



Hedy Lamarr co-invented a technology to prevent remote-controlled torpedoes from being jammed.

TECHNOLOGY

Inventing beauty

Robert P. Crease revels in the life of a Hollywood goddess who pioneered wireless technology.

Hedy Lamarr was no mere Hollywood starlet. The twentieth-century Austrian-American actress was also a tech-head, taking inspiration from the self-playing 'player piano' to create technology of a type now used in mobile phones. Richard Rhodes's biography, *Hedy's Folly*, gives this side of her story its due.

For some, her intelligence sits uneasily with her exquisite looks, and her invention looks like an eccentric sideline. Another biography — *Hedy Lamarr* by cinematic scholar Ruth Barton, published last year — was a solid portrait but devoted just ten pages to Lamarr's undercover life as an inventor. However, her engineering work, conducted largely in collaboration with avant-garde US composer and pianist George Antheil, was genuine. The duo patented a wireless technology to prevent jamming of

remote-controlled torpedoes. This was the first use of a system that, thanks to the particular way in which it allowed multiple users to share a common band, would later be incorporated into Wi-Fi, Bluetooth and most cordless phones.

An award-winning author on the history of the US atomic-weapons programme, Rhodes puts Lamarr's inventive spirit into coherent context. Despite its title, the book is nearly as much about Antheil: he spent the 1920s in Europe writing controversial compositions for player pianos — an early form of entertainment centre involving a primitive version of digital control. Antheil's 'orchestras' incorporated other far-out instruments: saws, hammers, electric bells, sirens and even a pair of aeroplane propellers.

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Hedy's Folly: The Life and Breakthrough Inventions of Hedy Lamarr, the Most Beautiful Woman in the World

RICHARD RHODES
Doubleday: 2011.
272 pp. \$26.95

Rhodes is not as good at conjuring the cultural climate as he is at describing technologies, so the book only really takes off when Lamarr meets Antheil in Hollywood in 1940. But the celebrity-riddled parties, openings and European premieres of Lamarr's day job were hardly a drab background to her hidden hobby, and her progression to stardom makes for fascinating reading.

Born in 1913 to a Jewish family in Vienna as Hedwig Kiesler, she grew into a beautiful teenager and was soon appearing in German films. The erotically charged 1933 Czech film *Ecstasy* made her a sensation: in it, she swims backstroke nude in a shimmering lake, and appears, famously, with bare breasts.

That summer, Kiesler married the first of her six husbands, a wealthy arms merchant who entertained German and Austrian weapons developers. Neither he nor his guests seemed to appreciate that their gorgeous hostess could follow conversations about submarine torpedoes and remote-control devices. When her husband tried to make her give up acting, she divorced him.

Kiesler moved to Hollywood, became Hedy Lamarr, and was soon a ravishing starlet in films such as *Algiers* (1938), the trailer for which contained the line (uttered by French actor Charles Boyer): "Come with me to zee Casbah!" But she was proud of her mental acuity. "Any girl can be glamorous," she said. "All you have to do is stand still and look stupid."

During the Second World War, Lamarr played glamour roles in films such as *Ziegfeld Girl* (1941), in which she wore a jewelled peacock-feather headdress. Meanwhile, she and Antheil had been hard at work applying for patents on weapons-related devices.

Their meeting and collaboration came at a fortuitous time for Antheil. He had been down on his luck, reduced to writing popular articles for *Esquire* magazine advising readers to evaluate women based on their glands. Lamarr hoped to tap into his expertise to find a way to augment her breasts. Antheil couldn't help her, but the two discovered a shared passion for pianos and for inventing. (Rhodes finds it "highly unlikely" that they were lovers.)

Lamarr happened to mention an idea she'd had about how to prevent jamming of remote-controlled torpedoes. Rhodes puts this simply: "If a radio transmitter and receiver are synchronized to change their

tuning simultaneously, hopping together randomly from frequency to frequency, then the radio signal passing between them cannot be jammed.” This process is now referred to as ‘frequency hopping’ or ‘spread spectrum’. Experience with player pianos had made Antheil proficient at getting machines to communicate in synchrony, so Lamarr recruited him to provide a proof of principle.

Using available documents and interviews, Rhodes retraces the steps that guided Lamarr in her thinking, and the genesis and development of the pair’s other inventions. He explains why the US Navy had no immediate use for the patent: its existing torpedoes were so problematic that it had no interest in developing another system, and Navy technicians misunderstood aspects of the Lamarr–Antheil design. So it was filed away. Rhodes charts the later, independent developments of the technology and its subsequent uses, notably in the Sonobuoy (a sonar system in a buoy) developed by the US Navy. The patent expired the year Antheil died, in 1959, when it was still classified.

