With this section, RWM continues a line of programmes devoted to exploring the complex map of sound art from different points of view organised in curatorial series.

Curated by Chris Cutler, PROBES takes Marshall McLuhan's conceptual contrapositions as a starting point to analyse and expose the search for a new sonic language made urgent after the collapse of tonality in the twentieth century. The series looks at the many probes and experiments that were launched in the last century in search of new musical resources, and a new aesthetic; for ways to make music adequate to a world transformed by disorientating technologies.

Curated by Chris Cutler

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At the start of the seventies, Chris Cutler co-founded The Ottawa Music Company – a 22-piece Rock composer's orchestra – before joining British experimental group Henry Cow, with whom he toured, recorded and worked in dance and theatre projects for the next eight years. Subsequently he co-founded a series of mixed national groups: Art Bears, News from Babel, Cassiber, The (ec) Nudes, p53 and The Science Group, and was a permanent member of American bands Pere Ubu, Hail and The Wooden Birds. Outside a succession of special projects for stage, theatre, film and radio he still works consistently in successive projects with Fred Frith, Zeena Parkins, Jon Rose, Tim Hodgkinson, David Thomas, Peter Blegvad, Daan Vandewalle, Ikue Mori, Lotte Anker, Stevan Tickmayer, Annie Gosfield and spectralists Iancu Dumitrescu and Ana Maria Avram. He is a permanent member of The Bad Boys (Cage, Stockhausen, Fluxus &c.) The Artaud Beats and The Artbears Songbook, and turns up with the usual suspects in all the usual improvising contexts. As a soloist he has toured the world with his extended, electrified, kit.

Adjacent projects include commissioned works for radio, various live movie soundtracks, *Signe de Trois* for surround-sound projection, the daily year-long soundscape series *Out of the Blue Radio* for Resonance FM, and p53 for Orchestra and Soloists.

He also founded and runs the independent label ReR Megacorp and the art distribution service Gallery and Academic and is author of the theoretical collection File Under Popular – as well as of numerous articles and papers published in 16 languages.
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PROBES #4

In the late nineteenth century two facts conspired to change the face of music: the collapse of common practice tonality (which overturned the certainties underpinning the world of art music), and the invention of a revolutionary new form of memory, sound recording (which redefined and greatly empowered the world of popular music). A tidal wave of probes and experiments into new musical resources and new organisational practices ploughed through both disciplines, bringing parts of each onto shared terrain before rolling on to underpin a new aesthetics able to follow sound and its manipulations beyond the narrow confines of 'music'. This series tries analytically to trace and explain these developments, and to show how, and why, both musical and post-musical genres take the forms they do. This fourth programme concludes our excursion into portamenti, looking at its use in popular music, before moving on to wholly unpitched probes that begin to map the many aspects of differentiated noise.

01. Transcript

[Gregorio Paniagua, 'Anakrousis', 1978]

[Risset-Shepard, 'Sample', 1968]

An infinite slide that goes nowhere. Jean-Claude Risset perfected this audio illusion – the sonic analogue of MC Escher's impossible staircase – for Pierre Halet's 1968 play *Little Boy* in which a pilot relives the bombing of Hiroshima: he is spiralling into madness; the bomb is endlessly falling. Risset's score was also the first substantial work to be entirely computer synthesized.

[Jean-Claude Risset, 'Computer Suite for Little Boy' (excerpt), 1968]

Where for the most part, alternative tuning probes explored harmony effects – drawing attention to the play of dissonance and consonance, probes into sliding pitches seemed to lean more toward the creation of melody effects – drawing attention to the individual trajectories of the moving lines.

[Sol Hoopii, 'St Louis Blues', 1927]

I'll close this probe with a highly successful and mainstream use of portamenti.

[Hawaiian lap steel, source and date unidentified]

The practice of playing a normal guitar with a steel or glass slide was first noted in Hawaii sometime in the nineteenth century. The guitar was laid flat in front of the player and played from above. One hand picked the strings at the body end, the other moved the slide over the neck. Because chord shapes could not be formed, a number of different tunings were employed, many of them chordal.

[Blind Willie Johnson, 'Dark Was the Night', 1927]

By the early twentieth century, a number of black blues artists were using slides in a similar way, except they would hold the guitar in the conventional position, with the slide – often the neck of a bottle – slipped over one finger, while the others stopped the frets in the usual way.

