

Automata for the People

Machine Noise and Attention

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Consider the iPod: a sleek, almost weightless object that creates a personalised sonic envelope within the experience of the surrounding environment. Listening to Miles Davis's 'Blue in Green' at the Shibuya crossing, or The Pixies' 'Debaser' on the Ringstrasse, effectively suppresses what the Viennese writer Felix Salten, writing in 1910, called '*Grosstadtwirbel*' (city whirl), the overlapping soundscape characteristic of the urban environment.¹ In the city, as elsewhere, the iPod works to isolate purposive signal from impinging noise. It defends against unwanted stimulus both from without and within, which is to say the iPod recapitulates the separation of sound from noise at the level of the mechanism itself. So, unlike its various portable music precursors—boom boxes, walkmen and discmen—the iPod produces signal in conditions approaching silence. There are no clunking buttons, hissing tapes or whining motors. In the latest solid-state iterations of the device, there is no detectable operating noise at all; an extraordinary development that introduces the subject—the historic reception of such incidental and unavoidable noise—by way of its apparent resolution. Noise of this kind has always proved doggedly inseparable from the expression or transmission of musical signal, whether the squeak of an

unevenly rosined bow, the woodwind's percussive valves, the ragged breath of the flagging soprano or the scratch of a needle on vinyl. The obvious solution is to ignore it, although this leads to a set of thorny questions about the self-evidence of 'it' among the various stimuli we may disavow, resist, begrudgingly acknowledge or embrace. How, in short, can we ascertain the difference between these varieties of sound?

In this article I trace the fortunes of incidental operating noise through a small sample of telling encounters between auditors and the inevitably noisy machines they have witnessed in demonstration. The argument that unfolds here is brief and propositional in nature and attempts to account for a period of suppressive muting of these unavoidable but apparently extraneous noises, followed by a surprising, if conditional, return to sensory perceptibility. Over time, these background noises begin to align with the experience and promotion of cognitive activity itself.

In the opening pages of *On the Sensation of Tone*, one of the central works of nineteenth-century acoustic theory, the German physicist Hermann Helmholtz identified one of the key differences between sounds as that between musical tone and noise:

The first and principal difference between various sounds experienced by our ear, is that between *noises* and *musical tones*. The sighing, howling, and whistling of the wind, the splashing of water, the rolling and rumbling of carriages, are examples of the first kind, and the tones of all musical instruments of the second ... We perceive that generally, a noise is accompanied by a rapid alternation of different kinds of sensations of sound. Think, for example, of the rattling of a carriage over granite paving stones, the splashing or seething of a waterfall or of the waves of the sea, the rustling of leaves in a wood ... On the other hand, a musical tone strikes the ear as a perfectly undisturbed, uniform sound which remains unaltered as long as it exists, and it presents no alternation of various kinds of constituents.²

Helmholtz's point is clear enough: musical tone is regular, noise is not. Noise conveys random and alternating sensation to the ear while musical tone, by contrast, is continuous and uniform. To describe the motions of musical tone is to speak, in Helmholtz's terms, of 'periodic oscillations, vibrations', or 'swings'. By way

of analogous illustration, he summons the examples of a tethered stone spun round in constant velocity, a clock pendulum, and a hammer made to rise and fall uniformly by its connection to a water wheel.³ Of course these are all machines of a sort with strong links to horology, navigation, astronomy, ballistics, and to the industrialisation of craft skill in agriculture and textiles. In this illustrative context, though, these machines are re-cast as metaphors and the sounds they produce in their functional capacity are silenced—or at least Helmholtz is resolutely deaf to them. At the time of writing *On the Sensation of Tone*, Helmholtz was professor of physiology at University of Heidelberg, Baden; a medieval town linked by a rail network that would have made a distinctive sonic contribution to the unfolding day. Notice the curious omission of the locomotive engine or, for that matter, anything of industrial origin from Helmholtz's examples of noise that form a soundscape that could as easily originate in 1525 as 1863. One conclusion we may draw here is that musical tone neither makes nor admits mechanical noise. This leads to the beguiling and confounding machines that occupy me here: automata. They pose an interesting problem for the kind of differences Helmholtz observes because they combine regular and irregular machine sounds towards the production of, among other things, musical tone.

