



Delia Derbyshire, among other electronic-music pioneers, started out in the BBC Radiophonic Workshop.

MUSIC

Pioneers of sound

Two books chart the laboratory origins of avant-garde electronic music, finds **Marc Weidenbaum**.

After decades of sonic experimentation, two maverick institutions met their ends within years of each other. In 1992, US composer John Cage, a prolific pioneer of electronic music, passed away four weeks shy of turning 80. And in 1998, the BBC Radiophonic Workshop closed down after 40 years of developing high-tech sounds. Two books — Kenneth Silverman's biography of Cage, *Begin Again*, and Louis Niebur's account of the Radiophonic Workshop, *Special Sound* — describe the technical innovations of these institutions and suggest that they were victims of their own notoriety.

Created in 1958, the BBC Radiophonic Workshop produced electronic sounds for radio and television franchises, including landmark science-fiction series such as *Quatermass*, *The Hitchhiker's Guide to the Galaxy* and, most enduringly, the signature tune for *Doctor Who*. Founded with advanced electronics equipment but a modest budget, the studio's edge was its ability to tinker within its means. It released some of its

Special Sound: The Creation and Legacy of the BBC Radiophonic Workshop

LOUIS NIEBUR

Oxford University Press: 2010. 272 pp.
\$27.95, £17.99

Begin Again: A Biography of John Cage

KENNETH SILVERMAN

Knopf: 2010. 496 pp. \$40, £27.95

experiments to the public in pamphlets that included instructions and wiring diagrams. Eventually, electronics became so affordable that freelance composers undercut BBC economics. Alien noises, manipulated recordings and synthesized instrumentation were replicated throughout pop culture, diminishing the workshop's individuality.

The Radiophonic studio had a lab-coat reputation from the start. The small team innovated instinctively, adopting new technologies such as voltage-controlled waveform synthesis; adapting existing ones such as the turntable; and developing new sounds and approaches to enlivening narratives

with audio. It owed its existence not to the BBC music department, which balked at electronics, but to the drama and features departments, which supported the creation of a team to expand the sonic palette of their productions. The name radiophonic was chosen over another term, electrophonic, which was deemed to be too closely associated with brain research.

Born in Los Angeles in 1912, John Cage learned to tinker from his father, a serial inventor of everything from submarines to an 'Invisible Ray Vision System'. From an early age, Cage was a good orator and had a media-genic quality. Once he left home, his life took on a Zelig-like fluidity: boarding with art collector Peggy Guggenheim, befriending author John Steinbeck and studying with composer Arnold Schoenberg. In his later life, Silverman writes, Cage was so celebrated that the festivities probably contributed to his death. His birthday milestones involved exhausting global galas that curtailed his composing.

Written for ensembles large and small, many of Cage's compositions invoked chance and interactivity. He championed percussion as an instrument in Western music and developed the 'happening' (the event as art) and the 'prepared piano' (in which objects rattle on its strings). Today, Cage is best known for the silent piece less than five minutes long that contains no notes: '4'33" was first played in 1952 and was inspired by his experience in an anechoic chamber. His technological experimentation was advanced for its time — Cage's early 1950s tape-splicing techniques, for example, did not reach their full potential until hip-hop samplers adopted them in the late 1970s and 1980s.

Many scientists were among Cage's close associates. Johan Wilhelm 'Billy' Klüver, a Bell Laboratories physicist, worked with him to invent a photoelectric system that allowed dancers to trigger sounds. Bell Labs employee Max Mathews — later of Stanford University, and after whom the widely used electronic music software Max/MSP was affectionately named — built Cage a 50-channel mixing board for Leonard Bernstein's performance of his *Atlas Eclipticalis*. And Lejaren Hiller, a former DuPont chemist, helped Cage to become computer literate in 1967, allowing him to accomplish long-envisioned projects that he had previously deemed too complex to achieve.

Begin Again — the title of which reflects the continual refreshment of Cage's ideas through his conversations with these many players — is more descriptive than critical. Silverman argues for the intensity of thought

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An interview with **Tod Machover**, the man behind *Guitar Hero*:
go.nature.com/34hf6n

and emotion captured in Cage's body of work. Known for his philosophical musings on nature (he was an avid mycologist), as

well as on chance, technology and other subjects, Cage became both a public intellectual and a celebrity.

The BBC Radiophonic Workshop also regularly replenished its perspective — by rotating its personnel. At first, this was a deliberate strategy by BBC managers. Electronic audio was so unfamiliar when the studio formed in 1958 that managers felt engineers could only work on sound effects “for a limited amount of time before succumbing to mental instability”. Niebur reveals the bureaucracy and political manoeuvrings inherent in the government-funded behemoth that is the BBC. Later, many studio hands left for better-paid jobs at private companies — among them such seminal individuals in the history of electronic music as Delia Derbyshire and Daphne Oram, the latter of whom went on to influence film and opera and develop new instruments.

