leg splint for the U.S. Navy designed in 1942 by Charles and Ray Eames,
and manufactured by the Evans Products Company

good design on any terms

I eventually tracked down this iconic object in San Francisco, having long admired the contrast between its organic form and geometric holes, the combination of subtle surfaces and crisp edges. I am not describing a sculpture by Barbara Hepworth but rather a mass-produced product by Charles and Ray Eames. It is not even a piece of domestic furniture; it is a leg splint they designed for injured and disabled service personnel in the U.S. Navy.

The splint is made of plywood that has been formed into complex curves. Its design language was radical in 1942, and is still inspiring today. It appeals to me not because of its medical purpose but as good design on any terms. How many other examples of design for disability might that be said of? How often do we qualify, even excuse, design in this field because of the market for which it is intended? Perhaps this standard of design is not even considered appropriate?

DCW (dining chair wood) chair designed by Charles and Ray Eames in 1945, and manufactured by Herman Miller

disability inspires design

Charles Eames believed that "design depends largely on constraints."[1] It was the particular constraints of the U.S. Navy brief that led the Eameses to develop their own technology for forming plywood in complex curvature in the first place, in order to make a lightweight yet stiff structure that accommodated the form and variation of the human body. But this technique had a far-reaching influence on the future work of the design partnership and design in general.

Organic plywood forms underpinned the iconic mainstream furniture manufactured by Herman Miller in the 1940s and 1950s, and through which the Eameses became famous and influential. This sequence of events challenges the so-called trickle-down effect whereby advances in mainstream design are expected to eventually find their way into specialist products for people with disabilities, smaller markets that could not have supported the cost of their development. Flow in the opposite direction is just as interesting: when the issues around disability catalyze new design thinking and influence a broader design culture in return.
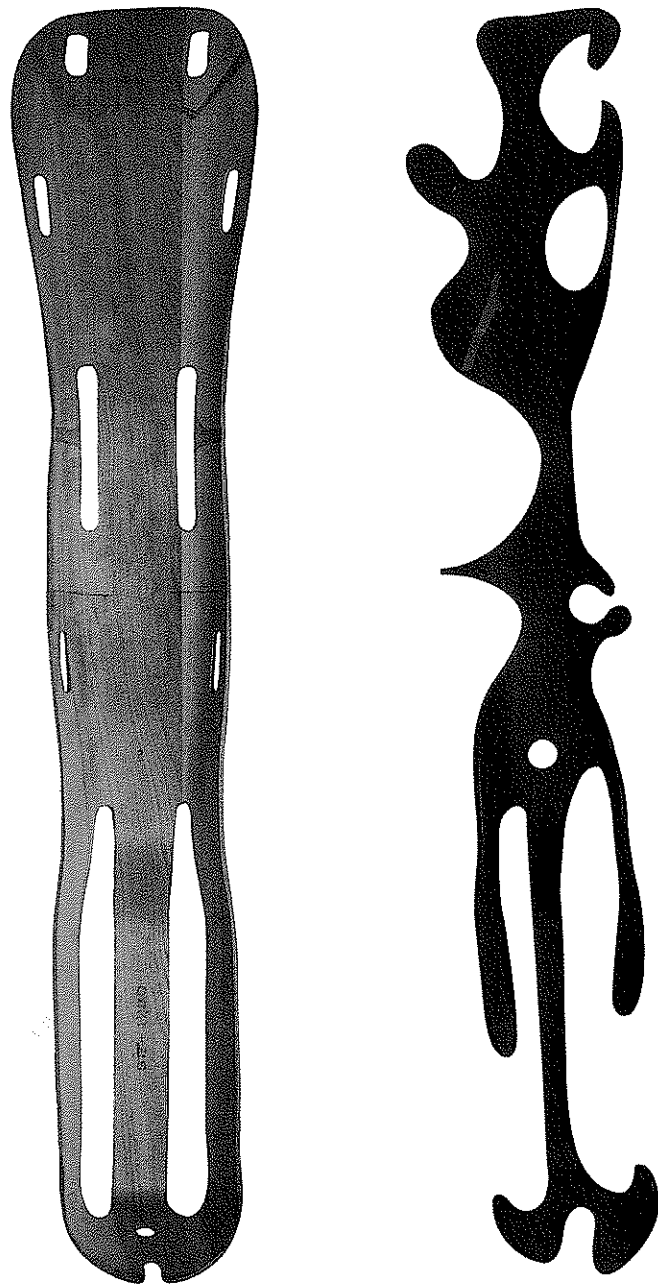
an original leg splint alongside a sculpture by Ray Eames