[One String Sam, 'I need $100', 1956]

There was also the West African Diddly Bow. This is a one stringed instrument made for children, also played with a slide – in the early twentieth century it was in common use in the American south. It may well have influenced the bottleneck style, though Hawaiian lap steel music was well known on the American mainland by then, and commercial recordings had been in circulation since at least 1915.
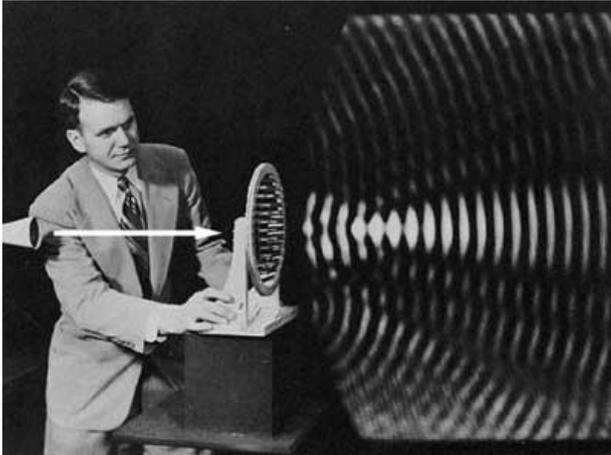
[Jean-Claude Risset]

In fact, the first electric guitar was a solid body version of the lap steel – the instrument we now call the Hawaiian guitar.[1]

[Unidentified lap steel track, source and date unknown]

Thanks mostly to the innovations of a number of technically-minded performers, that rather primitive solid body evolved over a period of about fifteen years into the highly sophisticated pedal steel instrument we know today.

In their popular forms, instrumental portamenti are never unsettling; if anything, they invoke a kind of controlled delirium. There are dips and peaks, but we are safe inside them. I'm going to play the whole of this next piece because this instrument is routinely ignored outside its own little niche – and yet it is certainly no less subtle, or exquisite, than the Ondes Martenot. And the great players are truly great. This is Lloyd Green playing 'Farewell Party'.[2]

[Lloyd Green, 'Farewell Party', live at the International Steel Guitar Convention, 1992]

And just to praise the instrument a little further – and to show something of its immense versatility – here's Mike Perlowin playing Debussy's 'Prélude à l'après-midi d'un faune'. This is from the middle section:

[Mike Perlowin, 'Prélude à l'après-midi d'un faune' (composed by Debussy in 1894), 2005]

And lastly, more probe-like still, this is from Susan Alcorn's 'Sintra':

[Susan Alcorn, 'Sintra' (excerpt), 2012]

[Elmore James, 'The Sky Is Crying' (excerpt), 1959]

In rock, the use of slide guitar is very localised, and mostly adopts the style made popular in Chicago in the fifties, although some exponents, like George Harrison, stick closer to Hawaii.

[George Harrison, 'Marwa Blues', 2002]

A rare exception was Syd Barrett who took a more experimental approach.

[Pink Floyd, 'Interstellar Overdrive', 1967]

And the Australian Daevid Allen, who mixed bottleneck and bow techniques, playing on the neck with a long glass or metal rod.

[Gong, 'Fohat Digs Holes in Space' (excerpt), 1971]

Now I come, at the last, to one of the first.

Perhaps the leading theorist and activist for extended portamenti, antedating just about everyone I have spoken about so far, was the Futurist painter Luigi Russolo. I speak of him now because, arguably, he made an even greater – in fact a groundbreaking – probe into our next territory: which is noise, or unpitched sound.

Like Grainger,[3] Russolo argued from nature, pointing out that sounds in the world are not limited to arbitrary pitches, but are infinite in their gradations. Winds howl and waves swell. But unlike Grainger – or anyone else at the time, for that matter – Russolo extended his argument to embrace the whole industrial cacophony of the Modern world. As a Futurist, he wanted not only to be done with the academy – and to celebrate the racket of aeroplanes, factories, cities and mechanical warfare – but also to bring the everyday and the aesthetic back together: to erase the barrier separating musical and non-musical sounds.

