



IN THE PAST 50 YEARS, industrial design has become a full-fledged profession with academic programs, human-factors laboratories, multidisciplinary teams, and global superstars. If anything, design may now be expected to solve too many problems, from terrorism to boredom. But at least its practitioners are gaining in prestige. A recent BBC survey put Jonathan Ive, Apple Computer's vice president for design and the father of the iPod, in first place on a list of people shaping British culture, ahead of Harry Potter creator J.K. Rowling.

There remains a parallel world of design far from fashion brands and portable electronics, however. It is the realm of dreamers and tinkerers—some with advanced degrees and others with limited formal education, some long-term corporate staffers, others part-time inventors. Their numbers have probably shrunk in the past half century. The people who grew up in the 1920s more likely built their own things from parts, whether radios or model airplanes. Interwar automobiles also left ample room for the amateur mechanic and customizer, and World War II was fought by a generation of master improvisers whose skills had been honed by the Depression. When the war ended, the cornucopia of surplus materials was a hobbyist's nirvana. And plastics, which could still be produced economically in small shops, were opening new realms of form.

I grew up in this milieu in 1950s Chicago. The scene was changing; even in elementary school I noticed that the scrap materials called for in Cub Scout manuals were becoming harder to procure than the authors had assumed. But inventor-designer-entrepreneurs were still fixtures of urban life. The father of a school friend, for example, owned a factory making plastic shower doors; his obituary noted that he had also designed a plastic handle that had replaced metal ones on glass milk bottles. In the early '60s he was even offering a toy that made it to Johnny Carson's *Tonight Show*. Sadly, it never sold.

Other obscure inventor-designers lifted themselves up to the lower rungs of the upper class; the originator of a popular rabbit-ear television antenna, for example, acquired a small estate on Long Island with a private menagerie, including a martini-stealing chimpanzee. No matter how large their sales, few achieved lasting wealth or fame.

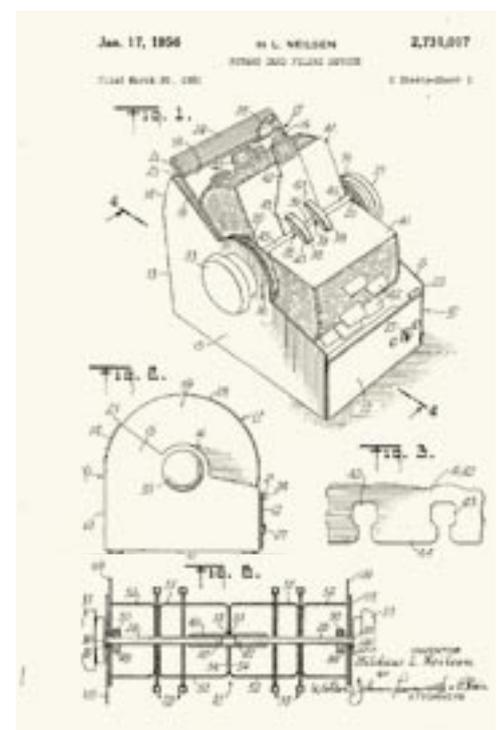
Yet the best of them were brilliant problem-solvers. With or without formal technical education, they had an intuitive grasp of consumer wishes and needs. And we're all familiar with their products if not with their names. It is time to pay tribute to the neglected Leonardos of everyday technology.

#### THE ROLODEX

### Hilda L. Neilsen and Arnold Neustadter

**1** The rotary card file, like most great works of the unsung, had a long history of precedents before it achieved archetypal form. In *Mechanization Takes Command* (1948), the Swiss architectural historian Siegfried Giedion describes an early-18th-century cabinetmaker's proposal for a giant rotary file bookkeeping system; and industrial-grade rotary card files seem to have been in use in the U.S. since at least World War I. Smaller desk models also became commonplace, spurred by postwar business growth that produced a need to organize ever more addresses and numbers. On February 16, 1947, *The New York Times* ran a stationer's advertisement for the Wheeldex Cub "for address and phone lists of customers, friends, suppliers, patients, members." The product looked like the classic Rolodex down to the slot system, tabs, and cantilevered aluminum base with slanted sides.