nurturing healthy tensions

The journey from leg splints to mainstream furniture was not a direct path. Ray Eames began by making (actual) sculptures out of spare leg splints, cutting into them with a jigsaw. She was exploring the visual languages that this new material could support, which was a natural mode of inquiry for an art school graduate—apparently playful, but with serious intent. Within the Eameses' work, two cultures existed side by side, in a healthy tension: the first directly solving problems and respecting constraints, and the second more open-mindedly, even playfully challenging these constraints and exploring further freedoms beyond them. The plywood furniture arose from both sides, from the splints and the sculptures.

Within design for disability, where teams still tend to come exclusively from clinical and engineering backgrounds, the dominant culture is one of solving problems. A richer balance between problem solving and more playful exploration could open up valuable new directions. The following chapters examine this and other tensions, each of which is currently biased in one direction, and each of which could benefit from a healthier balance.

fashion meets discretion

Graham Cutler, Tony Gross, Alain Mikli, Sam Hecht
Ross Lovegrove, Nic Roope, Aimee Mullins, Alexander McQueen
Hugh Herr, and Jacques Monestier
spectacles and eyewear, hearing aids and HearWear
pink plastic legs and carved wooden legs, split hooks and golden hands
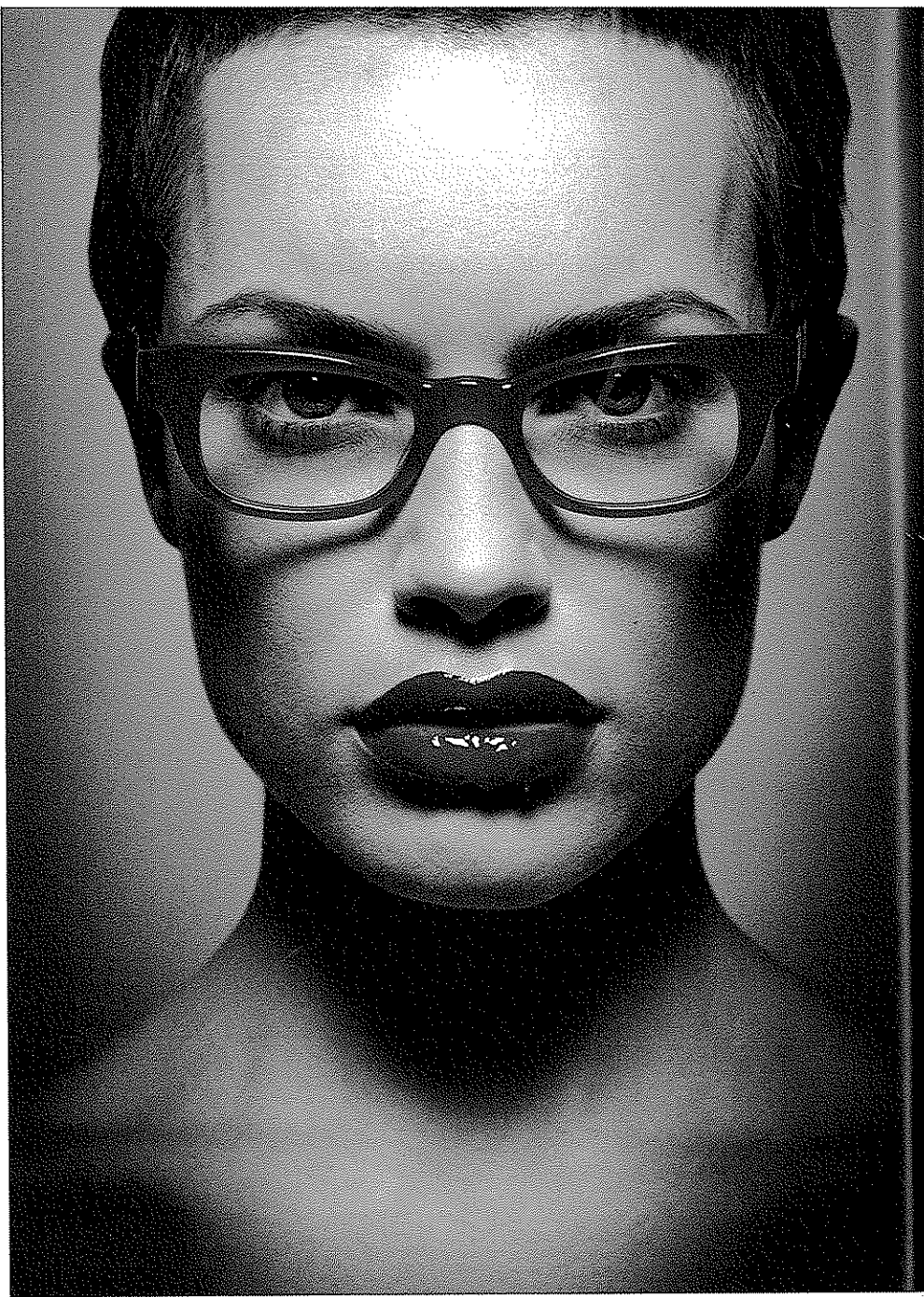
a memorable Cutler and Gross advertisement from the early 1990s