[Luigi Russolo, 'Intonarumori', example 1, 1913 (mechanical reconstruction from 1977)]
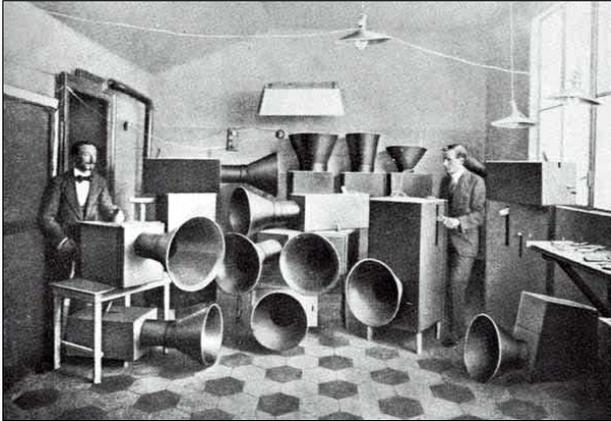
[Luigi Russolo, 'Intonarumori', 1913]

Although Russolo wrote about music, it was a transformed idea of music that moved away from pitched instruments and their tidy, sensitive sonorities, evolving in their place 'a music of noises'.

[Luigi Russolo, 'Intonarumori', example 2, 1913 (mechanical reconstruction from 1977)]

And since no means existed to achieve that, he designed and built – with the help of fellow painter Ugo Piatti – a noise orchestra: a family of ingenious mechanical and acoustic devices that could emit controllable howls, roars, crackles, buzzes and whistles. He called them 'intonarumori'. In his manifesto 'L'Arte dei Rumori' (The Art of Noises), published in 1913, he identified five categories of noise: roars, hissing roars, thunder, explosions, bang and booms; whistling, hissing and puffing; whispers, murmurs, mumbling, muttering and gurgling; screeching, creaking, tustling, buzzing, crackling and scraping; noises obtained by beating on metals, woods, skins, stones and pottery – and finally, shouts, screams, shrieks, wails, hoots, howls, death rattles and sobs. There were in all 27 varieties of 'intonarumori', their names determined by the sounds they emitted: howlers, thunderers, cracklers, buzzers, gurglers and so on. Many worked on variations of the hurdy-gurdy principle, which is to say they used an abrasive wheel to excite a string, which in turn resonated a drumhead attached to an acoustic horn. Shifting pitches and portamanti were controlled by a lever located on the top of each machine.

[Luigi Russolo, 'Ululatore', 1913 (mechanical reconstruction from 1977)]

Then he invented the graphic score to orchestrate them.

In the few years after 1913, Russolo toured his noise orchestra in Europe, sparking the obligatory outraged riots, but his exceptionally prescient ideas – not really taken up again until the development of Musique Concrète some thirty years later – won him no followers. Varèse and Stravinsky both expressed public interest, but neither took that interest any further. Then the instruments themselves were lost in the chaos of World War Two. And since the Futurists had failed to see the future in the phonograph, Russolo's inventions were never adequately documented. Although two recordings were made in 1926, featuring pieces written by his brother Antonio for a mixed ensemble of normal and noise instruments, they tell us little. The music is conventional and the 'intonarumori' difficult to hear. Here's a short snatch from 'Serenata'.

[Antonio Russolo, 'Serenata' (opening bars), 1926]

Happily the first of several new sets of instruments was constructed – working from photographs, drawings, schematics, and a great deal of guesswork – for the Venice Bienale in 1977, although only five of the twenty seven varieties were built. But at least it means we now have a better idea of what the public was confronted with back in 1913. As for the compositions, most of the original scores were lost along with the instruments, but seven bars of Russolo's 'Awakening of a City' were published in a magazine at the time,[4] and so survived. This fragment was also performed at the Venice biennale. And, this time, recorded.

[Luigi Russolo, 'Awakening of a City', 1913 (1977 reconstruction)]

Until now we have been looking at probes into the systematic recalibration of pitch-steps. And the complete abolition of pitch steps. But with Russolo we step away from pitches altogether and enter a world of noise; that is, sounds that are – or were in 1913 when Russolo wrote, by definition, 'unmusical'.

Russolo proposed to make them musical by organising them. And the ideas he set out in his manifesto for the total reconstruction of musical aesthetics have influenced just about every generation since, anticipating and influencing the work of Edgard Varèse, Arseny Avraamov, John Cage, Pierre Schaeffer, Murray Schafer, the Soundscape community – and countless others down to the present. Embedded in Russolo's Futurist iconoclasm was the suggestive notion – though he never said as much – that the essence of music lay not in pitch relations but

[The Dutch Grasshoppers aerobatics team, flying the Alouette helicopters they used in the world premiere of the 'Helikopter-Streichquartett']

in the way sounds were aesthetically deployed. At least half a century would pass before that idea achieved any broad support, although probes into the wider use of unpitched sounds – especially in the form of percussion – and the exploration of exotic and complex timbres did powerfully extend the range of sounds that could be accepted as musical. Which narrowed – and made more interesting – the possible meanings of the category, noise. There is a negotiated ambiguity today between the idea of noise as an absolute quality – implied in the descriptor noise music, for instance – and as something wholly contextual, a statement about whether a sound is wanted or unwanted. A helicopter is noise when it flies over your harp recital, but it is an instrument when it appears in Stockhausen's 'Helikopter-Streichquartett'.