In 1774 a trio of soon-to-be fabled androids—the work of Swiss father and son Pierre and Henri-Louis Jacquet-Droz—were exhibited in Neuchâtel. Each member of this little group of two boys and a young woman is possessed of an artistic accomplishment; one writes (*l'écrivain*), another draws (*le dessinateur*), while the last plays the organ (*la musicienne*). A descriptive brochure published at the time of their exhibition was particularly attuned to the grace notes humanising the automata's exactitude. In Adelaide Voskuhl's translation from the French, the musician is described as follows:

The automaton's body ... the head, the eyes, the arms, the hands, and the fingers conduct various movements which seem natural. The automaton herself plays on her harpsichord various melodies in two or three voices, with great precision. Since her head can move in all directions, as can the eyes, she casts her glances at times to her hands, to the music, and to the audience; her pliable body leans forward occasionally to have a closer look

at the music; her chest drops and rises alternately, in order to indicate the respiration.⁴

The writer automaton combines limitless flexibility (any text of up to forty characters could be pre-set on a disk plate inside the works) with the eager student's concern to demonstrate proper technique:

The automaton dips its quill into the ink by itself, shakes off the excess ink, and writes indiscriminately and correctly anything that one finds appropriate to dictate to it, without any person touching it directly or indirectly. It places the initial letters neatly and leaves appropriate spaces between the words it is writing. When it has finished writing one line, it goes successively to a following one, making sure there is a proper distance between the lines. While it is writing, its eyes are fixed on its work; but once it has written a letter or a word, it casts a glance at the original from which it seems to be wanting to imitate the characters.⁵

The draughtsman is described as 'equivalent' in form and size to the writer:

It represents a child on a stool, drawing sketches with a pencil on a piece of paper. The draughtsman automaton creates very neatly a few small drawings, of which it first draws the principal features, observing both the up-stroke and the down-stroke, and then creates the shadows and finally does some touching-up and corrects the imperfections of its work. For this purpose, it shifts its hand from time to time as if to see more openly what it has done, and it blows the dust which develops from the pencil drawing. The various movements of the eyes, the arms, and the hand imitate exactly the natural model.⁶

Like the other members of the trio, the draughtsman's movements are controlled by a set of cams mounted on a cylinder inside the torso. Instructions for each section of drawn line, patch of shading, or subsequent correction are encoded into the notched perimeter of the cams. Additional sets of cam stacks broadened the draughtsman's repertoire to encompass four subjects, each based on a contemporary French engraving: the head of Louis XIV; Louis XVI and Marie-Antoinette in profile; a cupid seated in a butterfly-pulled chariot; and, finally, a rather elegant dog. The puff of air that blows dust away from the page is produced by the activation of tiny bellows located inside his head.⁷

On YouTube you can watch a rather choppy presentation of the Jacquet-Droz trio by a curator from the *Musée d'Art et d'Histoire* in Neuchâtel.⁸ This clip is noteworthy in that it preserves something that other filmed automata performances tend to obscure through the imposition of background music: the bass rasp of the clockwork mechanism in operation. It is heard as the draughtsman traces the outline of the image, and ceases when his arm comes to an abrupt halt. The demonstrator does not draw attention to this sound as he puts the android through his paces drawing the dog. For the purpose of this exhibition, the draughtsman is mounted on a wheeled platform that allows the curator to bring him into close proximity to the small audience (this, as shall be seen below, is consistent with earlier display techniques—indeed I would argue that there exist important continuities honoured or rather preserved in the contemporary display of the device). When the sketch is completed, the draughtsman is rotated 180 degrees so that the extraordinarily complex internal works may be witnessed in motion. Arguably, the rhetoric of display here is premised on *not* audibly perceiving the presence of the gears until they are properly, that is dramatically, revealed to the curious eye. The automaton is then swivelled between apparently incommensurate orientations; the functional, mimetic and lyrical front, and the revelatory, technically prodigious and philosophically propositional back (the human body too may, after all, be just such a machine composed of cams, gears and springs). As Simon Schaffer has observed such untrammelled access to the insides of the machine was—and is—'at least as vital as the display of the marvellous performance itself.'⁹ As captured on the video, the incidental operating sound of the mechanism is continuous with the automaton's movement and, as such, exceeds the careful demarcation of front from back; disrupting the sequence that presents the drawing in process, and then the astonishing means by which such work is produced. The modern operator accedes to what was this historic mode of demonstration, obligingly swivelling between front and back, between art and technology. But that persistent sound is a burden (in every sense) that requires screening in order to preserve the sublimity of the disclosed mechanism. In lieu of effective noise-suppression, let me suggest that this task falls to the auditor who supplements the deficient technology by granting this sound little or no significance. In other words, the perceptual apparatus of the auditor must compensate for the state of technological immaturity.