discretion

The priority for design for disability has traditionally been to enable, while attracting as little attention as possible. Medical-looking devices are molded from pink plastic in an attempt to camouflage them against the skin. The approach has been less about projecting a positive image than about trying not to project an image at all.

But is there a danger that this might send out a signal that disability is after all something to be ashamed of? If discretion were to be challenged as a priority, what would take its place? *Invisibility* is relatively easy to define, and may even be achieved through technical and clinical innovation alone, but it is more difficult to define a positive image purely from these perspectives.

fashion

Fashion, on the other hand, might be seen as being largely concerned with creating and projecting an image: making the wearer look good to others and feel better about themselves.

Eyewear is one market in which fashion and disability overlap. On the rare occasions that the words *design* and *disability* are mentioned in the same breath, glasses are often referred to as the exemplar of a product that addresses a disability, yet with little or no social stigma attached. This positive image for disability has been achieved without invisibility.

tension

Fashion and discretion are not opposites, of course; fashion can be understated, and discretion does not require invisibility. Nonetheless, there is a tension between these qualities because they cannot both be the absolute priority. There are also deep cultural tensions between the two design communities. Perhaps fashion with its apparent preoccupation with an idealized human form is seen as having little to say about diversity and disability. The extremes and sensationalism of cutting-edge

fashion can seem inappropriate in the context of disability, where discretion is seen as being so important. For some in the medical field, the very notion of being in fashion, of designs coming and going, is the antithesis of good design.

But learning from fashion might require embracing not only its design qualities but also more of its values. Fashion does not just arise from a particular set of skills but creates and requires a culture. The mechanism through which fashion design evolves, whether through haute couture or street fashion, creates extreme designs that can provoke negative as well as positive reactions in different audiences. It may not be possible to have one without the other, to have the results without the culture and the values.

