels). So it was a fortuitous discovery to encounter the pioneering invention of Lamarr, who had collaborated with Antheil for this purpose, drawing on the history of pianola data storage as well as methods of complicating encryption, transmission and reception. Pianola paper just about looks like music notation, but it is intended to be read, played back and performed by the mechanical piano. Likewise, the calligraphic shapes featured in the Oramics machine invented by Oram certainly suggest a form of writing, but one which cannot be imagined or deciphered until it is sonified through the machine.

I am constantly drawn to certain technological devices which enable us to see or hear differently, providing access to an invisible layer of reality, which remains otherwise hidden. Recently I have made a project about 'human computer' astronomers, with a focus on pattern perception in photographic plates of constellations, leading to Henrietta Swan Leavitt's discovery of variable stars. Here too there is an interest in how we translate supposedly random data into meaningful patterns, which are measured in terms of a variable frequency. I suppose many of my works intend to explore heightened perception as a potential experience for the viewer or participant, but also convey the labour of close attention, altered perceptual sensitivity, and the mediated form of authorship or agency that these technologies provide.

JP: This idea of invisible layers of reality which cannot be directly accessed but become sensible, experienced through your artistic work, is really interesting. It somehow, to me, seems like a crystallisation of the logic of technical media realities as well as a commentary of that situation: the technical realities of sound and vibrations that are somehow paradoxically present and yet sensually removed from our bodies.

AS: Yes, I am drawn to sound and more recently colour as both suggest a certain instability, a vibratory state which is perceptually hard to hold on to or fix and codify. Acoustics often translates it into

visual means in order to apprehend it better, make it more stable as a sensory experience. The visualisation of sound waves facilitates the perception of patterns which are otherwise hard to access visually. It is essentially a form of notation, of transcription, which allows for the translation from one sense to the other. And yet precisely because of its elusive nature, sound resists notation, it can never be accurately conveyed, only certain information can be translated and it is inevitably a partial representation. An interesting example of this difficulty of transcription which I have always found fascinating is Alexander Melville Bell's 'Visible Speech' method of phonetic notation (1864); it is an attempt to write language from the outside in, as it were, the positions of the tongue and teeth in relation to pronunciation, so as to make spoken language accessible to those without hearing. I find these kinds of partial notation systems a useful way of accessing our bodies differently, reconfiguring our senses, hearing through seeing or vice versa. Colour too has its own instability, in the materiality of its support surface, which is inherently deteriorating or fading or shifting in tone according to light, but also perceptually: we all see colours differently. So although it is a sensory experience, it is intrinsically unreliable, resisting a stable system of codification; we can only approximate it.

JP: Another aspect that interests me in this piece is that it can clearly be said to be historical in some ways. As in a lot of your work – and we can return to your artistic methodology more broadly a bit later – you work with historical material and with archival methods too. But there is another way in which time is employed here and it is revealed in the title even: synchronisation. It can be claimed that synchronisation is one key modern technique of rationalisation (from synchronisation of mass transport such as trains to the wider temporal synchronisation of time across the globe since the nineteenth century) as well as part of technological culture. Modern computational systems as well are constantly concerned with synchronisation, such as network traffic. What's your interest in this concept or technique?

AS: That's a really interesting question. I think all my works deal with synchronisation and asynchronisation, tuning in and tuning out, in one way or another. In a sense the works themselves are always out of sync with their own time frame, having a strong historical reference point in the past. I am particularly interested in the time frame of 1850–1950, when many significant technologies of communication and the audiovisual were being established,

tested out and experienced for the very first time. I look back at history, exploring archives and trying to figure out what significant paradigm shifts a certain technology may have enacted. So in *Sound Seam* I looked at how the phonograph shifts our understanding of writing, or script, of time and playback, memory and recovery, whilst also opening up to the idea of creating sound out of nothing, from a line that is unencoded. How does technology remember in our stead? How does technology echo our own mnemonic patterns? And how might technology affect a change, so that we reconfigure our understanding of our anatomy and psyche? I am frequently in the position of looking backwards to a moment in which the future was imagined.