The Neuchâtel demonstrator, his audience and, by extension, the YouTube viewer, reduce the value of this persistent acoustic trace, consigning it to the category of phenomena otherwise barely detectable in the video: the creaking floorboards, and the hushed, appreciative murmurs. What does it mean *not* to hear something that is, one would think, both clearly perceptible and a component part of the machine's capacity to fascinate? When did we learn to do that? These are critical questions, particularly in the context of the historic view of hearing as the most grievously susceptible and open of the senses.¹⁰

Helmholtz, for one, is clear about how auditors deal with extraneous stimuli, the whizzing, hissing, and scraping of instruments that is the routine accompaniment to any musical performance: 'Those who listen to music make themselves deaf to these noises by purposely withdrawing attention from them'.¹¹

William James dubs this 'selective attention'. In order to attend to something, we must withdraw our attention from its surrounds. To do otherwise would be impossible; the world in all of its terrible apprehensibility would brutalise and overwhelm the sensorium leaving us no capacity for discrimination. Instead, and here too James relies on Helmholtz, we only notice those sensations which are signs to us of things:

But what are things? Nothing, as we shall abundantly see, but special groups of sensible qualities, which happen practically or aesthetically to interest us.¹²

That is, we notice what we need or desire to know and negate the perceptibility of that which fails to meet these criteria. For Helmholtz this is nothing more than the inevitable condition of those who listen to performed music; taking pleasure in tone, screening out screech. This desensibilising, suppressive faculty, which Karen Dale and Gibson Burrell call an-aesthetics, has a special relevance to forms of expressive technology, such as automata, where practical demonstration produces aural stimuli over and above the desired output.¹³ The evidence for this withdrawal of attention, and the subsequent negation of the perceptible value of incidental noise in performance, arrives, somewhat paradoxically, precisely in the form of the intermittent and unwonted noteworthiness of noise. In other words, the routine sensory indifference to incidental noise serves as the necessary precondition of its return to perceptibility in the service of stagecraft—where the sound of the

clockwork mechanism is the auditory equivalent of the magician's piano wire. Such is the case of 'the Turk'; a chess-playing automaton built by the Slovak engineer, Wolfgang Von Kempelen, in the early 1770s.

Initially displayed at Kempelen's home in Bratislava, 'the Turk' subsequently toured widely around Europe in the 1780s at the urgings of Joseph II who was involved in an anti-Turkish diplomatic campaign. By 1784 it arrived in London, preceded by a number of pamphlets exploring its significance as well as taking up the challenge posed by Kempelen's aide, Karl Von Windisch, in his booklet *Inanimate Reason; or, A Circumstantial Account of That Astonishing Piece of Mechanism, M. de Kempelen's Chess Player*, which acknowledged some deception involved in the design.¹⁴ I won't rehearse the Turk's rich political history as object; my interest here is rather narrowly attuned to what we may call its strategic noisiness. In performance one encountered the Turk much as the Jacquet-Droz trio are exhibited today: mounted on castors that promote a form of total, yet controlled, visibility:

Upon entering the apartment where it was exhibited, the Automaton, attired in handsome Turkish costume, was seated behind a chess board, affixed to a chest ... Both the figure and the wooden chair on which he sat were attached to the chest, and this being upon castors, the whole was moved with facility about the chamber. The exhibition commenced operations, by showing the interior of the chest, which was divided by a partition into two unequal parts, both apparently so occupied by machinery, that the concealment of a human being appeared impossible ... The machine was then turned round, and lights were again exhibited at the different openings, in such a way that every corner seemed visible. At the same time, the Automaton's robe was turned over his head, so as to display the internal structure, which was seen to be full of wheels, cylinders and other clockwork; and, in this exposed state, the whole apparatus was wheeled round for the inspection of the visitors ... As soon as an antagonist appeared, the eyes of the figure were apparently directed towards the piece to be played; the fingers then opened, took hold of the piece, and deposited it on the proper square; while during the operation, *a noise of wheel work was heard, which ceased only when the Automaton's arm had returned to rest again on the cushion.*¹⁵