This chapter will consider the way that spectacles have evolved from medical aids to fashion accessories, reflecting on how this might inform the design of other products. In the case of hearing aids, this chapter looks at a recent initiative to inspire design research; in the case of prostheses, it anticipates such engagement in the future.

glasses

Glasses or spectacles are frequently held up as an exemplar of design for disability. The very fact that mild visual impairment is not commonly considered to be a disability, is taken as a sign of the success of eyeglasses. But this has not always been the case: Joanne Lewis has charted their progress from medical product to fashion accessory.[1] In the 1930s in Britain, National Health Service spectacles were classified as *medical appliances*, and their wearers as *patients*. It was dictated that "medical products should not be styled."[2] At that time, glasses were considered to cause social humiliation, yet the health service maintained that its glasses should not be "styled" but only "adequate."[3] In the 1970s, the British Government acknowledged the importance of styling, but maintained a medical model for its own National Health Service spectacles in order

to limit the demand. In the meantime, a few manufacturers were offering fashionable glasses to consumers who could afford them. As recently as 1991, the design press declared that "eyeglasses have become stylish."[4]

These days, fashionable glasses are available in the shopping mall or on Main Street. It has been reported that up to 20 percent of some brands of glasses are purchased with clear nonprescription lenses, so for these consumers at least wearing glasses has become an aspiration rather than a humiliation.[5] So what lessons does this hold for design and disability? There are several, especially in relationship to the widely held belief that discretion is the ultimate priority in any design for disability.

First, glasses do not owe their acceptability to being invisible. Striking fashion frames are somehow less stigmatizing than the National Health Service's supposedly invisible pink plastic glasses prescribed to schoolgirls in the 1960s and 1970s. Attempting camouflage is not the best approach, and there is something undermining about invisibility that fails: a lack of self-confidence that can communicate an implied shame. It is significant that glasses continue to coexist with contact lenses, which do offer complete invisibility.

But neither is the opposite true: glasses' acceptability does not come directly from the degree of their visibility either. Brightly colored frames exist, although they are still a minority taste. This might serve as a caution to medical engineering projects that have adopted bright color schemes for medical products "to make a fashion statement" as the automatic progression from making a product flesh-colored. Most spectacle design, and design in general, exists in the middle ground between these two extremes. This requires a far more skilled and subtle approach—one that is less easy to articulate than these extremes. Designers often use the term *materiality* to describe the inherent aesthetic qualities of different materials. Materiality is hugely important to design in general and
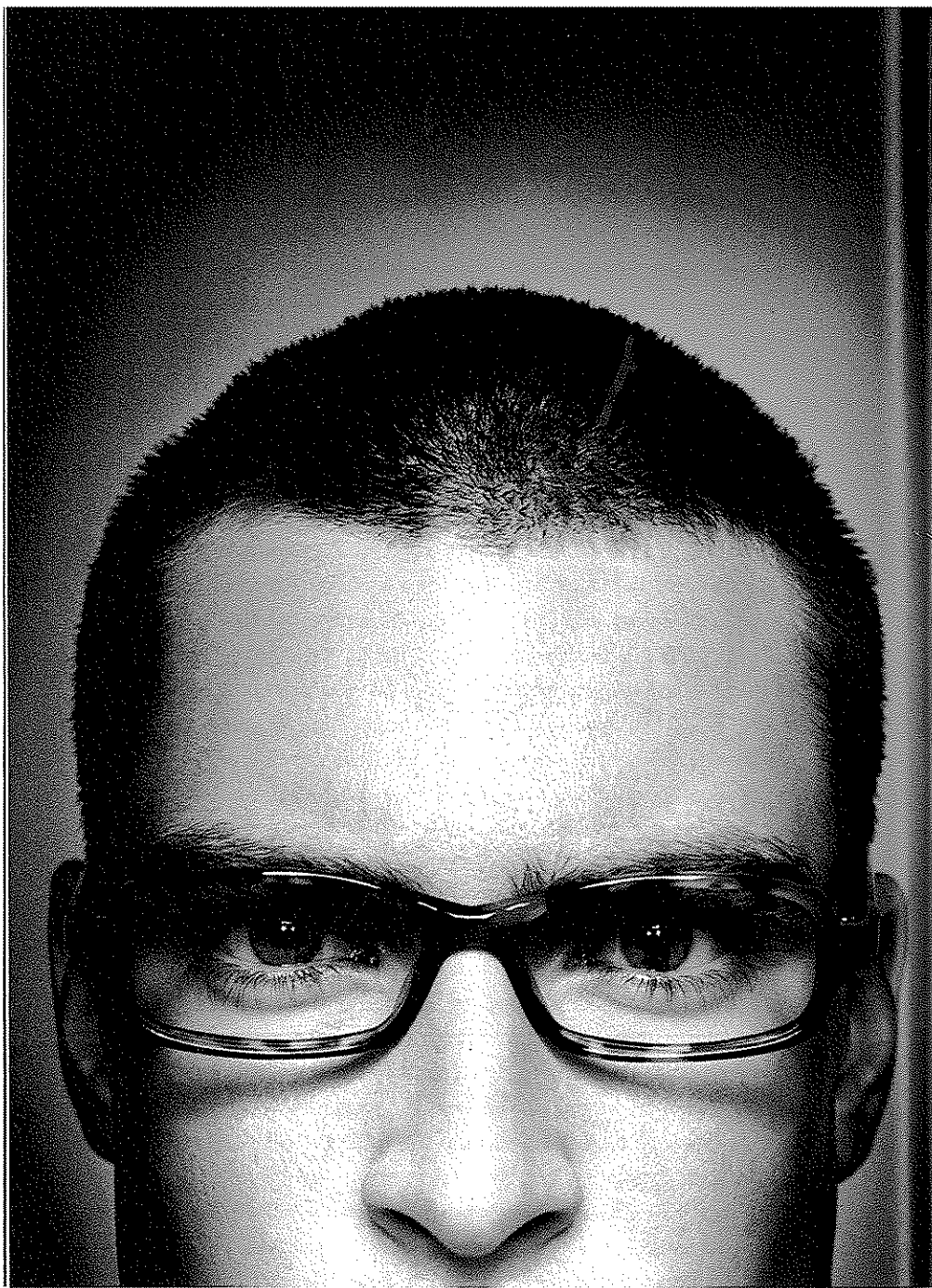
camouflage eyewear by Cutler and Gross