I think of many of my more historical works as a conversation of sorts, in which I am in dialogue with the historical figure from the past, bringing their work into speech, making visible a forgotten or overlooked part of history, providing a platform for this to receive attention. But beyond this revisionist project, it is crucial for me that the content of this historical moment in itself addresses questions around time.

In all my works around sound technology I am always questioning the possibility of playback, of writing sound in order to reproduce it. If the device is merely for the sake of visualisation (rather than repro-duction), such as my works with the Chladni Plate and the Ruben's tube, then it is again to address the difficulty of memory latching on to this living shape-shifting alphabet that resists writing and exists only in a fascinating now-moment. These geometric shapes in sand or flame patterns suggest a code but are in fact too abstract a form of writing for us to truly engage with it. And so we hover in a state of suspended attention; the patterning hypnotises us into looking, sensing we are on the threshold of understanding something, but at the same time we are thrown out of an easy narrative seduction, alienated from being fully immersed and therefore intensely aware of our sensory body and phys-ical engagement. I try to create in the spectator an intense awareness of the present through a phenomenological encounter with sensory dis-orientation (visual or acoustic illusions, hypnotic light patterns, drone music, etc.), a stimulation, sometimes even an assault on the senses, so we are forced into a bodily first-hand encounter. At the same time the work is about the past, speaking of and through the past. As I said above, I like to inhabit the slippages between synchronisation, when what you see doesn't quite fit what you hear and vice versa, and there-fore you are forced into a state of close attention, an awareness of the materiality of what you are looking at.

JP: I perceive a strong sense of rhythm, pulse and multi-sensorality in your approach and understanding of aesthetics.

AS: In my 16 mm film *In and Out of Synch*, the perfect rendition of an analogue optical soundtrack, a true representation of what you are hearing, is broken and segmented by the machine's stroboscopic monitor effect. Instead of a smooth translation of sound into image you are confronted with what look like Rorschach inkblots, pulsing to their own autonomous rhythm, which is not clearly connected to the poetic voiceover. The jarring effects of these instances become pregnant with new meanings. I like the freedom in abstraction, though it is always on the brink of appearing decipherable, and that tension between the abstract and the figure, the noise and the signal, provides a fascinating mode of encounter. In the title of *Impulsive Synchronisation* I wanted to point to the fact that as living beings we are inherently pattern seekers. No matter how random a sequence, there is a threshold at which we start to hear or see repetition and use this in our understanding of the world. We have an impulse toward synchronisation. I always come back to the example of how we understand the immateriality of sound; if an unexplained noise catches our attention, we will immediately seek out a visual counterpart (the slamming door etc.).

   I tend to work with an unsettling effect, where you cannot easily latch sound on to image, or where the sound itself doesn't quite reveal its source: is it human or machine? Is it inside or out, near or far? In many instances my projects seem to inhabit an unstable territory somewhere between futuristic nostalgia, science fiction, horror film and abstraction, all of which are closely tied in together.

JP: In my introduction to your work, I already used the term 'media archaeology'. At least to me I see your work as being close to some of that in media archaeological methods, both scholarly and artistic. It seems to write media history but in ways that are not 'merely' historical. What I mean by that is that you are interested in a non-linear as well as parallel investigations of media pasts and current moments, often attaching this to science and technology as well as gender issues. Can you elaborate a bit more on aspects of your artistic methodology? Does it relate to the just-mentioned idea of conversation?

AS: Yes, I am definitely interested in media archaeology, though I wouldn't dare call myself one! I think it is clear by now that I like

to time-travel through the work and sometimes take unexpected historical leaps. Some of the technologies I have engaged with are not quite ripe for their historical moment, or they are already obsolete in the moment of their inception. Others are small components in a greater technological or scientific evolution, but it is rarely ever linear. It flashes backwards and forwards to other moments in time, and is very often also in a close conversation with the present moment.