As the conditional language of this account indicates, the elaborate and apparently exhaustive revelation of the Turk's parts concealed a deeper secret. Following Kempelen's death in 1804, the Turk was purchased by the Viennese engineer, Johan Maelzel, who toured various European centres before settling in London in 1818. It was here the mathematician Robert Willis began a study of the automaton subsequently published under the title *An Attempt to Analyse the Automaton Chess Player of Mr De Kempelen*.¹⁶ Willis's respectful dismantling of Kempelen's illusion was equal parts idealist and materialist. First, he conducted a thorough study of published records of the Turk's games, before concluding that chess contained too many variables, and thus demanded a reasoning power beyond the limited capacity of any machine. Second, he undertook a course of surreptitious umbrella-based measurements of the cabinetwork, revealing that the internal volume was larger than it appeared and could in fact accommodate a concealed player. While other writers entered fully into the speculative minutiae of the deception, imagining small-statured players, translucent chess boards and invisible guide wires controlled from darkened corners, Willis coolly noted that it was the noise from the false gear train that masked the sound of the player moving in and out of playing positions within the device. So, the Turk was an elaborately staged fake, but an interesting one; a deception that relied on the unremarkability, that is, the an-aesthetic, of mechanical noise, to conceal, but also to cleave to, evidentiary noise—the incidental noise of the thinking body.

In 1814 Maelzel brought the Turk to Berlin where it was seen and expropriated by E.T.A. Hoffmann for his story, 'The Automata' (*Die Automate*) (1814). In summary, the narrative follows two aristocratic friends—sceptical Ludwig and curious Ferdinand—who pay a reluctant visit to the automaton, which in Hoffmann's version no longer plays chess but rather delivers oracular prophecy. Visitors whisper questions into the Turk's right ear that the device answered in a hushed voice. Like Kempelen's version, the Turk provokes intense scrutiny and speculation as to the secret of its function.

References to the operating noise of the automaton, the display of internal wheelwork, and the possibility of someone controlling the device from elsewhere in the room suggest the affinities between Hoffmann's mechanism and Kempelen's

Turk.¹⁷ What distinguishes Hoffmann's version of the automaton is the quality of its responses to the questions it receives:

These were sometimes cold and severe, while occasionally they were sparkling and witty—even broadly so at times; at others they evinced strong sense and deep astuteness, and in some instances they were to a high degree painful and tragic. But they were always strikingly apposite to the character and affairs of the questioner, who would frequently be startled by a mystical reference to the future, only possible, as it would seem, to one cognizant of the hidden thoughts and feelings which dictated the question.¹⁸

The answer that Ferdinand receives to his unrecorded question leaves him deeply shocked. He subsequently reveals to Ludwig that the Turk referred to an encounter from his past; a vivid dream vision provoked by hearing a woman in an adjoining room singing '*mio ben ricordati*'. On waking, Ferdinand looks out his window into the courtyard and is astonished to see the self-same woman disappear into a carriage. As he explains to Ludwig, Ferdinand has never spoken of this encounter, leaving him unable to account for the Turk's knowledge of his past and stricken by its prediction that 'when next you see her, you will be lost to her forever'.¹⁹ Ludwig, however, remains unconvinced and together they visit 'Professor X', a philosopher with a special interest in mechanics who is rumoured to be the inventor of the Turk. During the visit the friends are subjected to a grotesque concert performed by an ensemble of automaton musicians (modelled on devices produced by both Vaucanson and Jacquet-Droz) with Professor X conducting from the piano. On the final clanging note, the two friends make a rapid exit and begin a long conversation about the nature and prospects of mechanical music. The story ends abruptly with Ferdinand summoned by his father. On his journey home he sees his beloved again just as she has married a Russian officer, thus fulfilling the Turk's prophecy. On recognising Ferdinand, she faints into the arms of Professor X. The secret of the Turk, the true identity of Ferdinand's love and the nature of her relationship to Professor X remain unclear.

Although it is difficult to trace anything approaching a programmatic statement about the nature of automata in Hoffmann's story, there is nevertheless the broad outline here of an important distinction drawn between two mechanical domains.