[Karlheinz Stockhausen, 'Helikopter-Streichquartett', 1992-3]

While sound is an objective category, noise is a cultural descriptor. Some plants we call flowers, others weeds – the distinction is ours, not nature's. And it's a distinction that changes over time. Noise is just a word, and it means whatever the community using it feels comfortable using it to mean. Most new music is initially denounced as noise – and most noises have at one time or another been claimed for music.[5]

For probes into unpitched sound (noise) we'll take under two aspects: timbre and amplitude.

We'll start with timbre, because probes into timbre are concerned not so much with the notes as with the precise and particular grain of sounds heard.

[Johann Sebastian Bach, 'Partitas' (excerpt), ca. 1725-30]

In the sixteenth century, music was taught alongside mathematics and astronomy, behind it lay the notion of cosmic geometry and the Music of the Spheres. Music was mathematics expressed in time, and the work of composition was work with number, divine ratios and the great ladder of being.

In such a system, it's the underlying patterns that matter, because they embody an indivisible truth; linking the soul to the perfection of the cosmos. And in this respect, a score and its cosmic resonance are both, like Plato's forms, eternal and unchanging. They are preserved no matter what instrument is used to sound them.

That's not to say that instrumentation doesn't matter, just that the music is rooted in its form, rather than it's sound. Sound is more like a clothing.

Anything from this period, Vivaldi's *Four Seasons*, for instance, will retain its essential character, no matter how it is clothed in sound.

[Vivaldi, 'The Four Seasons, Winter', 1723, for strings]
[Vivaldi, 'The Four Seasons, Winter', 1976, for koto ensemble]
[Vivaldi, 'The Four Seasons, Winter', date unknown, for unidentified rock band]

This is no longer so obviously true, for instance, of Stravinsky's *The Rite of Spring*. This:

[Igor Stravinsky, 'The Rite of Spring' (opening for orchestra), 1912]

…is not remotely compatible with this:

[Igor Stravinsky, 'The Rite of Spring' (opening for electric guitars), unknown origin]

Sound is beginning to be more than simple orchestration.[6]

As it appears on the page, a note is a pure and one-dimensional entity: an A is an A; it possesses only pitch. But a real A – played on a piano, or an oboe, or a tubular bell is unique and quite different from all other As. For seven hundred years orchestration lent colour and vitality to paper composition, but remained secondary to the basic architecture of the music. First the structure, then the orchestration. But by the early twentieth century this paradigm was being

[Igor Stravinsky, 1930]

questioned too. Both a heightened consciousness of experience, and a greater reliance on sound itself to carry a composition – or even to be a composition – grounded a new paradigm rooted in aesthetic sensuality. And this came first through an increased sensitivity to timbre.[7]

Early probes were launched into the structural deployment of timbre by a number of late nineteenth century composers, but it was Schönberg in his *Harmonielehre* who introduced the notion of timbre-structure. In the third of his *Five Pieces for Orchestra*, for instance, melodic and harmonic motifs are minimised in order to foreground the play of carefully calculated shifting timbres:

[Arnold Schönberg, 'Five Pieces for Orchestra. Op. 16. No. 3', 1909]

Or listen to this piano reduction of the opening of Webern's *Five pieces for Orchestra*.

[Anton Webern, 'Five pieces for Orchestra', piano reduction, internet site, no details given]

And now to the music as composed:

[Anton Webern, 'Nicht diese 4', internet site, no details given]

The orchestration is not an afterthought, it's the heart of the composition; Webern is composing with sound as much – arguably more – than with a pattern of pitches. This was a notion Edgard Varèse took as his starting point – and then raised to the level of genius

[Edgard Varèse, 'Arcana', 1927]

Varèse took sound into three-dimensional space. His was a music in restless and dynamic motion. Pitch relations took second place to a choreography of shards, blocks and parabolas of sound – all moving at different velocities, sometimes together, more often apart. There is no elaborated centre in this music, no orchestrated melody, ground and foreground, just the dynamic interaction of quasi-autonomous parts. It cannot be reduced. Its sound is what it is.