Hilda L. Neilsen's patent drawing for the Rolodex, 1956, illustrates the device's familiar side handles and notched cards.



What was left to improve? Hildaaur L. Neilsen, a self-taught engineer from a Danish immigrant family, working with Arnold Neustadter, head of the business products company Zephyr American, introduced three crucial changes to the Wheeldex during the 1950s. The men added a second circular rail for holding the cards, making them less likely to fall out. They mounted big plastic handles on either side of the drum so that it became easier to turn (Neilsen had been inspired by the wheels of a Mack truck displayed on top of a New York building as an advertisement). And they inserted a new friction clutch. Neilsen's son Eric describes the clutch on the vintage Rolodex as two disks, one with eight small holes around its rim, the other with three spring-loaded ball bearings, also evenly spaced. At any time, only one of the balls is engaged, creating just the right amount of friction to hold the cards in place without obstructing rotation.

Neilsen was the inventor; he had mastered a whole suite of machine tools and

was constantly streamlining Zephyr products (earlier, he had designed a pop-up address directory with a sliding index for the company). Neustadter was the marketing expert. The two men hammered out design details in endless arguments, Eric Neilsen recalls. But Neustadter received nearly all public credit for the Rolodex. When he died in 1996, having sold Zephyr to Insilco in 1972 (Rolodex is now a brand of Eldon), he was a multimillionaire philanthropist. Despite his lower profile, Neilsen didn't do badly either. His royalties amounted to the equivalent today of hundreds of thousands of dollars a year, and his friction clutch, developed just as human-factors researchers were beginning to explore the tactile side of information, still impresses ergonomists.

"As beautiful as they are comfortable" proclaims this 1955 magazine ad for the BarcaLounger, designed by Anton Lorenz and Peter Fletcher.

#### THE TELEVISION CHAIR

### Anton Lorenz and Peter Fletcher

2 Along with business contacts, domestic objects proliferated in the 1950s boom. After a hard day of adding names to card files (or instructing their secretaries to do so), tired managers wanted to relax. Reclining furniture was already decades old, starting with the Morris chairs of the 1890s and continuing with the La-Z-Boy of the 1930s, but inventors continued to propose fresh variations.

One of these inventors was a Hungarian-born teacher, Anton Lorenz, who had bought a key copyright from the Dutch designer Mart Stam for the use of cantilevered tubular steel and registered his own design. Lorenz won a landmark copyright case against the European giant Thonet in 1932. The judgment gave him control over a large part of the modern furniture market. He then turned to a favorite idea, a self-balancing recliner for hospitals and sanatoria. The result, coined with the German architect Hans Luckhardt, was the Siesta Medizinal (1936). When the sitter leaned back, a linkage raised the footrest for optimal comfort (most other recliners still had separate ottomans).

When the Second World War broke out in Europe, Lorenz was in America pursuing an infringement suit related to his cantilevered designs. He wisely decided to stay, licensing his reclining furniture ideas to the Barcalo Co., a Buffalo, New York, metalworking firm. The Siesta mechanism inspired first a wheelchair and then a lawn chair—the BarcaLoafer—after the war. An upholstered version, the BarcaLounger, appeared in 1949; unlike the more populist La-Z-Boy, it was marketed through exclusive department and specialty stores.

The original BarcaLounger was fine for napping, but the mechanism left the sitter staring at the ceiling. Lorenz realized he needed an engineer and in 1955 offered an attractive salary to Peter Fletcher, a neighbor's son who had just received a mechanical engineering degree from Stevens Institute. Fletcher's assignment was a model that would permit at least two resting posi-

Every Santa wants a BarcaLounger

Isn't it true every Santa Claus had a really nice BarcaLounger? Isn't it true every Santa Claus had a really nice BarcaLounger? Isn't it true every Santa Claus had a really nice BarcaLounger? Isn't it true every Santa Claus had a really nice BarcaLounger? Isn't it true every Santa Claus had a really nice BarcaLounger? Isn't it true every Santa Claus had a really nice BarcaLounger?