The first of these comprise the prophetic Turk, the experimental instruments that harness nature's hidden sonorities discussed by Ferdinand and Ludwig, and Ferdinand's love object (whom, it is hinted, may also be of mechanical origin). Collectively, these model the etherealised fusion of technical and aesthetic achievement.²⁰ The second group is made up of Professor X's ghastly automaton musicians. Their concert, which begins with the Professor at the keyboard, builds in volume as each musician joins the fray. Away from the vulgar clamour of the Professor's studio, Ludwig gives vent to his furious response:

'All that machine music (in which I include the Professor's own playing) makes my bones ache. I am sure I do not know when I shall ever get over it! The fact of any human being's doing anything in association with those lifeless figures which counterfeit the appearance and movements of humanity has always, to me, something fearful, unnatural, I may say terrible about it.'²¹

As an aesthete Ludwig is entitled, even obligated, to express himself in such extreme terms, but his response—marked by disgust for the promiscuous and abject mixing of organic and inorganic—is also markedly physicalised. Without labouring the point, it is notable that the Professor's failed experiments are deemed to be both musically impoverished as well as taking a toll on the auditor. That is, what is produced comes at a subtractive physical cost (bone ache) that inspires resentment and dread. It would be a mistake to view the Professor's workshop as a sly allegory of the factory. Rather, it gestures towards aspects of industrial modernity: inauthenticity, punctuality, Arkwrightian efficiency and the production of human suffering.

Ludwig contrasts his negative experience of Professor X's ensemble with music produced by breath applied to a woodwind instrument or supple fingers laid on strings. This, he suggests, has the capacity 'to evoke those tones which lay upon us a spell of such power, and awaken that inexpressible feeling, akin to nothing else on earth—the sense of a distant spirit world, and of our own higher life in it'.²² And yet this rapturous capacity to transport, imagined here as the unique property of human performance, is actually demonstrated most emphatically in the mechanical Turk whose ability to penetrate Ferdinand's private mystery is accompanied by 'one or two broken phrases of the sorrowful melody, "*mio ben ricordati*". In other words, in

the presence of the Turk, Ferdinand hears once again the very song and ‘glorious voice’ of his beloved dream vision summoned forth by the automaton’s enigmatic power. The opposite of Professor X’s vulgar automaton is not human, as Ludwig may have it, but rather a superior machine supernaturally attuned to the affections. Although the source of the Turk’s capacity, much like the identity of Ferdinand’s ideal singer, is left unresolved, in a letter to his editor Hoffmann does make some claims about the tale that bear on machines in both their etherealised and crudely deficient aspects:

As little as the automata at first seem to adhere to the direction of the M.Z. [the Leipzig Music Journal], I do believe that they are fitting for this journal because I found the opportunity *to talk about everything concerning the automaton*, and therefore also consider that type of musical artwork excellent, along with allowing the musical Ludwig to say something *ppp* about the most recent attempts of the mechanics—about the Nature-Music—about the complete tone-harmonica-harmonichord, which could not find a better place than in the M.Z.²³

In ‘The Automata’, Ludwig speculates that the hidden tones of Nature-Music may be captured via experimental instruments such as the harmonichord, and the storm harp that is composed of thick wires that give forth ‘great, powerful chords when the wind smote them’.²⁴ In the story these etherealising objects share affinities with the Turk’s ability to give voice to encrypted knowledge. Significantly, Hoffman indicates that he lets Ludwig speak about the aesthetic merits of these instruments *ppp*. As Katherine Hirt explains, in musical scores *p* is shorthand for *piano*, or softly, while *pp* indicates *pianissimo*, that is, even more softly. *Ppp* is described as a ‘rarer marking’ that was ‘used in some nineteenth-century works as dynamics became more extreme, [and] means very, very softly’.²⁵

Hoffman’s metaphor aptly ties ‘everything concerning the automaton’ to the presence of a barely perceptible under-tone—an an-aesthetic noise related to the operation of the machine, and, although not avowed, to imaginative expression. The very presence of this select form of automata/experimental machine implies a sublimated acoustic element, thematically transcribing the automaton’s auditory signature in a new light as a sign of speculation and transcendence. The contrasting alternative is the brash and vulgar device hopelessly rooted to aesthetic failure,

disappointment and pain. Hoffmann's unresolved story nevertheless offers sufficient grounds for contemplating just this fault line dividing the coarse and clamorous mechanism from the spiritualised machine (*ppp*)—between Professor X's crude automata and the prophesy-whispering Turk. This distinction suggests not just a functional difference, but competing and irreconcilable sensorial regimes. On the one hand, a punishing industrial stimulus that improperly exceeds its boundaries, registering as illiberal and assaultive. On the other, rarefied machine sounds that establish and embed the undertone of productive, intellectually creative modernity.