There are parallels between the two books. The Radiophonic faithfully served the BBC, and Cage composed reams of music for his lover Merce Cunningham’s dance company. Both institutions pioneered tape loops and other techniques, and each associated closely with naturalists — Cage idolized philosopher Henry David Thoreau, and the Radiophonic team wrote ardently for wildlife broadcaster David Attenborough. Both performed for a global audience, yet their paths rarely crossed.

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Differences emerge in their philosophies. Cage was intellectually highbrow, but the Radiophonic members were chartered populists. Cage loomed large in European universities and cultural institutions in Germany, France and Italy. The Radiophonic, although equally inventive, defined itself by remaining opposed to such academic forces. It avoided ideological battles about the political nature of the orchestra or about musical structures such as 12-tone serialism, in which Cage participated. The Radiophonic was, Niebur says, “the first studio in the world to make electronic music accessible to ordinary people”. Its legacy lives on in the latest return to our screens of *Doctor Who* — featuring yet another rendition of that indelible theme tune. ■

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ETHICS

The good life

Pascal Boyer assesses what science has to say about morals.

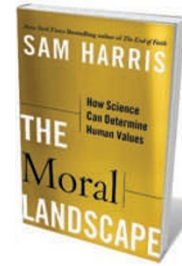
Philosopher David Hume wrote in the eighteenth century that one cannot derive an ‘ought’ from an ‘is’. In *The Moral Landscape*, journalist Sam Harris counters this view, arguing that science can shed light on why we hold moral values and also say which values are valid. In doing so, he eloquently counters the jaded pessimists who think that science has little to say about happiness. His thesis is compelling, but he underplays the extent to which our decisions are rooted in intuition, preferring to portray decision-making as a calculated maximization of our well-being.

The psychology of morality is a rapidly growing field. Investigations of brain processes involved in moral intuitions, feelings and judgements reveal a suite of sophisticated mental capacities, fine-tuned by natural selection, that orchestrate our reactions to other people’s behaviours and to our own. In distributing resources, for example, people are sensitive to differences in need and merit as well as welfare. In most circumstances, people experience moral judgements as gut feelings, produced by largely unconscious processes. Our moral reasoning is thus an awkward attempt to rationalize these intuitive feelings.

This nuanced scientific perspective is far from the hackneyed picture of virtue being a culturally derived imprint, imposed for the benefit of society on an instinctive beast. It shows how moral sentiment may have played a part in our evolution, conferring fitness advantages on ethically inclined individuals. But Harris goes further, arguing that humans can intuitively distinguish ‘the good life’ — which maximizes individual well-being — from less-optimal alternatives. Moral courses of action, he suggests, are those that lead us closer to this positive ideal. Scientific research addresses morality by explaining how our actions contribute to our well-being.

Harris runs against the intellectual grain in stating that moral choices can be set on an objective scale — those that increase well-being versus those that do not — and that societies are capable of moral progress, such as outlawing slavery or torture. Both views oppose the prevailing position of moral relativism, which supposes that the suffering is justifiable if it fits some local custom. Harris punctures such incoherent philosophy easily.

If morals are fluid, what should be our yardstick of valid choices? Religion is ruled out. Harris’s brand of consequentialism — the ends justify the means, so what is good is what maximizes well-being — excludes transcendent



The Moral Landscape: How Science Can Determine Human Values

SAM HARRIS
The Free Press: 2010.
304 pp. \$26.99

sources. Because there is a quantifiable outcome, we do not need a deity to know whether our choice had good or bad consequences. Harris points out that most of the choices that are spread in the name of religion, such as proscribed killings, stem from intuition and not from the doctrine followed. Moral intuition and scientific findings are the main bases for making moral decisions.

But science and intuition are not always reliable. The case against mugging people is easy to make, by quantifying suffering and benefit and the net result on the level of well-being. But an issue such as abortion is more difficult: our feelings are grounded in our intuition about whether a fetus is a person. Our idea of personhood has evolved as an approximation that is sufficient in our social interactions. Such ideas typically founder on limiting cases — we simply cannot know whether a brain-dead individual or an unborn fetus is a person or not. Harris sees such conundrums as difficult, unsolved scientific puzzles that we should pursue.

A moral optimist, Harris suggests that people can be persuaded to abandon harmful behaviours, such as the stoning of adulterers. Here, social scientists may feel that he rides roughshod over some solid findings of moral psychology. Consequentialism is not the heuristic of most humans. Experiments show that assessments of well-being are of less importance in moral decision-making than a gut feeling that actions are wrong or right. For example, beyond its genetic risks, people maintain that sibling incest is wrong, even in cases where no children result.

To be persuaded that some actions are immoral because they diminish well-being, people need to accept that welfare is the most relevant criterion of morality, which may require a special education. This and many other difficulties stand in the way of Harris’s moral reforms, but they are all reasons to read his lucid, deep and uncompromising essay. ■

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