All of Varèse's music – and there's not much of it, a bare 140 minutes in all – moves away from pitch as a source of meaning.

The critical step to tonal freedom came with Varèse's *Ionisation* – the first major Western composition for unpitched sounds alone – it was scored for thirteen percussionists playing forty different unpitched instruments. This was not a rhythmic exercise but a complex music of moving lines, sound masses, counterpoints and colour: a fully-fledged composition of immense rigour and complexity. With no reference at all to pitch.

[Edgard Varese, 'Ionisation', 1929-31]

Here again, Varèse anticipates the century, ushering in a vastly expanded role for percussion, and vastly expanded library of percussion instruments, both now a commonplace of later twentieth century music.[8] To avoid argument, Varèse preferred to call his works organised sound, and he was exceptionally alert to the potential of new instruments and new technologies.

In the early thirties, he embraced electronics and experimented with gramophone records and, in 1933, he attempted to raise funds from the Guggenheim Foundation and Bell Laboratories to develop an electronic music studio. He was turned down. The world would have to wait another sixteen years for that vision to be realised, and look to France and Germany, not America to make it happen.

Like Grainger, Varèse was convinced that machines would revolutionise music and deliver undreamed of power to composers. When he was given an Ampex tape-recorder in 1953 – an early model, donated anonymously – he immediately set to work devising tape interpolations for *Deserts*, his first new composition for seventeen years – and the first full scale work ever written for orchestra and pre-recorded Tape.[9]
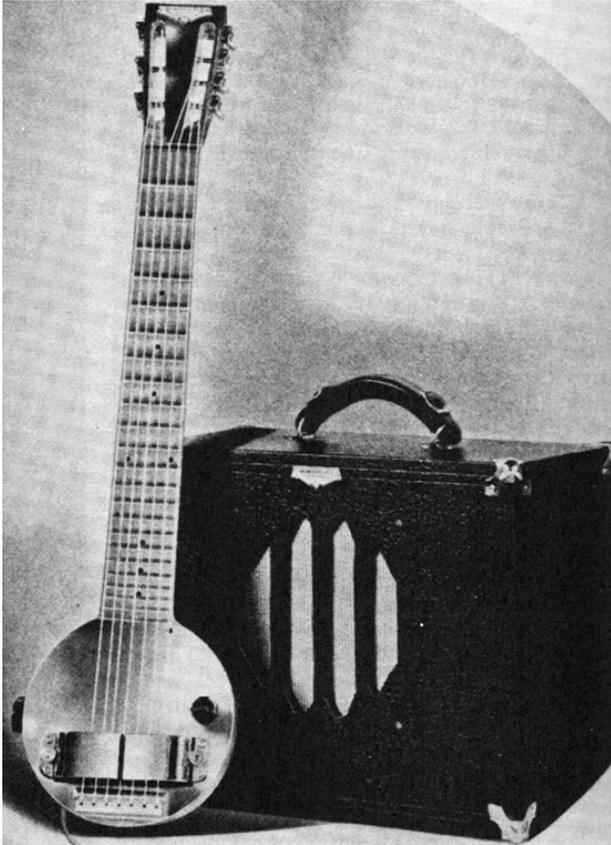
[Rickenbacher Electro A-22]

This is the first of three tape interpolations:

[Edgard Varèse, 'Deserts', 1950-54]

Three years later, when Phillips commissioned the architect Le Corbusier to design a pavilion for the World's Fair, Corbusier insisted on involving Varèse. The building, he said, would be a poem of light and sound. For the first time, using 425 speakers and an extremely complex routing system, Varèse was able to fulfil his dream and move his sounds physically through space.[10]

The 'Poème électronique', completed in 1956, is both Varèse's home-coming – and an encomium to the poetry of noise.

[Edgard Varèse, 'Poème électronique', 1957-8]

Parallel with the extension of the role of percussion, the extension of composition into manipulations of sound rather than pitch became standard operating procedure in the world of Western art music, so we won't need any further examples. Instead we'll look at more extreme or unusual probes into timbre or noise that test more uncompromising possibilities.

Here is one: a narrower but more extreme probe into the structural use of timbre, launched in 1959 by Giacinto Scelsi in this orchestration of not much more than a single note in which – in the absence of melody or rhythm, and with minimal use of harmony – tone-colour provides the main aesthetic focus.[11]

[Giacinto Scelsi, 'Quattro Pezzi per Orchestra No. 4', 1959]

Of course, all drone music trades heavily on timbre for its affects but for most, this is not its main objective. Drone music is a deep vein and I will leave it here for now. We shall be returning to it in more depth later, under a different heading.