In his fabulist *Memoirs* (1860), the French illusionist and inventor Robert-Houdin describes precisely this split between competing sensoria encountered in the fraught exhibition of his own writing automaton:

It was more extraordinary, though, that I had eventually to make an alteration in the automaton for the following reasons: the public (I do not mean the educated portion) generally understand nothing of the mechanical effects by which automata are moved; but they are pleased to see them, and often only value them by the multiplicity of their parts. I had taken every care to render the mechanism of my writer as perfect as possible, and set great store on making the clockwork noiseless. In doing this, I wished to imitate nature, whose complicated instruments act almost imperceptibly.

Can it be credited that this very perfection, which I had worked so hard to attain, was unfavourable to my automaton? On its first exhibition, I frequently heard persons say: 'That writer is first rate; but the mechanism is probably very simple. It often requires such a trifle to produce great results.'

The idea then struck me of rendering the clockwork a little less perfect, so that a spinning sound should be heard, something like cotton spinning. Then the worthy public formed a very different estimate of my work, and the admiration increased in a ratio to the intensity of the noise. Such exclamations as these were continually heard: 'How ingenious! What complicated machinery! What talent such combinations require!'

In order to obtain this result, I had rendered my automata less perfect; and I was wrong. In this I followed the example of certain actors who

overdo their parts in order to produce a greater effect. They raise a laugh, but they infringe the rules of art, and are rarely ranked among first-rate artists. Eventually I got over my susceptibility and my machine was restored to its first condition.²⁶

As he artificially amplifies the volume, Robert-Houdin reconceives his mimetic automaton (whose original silence in operation is likened to the imperceptibility of nature's complex instruments) in terms of an industrial soundscape aligned with cotton spinning. In other words, the device is recalibrated with an ear to the perceptual apparatus of an audience placed in a proletarianised relationship to the machine ensemble. The audience may appreciate Robert-Houdin's art only, it would appear, when the operating noise places the object on a continuum with other perhaps more familiar industrial devices. We learn that a mechanical object may undergo just such a profound transformation—from ethereal to vulgar, from apparent failure to commercial success—merely by raising the level of incidental operating noise above a certain threshold of perceptibility. No other alteration is required.

When Robert-Houdin determined that he could no longer sustain the sonic illusion of complexity, he returned his work to mysterious and provocative near-silence, and to a corresponding state of aesthetic purity and, presumably, theatrical failure. While changes to the mechanism can be discussed, Robert-Houdin can neither name his financial indebtedness to the audience nor bring himself to properly cater to their tastes. Significantly, the return to silence, and the solecism that occasioned it, is understood in terms of contrasting styles of dramatic performance. In a state of noise, the writing machine analogises the textile industry, restored to quietness; it opens a space to reflect on stage aesthetics and artistic integrity. Robert-Houdin's repaired mechanism also resists a particularly compelling narrative outlined by David Brewster in his *Letters on Natural Magic*, in which, in addition to their capacity to amuse and astonish, automata are recognised for their contribution to the glory of the industrial moment:

The same combination of the mechanical powers which made the spider crawl, or which waved the tiny rod of the magician, contributed in future years to purposes of higher import. Those wheels and pinions, which almost eluded our senses by their minuteness, reappeared in the

stupendous mechanism of our spinning machines and our steam engines ...
The shapeless wheel which directed the hand of the drawing automaton
has served, in the present age, to guide the movements of the tambouring
engine.²⁷

Where Robert-Houdin mutes, Brewster turns the volume way up.

By way of conclusion, I want to suggest something of the afterlife of automata noise. In *Discipline and Punish*, Michel Foucault describes *un complexe corps-machine*; the joining of worker bodies and machines as a complex.²⁸ But, of course, it was not only labouring bodies that were fastened to machines. The audience for automata performance bore witness to the machine in its—intermittently claimed—non-industrial light. They were encouraged to observe its operation and probe its secret recesses without threat of proletarianisation. As attentive viewers, their labour was cognitive, experientially additive and pleasurable, rather than rigorously extractive and immiserating. The muted sounds produced by these machines—the constant whir of the fly wheel, the grating of the gear train—acoustically simulates a form of spatial distance from the machine that may be seen but scarcely heard. As the urban soundscape experienced industrial encroachment throughout the nineteenth century, these etherealised versions of otherwise intolerable machine sounds persisted even in the absence of their automaton source. In other words, the soundscape of automata performance anticipates, or rather suggests continuities with, the emergence of an exceptional category of urban noise.