The Lamarr/Antheil invention is very much of this moment, with wifi, spread-spectrum and broadband being the predominant network system for telecommunications. With regard to gender, it really started with my *Oramics* project, though I had been interested in the female voice and technology for many years prior to that. In *Ventriloqua* I was interested in the possibility of suggesting intra-uterine speech from an unborn foetus. A truly literal ventriloquist act of 'belly-speaking', the pregnant belly was transformed into a musical instrument, an antenna, a medium, through which an otherworldly voice was transmitted. The body became a vessel, a mouthpiece through which the disembodied voice appeared re-embodied – one body placed within another body, speaking and spoken through, producing abstract musical utterances which might predict the future, although destined to remain in an amniotic amnesia. This in itself harks back to the primal drive of all sound reproduction technologies, a dislocation of voice from the mouth, sound and its source.

Since then I have remained concerned with questions of voice, of speaking and being spoken through, a porous notion of authorship. It seems that women were instrumental in the most significant moments of the history of telecommunications, as telephone operators; of writing systems, as secretarial typists; to name but a few. They were in a sense hollow vessels or carriers of other voices, but they barely had the right to vote, to actually have a voice.

So I feel it is partly my duty, not only my fascination, to convey some of this history and bring back into speech – make audible – something of this forgotten narrative. Through my work I am also somehow spoken through, a medium or carrier of other historical voices. I like to examine technologies, which are for the most part speech and image containers, and in my films most of my camerawork involves close-up, getting inside the machine and looking at it in ways which are usually inaccessible. I try to uncover some of the narratives that are already implicit in the sculptural qualities of the technology I am zooming in on. Mechanical music instruments look like analogues of the human body, complete with wheezing lungs, skeletal fingers and splayed entrails. The Oramics machine looks like a weaving loom, a film lab, a dystopian architectural ruin, the film

Figure 3.3 Aura Satz, *Oramics: Atlantis Anew* (2011). Film still. Courtesy of the artist.

set of *Metropolis* (Figure 3.3). The valves and lenses of the colour lamp-house of an analogue printer in my film *Doorway for Natalie Kalmus* bring to mind sci-fi film sets, where the specks of dust on a glass surface evoke the constellations of outer space or galaxies, and the miniature valves controlling the colour flow recall the haunting doors and coloured gel lights of a Dario Argento film set. The formal material qualities of these machines are in themselves darting back and forth in historical timelines, referencing potential echoes of their pre- and post-existence.

JP: And also in addition to historical, archaeological impulses, you underline the collective nature of the work: with specialists but also collectively letting objects have a certain agency and participate in the collectives of the art making.

AS: I undertake extensive research and I also consult with specialists in the field, be this historians, technicians, engineers, archivists, so in that sense there is definitely a 'scholarly' aspect to my process. I feel I need this also out of respect to the subject matter. But at the same time I do let the objects speak for themselves, tell a different story, based on visual, acoustic or formal associations. The scrolling screen of *Impulsive Synchronisation* seemed to evoke the temporary projection screens of contemporary PowerPoint lectures, while the pulsing light of Hedy Lamarr, though drawing on Morse code and other forms of light signalling such as heliography (solar telegraphy),

also brought to mind the spotlight of Hollywood, like a variable star, fading in and out of visibility. My private reference point for the film installation's light configuration was actually structuralist film-maker Malcolm Le Grice's piece *Castle 1*, in which a film is projected alongside a bare flashing light bulb which has itself been filmed and appears within the movie. When the light bulb switches on, the screen as a projection surface is flattened to reveal its materiality. So the archaeological impulse is both historical, looking through time, and material.

JP: That is indeed the fascinating point – this entanglement of time and materiality. You mention your interest in the period of 1850–1950 as fundamental to a range of modern inventions, or a technological way of life. It's interesting in this context to consider how research into acoustics was instrumental in post-World War II and Cold War-era information theory as well: psychophysics as a way to understand information and noise. In the context of information theory, cybernetics and systems theory even, it seems that sound, vibrations and acoustics (and the embodied listener of the psychoacoustic measurement) still have a place too. Perhaps one could go even as far as to speculate on this aesthetic and embodied grounding of information theory, a thesis that sounds paradoxical but has some historical mileage. There are interesting projects in the media art history of the twentieth century – for example, Alvin Lucier's – which offer interesting counterpoints and resonances. To me your work also addresses this aspect of materiality of information, and I am looking forward to your future projects.