Bringing elements of Schönberg and Scelsi neatly together is this short probe by Canadian plunderphonian John Oswald. As with the Webern and Schönberg examples, this music is fully articulated – but calculated to highlight timbral rather than pitch modulations.

[John Oswald, 'Klangfarbenprobe', 1991]

Olivier Messiaen was another composer who flew subtle missions into this territory – which he called 'mélodies de timbres', mixing shifting chords quietly behind foreground tones to create delicate modulating timbral movement.

[Olivier Messiaen, 'Couleurs de la cité céleste' (excerpt), 1963]

In part five, we will dig deeper into timbre, the grain of sound, extended technique and electrification.

[1] 1931 by George Beauchamp, marketed in 1932 by Rickenbacher Electro as the A-22, but commonly nicknamed the frying pan, because it looked like one.
[2] Nashville session player who has appeared on more than 30,000 songs to date and worked with more or less every major country artist of the sixties, seventies and eighties, as well as in pop and jazz contexts. That's him on 'Sweetheart of the Rodeo'. He has also made seventeen instrumental albums.
[3] Luigi Russolo, Percy Grainger and Edgar Varèse all studied with Feruccio Busoni.
[4] In an article, 'Rete dei rumori' (Network of Noises) which Russolo published in the magazine *Lacerba* in 1914.
[5] There are contexts too, in which noise is given ideological protection. Analogous perhaps to the idea of ugliness in the work of Edmund Burke, noise is praised for its ability to instil intense emotions – which are the source eventually of the sensation of pleasure. At other times, noise is a badge of defiance, or a means to repel. In all of these contexts noise acquires a value in its own right. I will try to distinguish between them as we proceed.
[6] In orchestra writing, the beginning of the twentieth century saw the massed reinforcement of individual lines giving way to more subtle timbral shadings – and to the use of smaller ensembles – as probes were launched into the greater exploitation of timbre as a structural element of composition. It is impossible not to imagine that the existence and materiality of recorded sound did not exert a profound influence on this way of thinking. Indeed Schönberg noted in a 1928 dialogue with Irwin Stein that the radio and gramophone were 'evolving such clear sonorities that one will be able to write much less heavily instrumented pieces for them'.
[7] So what makes those As different from one another when they are clearly all the same note? One

[Yves Klein, *Monotone Silence Symphony*. Chapel Saint Rita, April 28, 1998]

difference, as we have already seen, is the combination, mixture and relative loudness of the simultaneously sounding natural overtones. That differential applies to every acoustic instrument. Then there are timbres created by the combination of inharmonic partials – which is to say the non whole-number harmonics produced when different fundamentals sound together. Potential levels of complexity are infinite and incalculable. The thicker and more unruly the simultaneous tones, the more likely we are to speak of them as noise, since no clear sense of pitch is any longer discernable. Bass drums and cymbals are timbrally rich, for example, but tonally poor. As are most of the sounds we classify as noise.

[8] There are nine percussionists in *Amériques*, and (in the original score) 144 other instruments, as well as the siren; forces unheard of and unimaginable in the ninetheenth century.

[9] He did more work on it at Pierre Schaeffer's new tape studio in Paris. *Deserts* was also premiered in Paris (in 1954) to howls of outrage. Sandwiched between pieces by Mozart and Tchaikovsky, it was introduced by Pierre Boulez and Karlheinz Stockhausen controlled the tape. Final revisions were made at the Columbia-Princeton Electronic Music Centre.

[10] Different sources give different numbers of speakers. Varèse himself said it was 425. The recording was made at a specially built three track studio in Holland. The pavilion was the work not of Le Corbusier himself, but his assistant, Iannis Xenakis – who also produced his own tape work, 'Concret PH', that was played in the foyer.

[11] He was not the first, but his goal was different from say Yves Klein, who in May 1957 at the Micro-salon d'Avril in the Iris Clert Gallery, had his *Monotone Symphony* – conceived in 1949 as *Monotone-Silence Symphony* – performed: a 40-minute orchestral work consisting of a single 20-minute sustained chord followed by a 20-minute silence. On the opening night 1001 blue balloons were released into the sky, which Klein called an 'aerostatic sculpture'.

02. Acknowledgments

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03. Copyright note