spectacle frames in particular, yet it is so frequently absent outside a design culture. Manufacturers such as Alain Mikli are perpetually exploring new combinations of laminations, translucency, color, and decorative texture.[6]

And the most elegant frames can be let down by a badly resolved hinge detail or the way a nose bridge meets the frame. Everything is on display and contributing to the whole. Everything must be visually resolved—an attention to detail that is demanding even for the best designers.
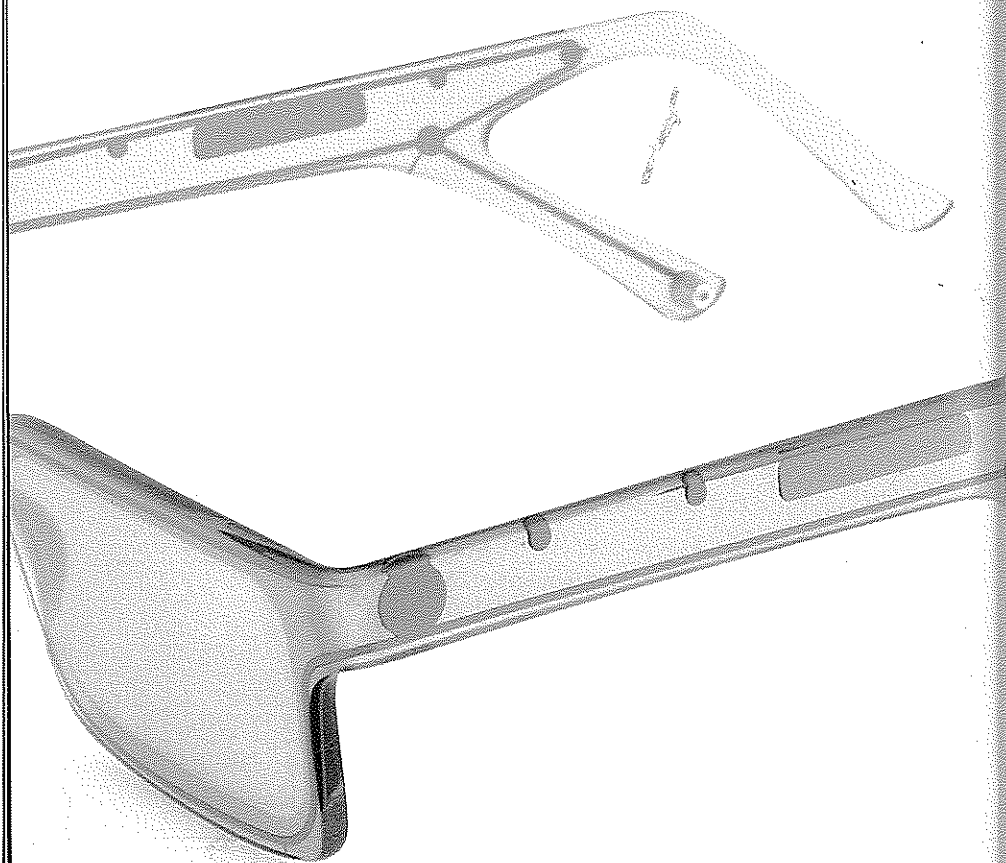
eyewear