I offer here two brief examples of this variety of mechanically produced noise that is an-aesthetic, distanced, diffuse, and that makes no strident claim upon consciousness and is generally conducive to thought. It is marked *ppp*. The first comes from an essay by the influential Victorian psychologist, James Sully, titled 'Civilisation and Noise'. Sully argues that sensitivity to noise is indexed to cultural development. It follows that in a city like London, home to a diverse population in 'very different stages of sensibility' there will be those who are unmoved by sounds that, to the sensitive are 'analogous to bodily hurts'.²⁹ Sully's is an early entry in the canon of the sensorially put-upon citizen, with an aggrieved ear permanently open to the diversity, frequency and volume of the city's noxious sounds. And yet in the margins of this essay, an exception to this state of affairs appears in the form of a footnote:

It should be remembered that the noise of London streets is a continuous roar, and consequently is much less likely to disturb attention than an intermittent noise of much less intensity. In truth, a constant hum is known with many persons to favour intellectual activity.³⁰

The second example is from Peter Payer's account of Viennese author Alfred Freiherr von Berger's demand for a right to silence in 1909:

'What the city dweller calls silence, is a mixture of all sorts of sounds he has become used to. He does not hear them anymore and therefore to him, they represent silence.' According to Berger, real silence was practically unknown by then. What is more, many people have come to depend on a particular background noise to feel good.³¹

Sully describes the background hum of industrial modernity as an adjunct to intellectual production—a rather important and unlikely link between the two apparently irreconcilable domains in an essay otherwise devoted to detailing the punishing quality of the urban soundscape. For Berger, the noise that fills the space once reserved for silence is a source of contentment.

That we may recognise and perhaps even endorse these views speaks to the way they anticipate the advent and ubiquity of white noise; the combination of frequencies across the audio spectrum that produce a sound resembling dense static. White noise makes its first appearance as an idea in *The Journal of Aeronautical Sciences* in 1943. Initially, it was regarded as an annoying source of disruption to the efforts of jet crewmembers to communicate with one another.³² Later, white noise was appropriated by engineers and architects in the form of an artificially produced background hiss designed to improve productivity by suppressing the distinctive and potentially disruptive noise of co-workers. Automata taught us to ignore the sound of the machine, the noise of production, and attend only to the thing produced, the head of Louis XIV; Louis XVI and Marie-Antoinette in profile; a cupid seated in a butterfly-pulled chariot; a dog, or rather our thoughts, our work, our outputs. White noise effects a decreased awareness of the world in favour of a more centralised, focused consciousness—it is the an-aesthetic noise of selective attention—the *ppp* of greater efficiency.

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¹ Peter Payer, 'The Age of Noise: Early Reactions in Vienna, 1870–1914', *Journal of Urban History*, 2007, p. 774.

² Hermann Helmholtz, *On the Sensations of Tone*, trans. A. Ellis, Longmans Press, New York, 1895 [1863], pp. 7–8.

³ *Ibid.*, p. 8.

⁴ Adelheid Voskuhl, 'Producing Objects, Producing Texts: Accounts of Android Automata in Late Eighteenth-century Europe', *Studies in History and Philosophy of Science*, 2007, pp. 427–8.

⁵ *Ibid.*, p. 427.

⁶ *Ibid.*

⁷ Mary Hillier, *Automata and Mechanical Toys: An Illustrated History* (1976; reprint, London: Bloomsbury, 1988), p. 56.

⁸ <<http://www.youtube.com/watch?v=u8u93VQfHmw&feature=BFa&list=FLL0bnYrd6rgQP-ihKewL6Yg>>.