The technology the two invented emerged from secrecy in 1976 and found wide application in commercial communications. In 1997, the inventors were given (Antheil posthumously) a Pioneer Award by the Electronic Frontier Foundation, a non-profit communications industry group based in San Francisco, California. But from the end of the 1940s, Lamarr’s Hollywood career had begun to drift down an all-too-familiar path. Her film performances had grown hammy, as in the overwrought and pretentious *Samson and Delilah* (1949). She gradually acquired a reputation reminiscent of *Sunset Boulevard*’s Norma Desmond, was arrested twice for shoplifting and died in 2000.

Although the book is mainly about her collaboration with Antheil, its cover sports a collage of Lamarr the starlet sitting on a long golden torpedo. Yet again we are asked to marvel at the spectacle of actress–inventor as oddity. Does this reflect sexism, the disbelief that beauty is compatible with intelligence? Would we be less surprised if her on-screen persona had been less erotic and more like Katharine Hepburn’s? Or perhaps there is a deeper cultural prejudice at work — the platonic notion that the skill involved in imitating the world is incompatible with that of understanding it.

Inside its cover, Rhodes’s book gives us the whole Hedy — a closet geek in peacock feathers — and makes that mix believable. Now it is up to us to figure out why we find that hard to digest. ■

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Books in brief



Mushroom

Nicholas P. Money OXFORD UNIVERSITY PRESS 224 pp. \$24.95 (2011)
Botanist Nicholas Money is unashamedly in thrall to the ‘fungal sex organ’. In this brilliant scientific and cultural exploration, these organisms of rot and soil positively sparkle. From biology to medicine, cuisine and recreation, this is a history as convoluted as the systems of fungal filaments that enrich woodlands. A human and mycological cast of thousands throngs the pages — from a 10-kilometre-square colony of honey fungus in Oregon’s Malheur National Forest, to Charles McIlvaine, author of *One Thousand American Fungi*, who fearlessly chomped his way through many of them.



Science on Ice: Four Polar Expeditions

Chris Linder UNIVERSITY OF CHICAGO PRESS 288 pp. £26 (2011)
A century of polar science has seen vast change, not least in the researchers still braving the blizzards and gelid waters. To give an idea of their daily realities, oceanographer and photographer Chris Linder and several embedded journalists followed four Arctic and Antarctic expeditions studying, variously, an Adelie penguin colony, the Bering Sea in spring, the Greenland ice sheet and ocean pack ice in the eastern Arctic. The vivid images — of fishing for zooplankton at dawn, intent ice-breaking crews, Ernest Shackleton’s hut at Cape Roys, for instance — enliven a detailed yet accessible chronicle.



Memory: Fragments of a Modern History

Alison Winter UNIVERSITY OF CHICAGO PRESS 312 pp. £19.50 (2011)
Notions of how memory works have shifted wildly over time. Historian Alison Winter traces the evolution of memory sciences through ‘fragments’, or flashbulb moments. Drawing on sources from neurological research to diaries, she shows how the understanding of memory has deepened, ramified and sometimes taken wrong turns. Case studies include the extreme brain surgery performed by Canadian neurosurgeon Wilder Penfield; forensic hypnosis (as used in the book *The Manchurian Candidate*); psychologist Frederic Bartlett’s studies of remembering; and false-memory syndrome.



Small, Gritty, and Green: The Promise of America’s Smaller Industrial Cities in a Low-Carbon World

Catherine Tumber MIT PRESS 192 pp. \$24.95 (2011)
Detroit in Michigan may be Motown — an intrepid city founded on car manufacture — but depopulation, ill-conceived infrastructure and the flight of industry have left it devastated. Yet historian and journalist Catherine Tumber sees such urban wastelands as tomorrow’s sustainability hubs. Low population density, proximity to farmland, and a skilled workforce could aid the advent of renewable-energy technology. Plucking ideas from 25 small cities in the US Rust Belt, Tumber outlines a plausible route to a ‘repurposed’ future.



And So It Goes: Kurt Vonnegut, A Life

Charles J. Shields HENRY HOLT 544 pp. £20 (2011)
The late Kurt Vonnegut carved out his own literary landscape — blending dystopian tendencies, pitch-dark humour, autobiography and elements of his grounding in chemistry. Authorized biographer Charles J. Shields’s exhaustive research does justice to him. Whether it is the dimension-hopping Trafaladorians, ice-nine (a solid water) or the shenanigans of fictional sci-fi writer Kilgore Trout, Vonnegut used the fantastical to comment astutely on the human condition. His honesty, Shields reminds us, is still needed.