The BarcaLounger is the only recliner that... (text is small and partially illegible)

Model 1000... (text is small and partially illegible)

Model 1001... (text is small and partially illegible)

Model 1002... (text is small and partially illegible)

Model 1003... (text is small and partially illegible)

Model 1004... (text is small and partially illegible)

Model 1005... (text is small and partially illegible)

Model 1006... (text is small and partially illegible)



Two early remote controls, Gene Polley's Flashmatic (left) and Robert Adler's Space Commander (below) grew out of a Zenith CEO's crusade against offensive commercials.



tions: the existing full recline, and a second posture with the footrest up and the back at about 45 degrees. It took four years to develop the complex set of linkages that allowed easy transitions.

Lorenz was an old-world gentleman indifferent to the rise of video—his chair was intended for reading. But at the 1959 furniture market in Chicago the companies licensing the design, sensing a demand for viewing comfort, touted it as the Television Chair. Today it is becoming the Home Theater Chair. And Peter Fletcher, now 75 and an industry consultant in West Palm Beach, Florida, finds it ironic that furniture initially designed for health has supported the habits of couch potatoes for 45 years.

#### THE REMOTE CONTROL

### Gene Polley and Robert Adler

**3** While Lorenz and Fletcher fiddled with the spectator's comfort, television design was following its own course. The set was emerging from its cabinetwork camouflage to dominate living rooms. But who would rule the TV itself: the viewer or the advertiser? Eugene F. McDonald, Jr., Zenith Electronics' imperious CEO, hated commercials and had long pushed his engineers

to find ways to silence them. Zenith's first effort, the hardwired Lazy Bones of 1950, was ugly, and the cord proved hazardous.

One Zenith engineer, Gene Polley, developed the Flashmatic (1955), the first practical remote as we know it. Viewers pointed a battery-operated light source at four sensors dedicated to turning the set on and off, muting it, or changing channels. Because ambient light could trick the system, another Zenith employee, the physicist Dr. Robert Adler, found a way to generate more reliable ultrasound signals with four triggers that struck precisely sized aluminum rods when aimed at the set. (The trigger metaphor was deliberate. McDonald was a keen marksman and took satisfaction in targeting unwelcome announcers and programs.) This system, introduced in 1956 as the Space Commander, made batteries unnecessary, an advantage welcomed by Zenith sales executives who feared that dead batteries would mislead consumers into believing that the set wasn't working. The extra tubes, however, raised prices by 30 percent, and Space Commander remained a niche product. The remote market exploded

in the 1980s, after microelectronics yielded the infrared signals currently used.

With hundreds of channels made available by cable and satellite television since the mid-1980s, keypad remotes have become essential. Meanwhile, more and more audio and video components are supplied with remotes. As these accessories have grown in function, they have become more confusing, not to mention easy to misplace. One answer is a programmable multiple controller such as the Sony Navitus, which directs up to 18 devices, has its own color screen, and even presses back against the user's finger to confirm a command. At about \$600, the 4x6-in., 11.5-ounce instrument costs more than many TVs and may be ready for a remote control of its own.

As for the designers, Polley received a \$1,000 bonus, and Adler just one dollar. Their contribution to design is immeasurable, though. Handheld, thumb-operated devices launched a trend that underlies today's cellular communications. And McDonald would have been glad to know that the world is still zapping away.



Kurt Lorber's manufacturing know-how helped make a success of the Plastiklip, though he remains relatively obscure.

#### THE PLASTIKLIP Kurt Lorber

**4** If Polley and Adler represent the corporate laboratory tradition, Kurt Lorber is one of the most brilliant independents, virtually unknown in North America despite the ubiquity of his products: colorful triangular plastic paper clips.

Lorber was born in Stuttgart, Germany, in 1926 and was educated at the automotive research institute of the city's technical university during World War II. After military service he joined Daimler-Benz as a *konstrukteur*, a specialist in turning engineering concepts into products, as opposed to an aesthetically oriented designer, or *produktgestalter*.

Lorber's career shows how arbitrary the distinction can be. In 1952, he left Daimler to establish, with his wife, the independent company Laurel Plastic—a bold act of entrepreneurship in the heartland of corporate loyalty. But the Lorbers knew what they were doing. In 1953 Laurel introduced the world's first plastic paper clip.