⁹ Simon Schaffer, 'Babbage's Intelligence', <<http://www.imaginaryfutures.net/2007/04/16/babbages-intelligence-by-simon-schaffer/>>. In his discussion of Vaucanson in 'Enlightened Automata', Schaffer quotes from Benhamou: 'At first many people could not believe that the sounds were produced by the flute which the automaton was holding ... The spectators were permitted to see even the innermost springs and follow the movements', Simon Schaffer, 'Enlightened Automata' in *The Sciences in Enlightened Europe*, ed. William Clark, Jan Golinski and Simon Schaffer, University of Chicago Press, Chicago, 1999, p. 136.

¹⁰ 'The pains inflicted through the ear are deep and pervading, analogous to bodily hurts, and wholly incommensurable with the momentary discomforts caused by the visual impression of ugly objects. They are, moreover, inevitable, the ear being, unlike the eye, completely defenceless against attack.' James Sully, 'Civilisation and Noise', *Fortnightly Review*, vol. 24, no. 143, November 1878, pp. 704–20. See also Kevis Goodman, 'Magnifying Small Things: Georgic Modernity and the Noise of History', *European Romantic Review*, vol. 15, no. 2, 2004, pp. 215–27, p. 221.

¹¹ Helmholtz, p. 67.

¹² William James, 'The Principles of Psychology', 1890, <<http://psychclassics.yorku.ca/James/Principles/prin11.htm>>

¹³ 'We compare aesthetics with anaesthetics in the context of architecture and attempt to show how [to use Benjamin's term] the "dazzle" (Benjamin, circa 1930s) of buildings is often accompanied by

desensitisation of those who live and work within them. This is to say that almost every aesthetic development is matched with an anaesthetizing one', Karen Dale and Gibson Burrell, 'An-aesthetics and Architecture', *Tamara Journal of Critical Organisation Inquiry*, vol. 2, no. 1, 2002, p. 77.

¹⁴ Schaffer, 'Enlightened Automata', pp. 159–61; see also Schaffer, 'Babbage's Dancer'.

¹⁵ 'The Automaton Chess Player Redivivus', *Illustrated London News*, 20 December 1845. Qtd in Arthur W.J.G Ord-Hume, *Clockwork Music: An Illustrated History of Mechanical Musical Instruments from the Musical Box to the Pianola: From Automaton Lady Virginal Players to the Orchestrion*, George Allen and Unwin, London, 1973, p. 57 (italics mine).

¹⁶ Robert Willis, *An Attempt to Analyse the Automaton Chess Player of Mr De Kempelen*, Printed for J. Booth, London, 1821.

¹⁷ E.T.A. Hoffmann, 'Automata', trans. Alexander Ewing, *The Best Tales of Hoffmann*, ed. E.F. Bleiler, Dover Publications, New York, c. 1967, pp. 79–80.

¹⁸ *Ibid.*, 80.

¹⁹ *Ibid.*, 87.

²⁰ Emily Dolan discusses Hoffman's account of ethereality in terms of the contemporary interest in instruments that sought to reproduce the sonorities of the human voice. See Emily I. Dolan, 'E.T.A. Hoffmann and the Ethereal Technologies of "Nature Music"', *Eighteenth-Century Music*, vol. 5, no. 1, 2008, pp. 7–26. Katherine Hirt weighs the evidence in favour of reading Ferdinand's female singer as an android in Katherine Hirt, *When Machines Play Chopin: Musical Spirit and Automation in Nineteenth-century German Literature*, Walter de Gruyter, New York, 2010, p. 48.

²¹ Hoffman, p. 95.

²² *Ibid.*

²³ Qtd in Hirt, p. 37 (italics mine).

²⁴ Hoffman, p. 99.

²⁵ Hirt, p. 38.

²⁶ Jean-Eugene Robert-Houdin, *Memoirs of Robert-Houdin: Ambassador, Author, and Conjuror*, Chapman Hall, London 1860, p. 153.

²⁷ David Brewster, *Letters on Natural Magic*, William Tegg and Co., Cheapside, 1856, 7th edn, p. 286.

²⁸ Michel Foucault, *Discipline and Punish: The Birth of the Prison*, trans. Alan Sheridan, Vintage, New York, 1977, p. 153.

²⁹ Sully, pp. 716–17.

³⁰ *Ibid.*, p. 714.

³¹ Payer, p. 778.

³² Timothy Aubry, 'White Noise Generation', *Critical Matrix: The Princeton Journal of Women, Gender, and Culture*, vol. 12, no. 1–2, Fall 2000 – Spring 2001, pp. 148–73, p. 151.