Lorber's U.S. Patent 3,673,641, issued in 1972, consists of a stiff, arrow-shaped internal clamp molded continuously within

a larger V. The difference in springiness between the clip's two regions allows for the easy insertion of paper sheets yet maintains pressure on them. The elegant triangular design can serve as a pointer on a single leaf. Different colors are available, and the hues don't rub off on documents. The Plastiklip, as Lorber named it, is pH neutral and much lighter than steel. It does not react with paper and corrode over time, as metal clips might. Nor does it interfere with automated postal sorting equipment or risk corrupting computer storage media through magnetization.

For these benefits, Plastiklips command a premium price, at least compared with other paper clips. On the Web, a package of 200 small U.S. brand-name steel clips sells for under a dollar; 100 Plastiklips are \$2.95, and they are available only through specialty stores or Laurel's U.S. distributor, Baumgarden's.

So how does an independent paper-clip designer in a high-wage zone keep imitators at bay after his original patents have expired? Having been responsible for conceiving entire manufacturing processes in his younger days, Lorber designs and makes much of his own equipment and runs his

own factory. "You know, the little clip is not so complicated," he told a German magazine. "The machine is the more important innovation." He has produced a stream of ingenious small office products, most of which, unfortunately, are difficult to find in North America.

Yet no design is perfect. While many libraries specify Plastiklips for document preservation, the Smithsonian Archives Center recently discontinued them. According to John Fleckner, the center's director, the clips are *too* durable and were beginning to tear through fragile papers. The center has replaced them with wire clips buffered by strips of acid-free paper.

#### IN-LINE SKATES Scott Olson

**5** The youngest unheralded designer of the group has the purest amateur credentials. In 1979, Scott Olson, who was then 19, was playing semiprofessional hockey in Minneapolis and looking for a way to practice off-season. Shopping at a local sporting goods store, he discovered a pair of in-line skates manufactured by a California company, Super Skate, under a 1973 patent.

Originally, all roller skates were in-line; in fact, the Dutch developed them in the 18th century precisely as a warm-weather substitute for skates with blades. Four-wheel models were not introduced until the 1860s; with available materials, they offered better control for skaters not concerned with hockey practice.

Olson had not originally planned to go into the skate business, but when he demonstrated to fellow hockey enthusiasts that the new in-line skates permitted greater speed and more natural movement, he discovered he could make money as a reseller. Sales were brisk because he believed in the product; he even commuted between his rural home and Minneapolis on the skates, a distance of 15 miles each way.

Still, Olson saw that non-skaters had difficulties with the existing in-line model. Working with his younger brother, Brennan, in the family basement, he looked for ways to make the skates more efficient. For the wheels he chose urethane, already employed in skateboards and in many conventional roller skates. Specifying a soft

grade that gripped pavement, he added a second ball bearing to each axle to reduce friction, and an adjustable metal frame for mounting on different-size boots. The boots themselves were made of plastic, which skiers had already proved to be superior to leather in enhancing lightness, durability, and ankle support.

After discovering a 1966 patent that covered some of his key innovations, Scott Olson hitchhiked to Chicago and negotiated rights with the patent's owner, the Chicago Skate Company. In 1983 he incorporated under the name Rollerblade—a trademark ever since—and began a national publicity tour that included roller tennis and roller hockey events and giveaways on California's trendiest beaches.

The surge in demand for the product proved as dangerous as indifference. Facing management and financial problems, Scott Olson sold the company in 1985 to a group of local investors for only \$100,000; his brother Brennan remained a salaried designer. While Olson was bitter about the terms of the deal, he acknowledges that the new owners continued to invest in the product, improving the fit, wheels, and brakes. By 1989 Rollerblade was sell-

ing 100,000 pairs a year. In 1995 the company, by then multinational, accounted for half of a \$700 million market served by 40 other manufacturers of in-line skates. The official history on the Rollerblade website does not mention the Olsons by name. Once a sports celebrity, Olson turned into a historical footnote, though a prosperous one; in 1994 *Newsweek* estimated that his total royalty earnings would amount to \$10 million by the time they were scheduled to end in a few years. Olson now uses the Web to sell another invention, a rowing bicycle that exercises the upper body as well as the legs.

### THE LESSONS

Today's independent designer has even less opportunity to make a mark as prototyping costs and legal fees continue to escalate. But professionals can learn important lessons from the heroes who have faded into the background.

First, respect incremental change. Small but critical improvements in existing ideas, even those that are centuries old, can dramatically affect user satisfaction and sales. The knobs, second rail, and friction mech-

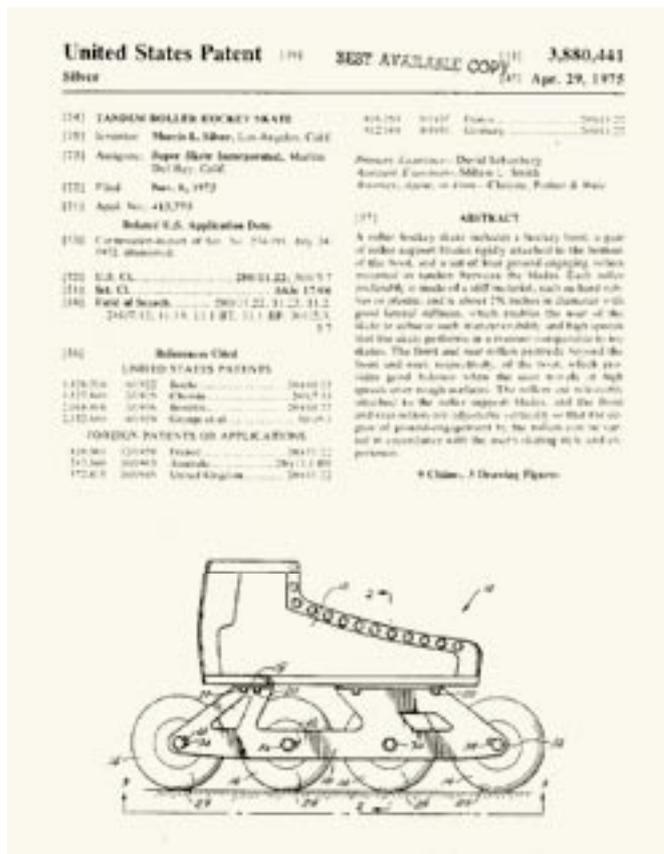
anism that separated the Rolodex from the Wheeldex, and the ball bearings and rigid boot that distinguished the Rollerblade from the Super Skate, made vast improvements. Even the remote control did not become a mainstream device until other inventors developed infrared technology.

Second, value teamwork. Anton Lorenz had a gift for patenting, marketing, and improving other people's ideas. Many companies and individuals he pummeled with litigation later became his contented partners. (Even the notoriously thorny Mies van der Rohe set aside differences to help Lorenz settle in Chicago.) Arnold Neustadter might have given Hildaur L. Neilsen a better deal and more public credit, but his marketing skills and successful sale of the company to a bigger and better-capitalized firm made Neilsen's fortune, as the new owners of Rollerblade made Olson's. And while Commander McDonald failed to share his profits from remote-control devices with Gene Polley or Robert Adler, his insight into the home-entertainment market launched the engineers' efforts in the first place.

Third, know production. A designer who understands manufacturing processes and unit costs is in a position to negotiate confidently. Because he could develop production machinery, Kurt Lorber stayed ahead of global imitators and improved designs more rapidly. Rolodex also owed much of its success to Neilsen's constant attention to shop-floor improvements.

Finally, accept the unintended. No innovator ever knows where an idea will lead, or what positive or negative results might ensue—shortened attention spans or thickening waistlines for users of remote controls, injuries for in-line skaters. Since stagnation also has unpleasant consequences, we don't have much choice. In the next 50 years our tools and materials may be radically altered, but we will still rely on products designed by the unsung.

Scott Olson negotiated rights to an existing patent when he improved in-line skates. However, he quickly lost control of his creation, the Rollerblade.



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