Spectacles have become *eyewear*, and this term encapsulates a number of important perspectives—perspectives that are currently missing from much design for disability. You *wear* glasses rather than carry or just *use* them. Somehow, the term *user* becomes inappropriate. *Wearer* sets up a different relationship between the designer and the person being designed for.

Of course, glasses are designed not as products in isolation but in relation to the body, and the most personal part of the body at that. This makes glasses' acceptability all the more impressive and encouraging. They frame not only their own lenses but more important, our face, eyes, and glances. With this comes the risk of a design not suiting a particular individual, or that individual not liking the design, and so the need for variety and choice.

This acknowledges the shift in perspective from a *medical model* to a *social model* of prescription. In the past, spectacles were seen almost exclusively in terms of their vision correction. This broader perspective acknowledges the significance of the perceptions of those around you: "What others see is more important than what you see yourself," as design writer Per Mollerup said of glasses.[7]

Eyewear positions glasses more as items of clothing than as products. A different approach, different references, and different designers spring to mind when thinking about glasses

in this way. Alongside specialist spectacle manufacturers, many fashion labels design and market eyewear collections. *Collections, labels,* and *brands:* these words set up different expectations and engagement from consumers. And *consumers* is a long way from *patients* or even *users.*

Fashion and trends become relevant. Materials and color play off clothing, accessories, and cosmetics; shapes work off hairstyles, not just bone structure. Wearers look forward to purchasing a new pair of glasses for the opportunity to try something different and reinvent themselves a little, as they might look forward to a change of haircut, or buying a new outfit or wardrobe of clothes.

Design becomes freighted with cultural references. Do these frames look rather 1970s? Are these flirting with bad taste? Designs can date and come back into fashion. Fashion moves forward through its avant-garde, be that couture or street culture. So embracing fashion necessitates going too far at times.

Eyewear designers Graham Cutler and Tony Gross have spent thirty years on the front lines of the revolution that turned eyewear "from medical necessity into key fashion accessory."[8] It is interesting to note how recent this revolution was, given how much it is now taken for granted. But Cutler and Gross describe themselves as the enfants terribles of optometry, and their role even now is to constantly test the limits of taste and style. Many of their frames refer back to vintage designs, and even play with past negative perceptions of glasses as nerdy and unfashionable. Nevertheless, Cutler and Gross glasses are always individual and glamorous, without being ostentatious (having no visible label), and their customer base transcends age and occupation.

This in itself is contentious. Many groups involved in design for disability subscribe to a culture of problem solving, evident in their methodology and work, and may even see fashion as the antithesis of good design. The thought of changing a hearing aid or prosthesis just because it had gone out

Surround Sound Eyewear designed by Industrial Facility for RNID
HearWear project
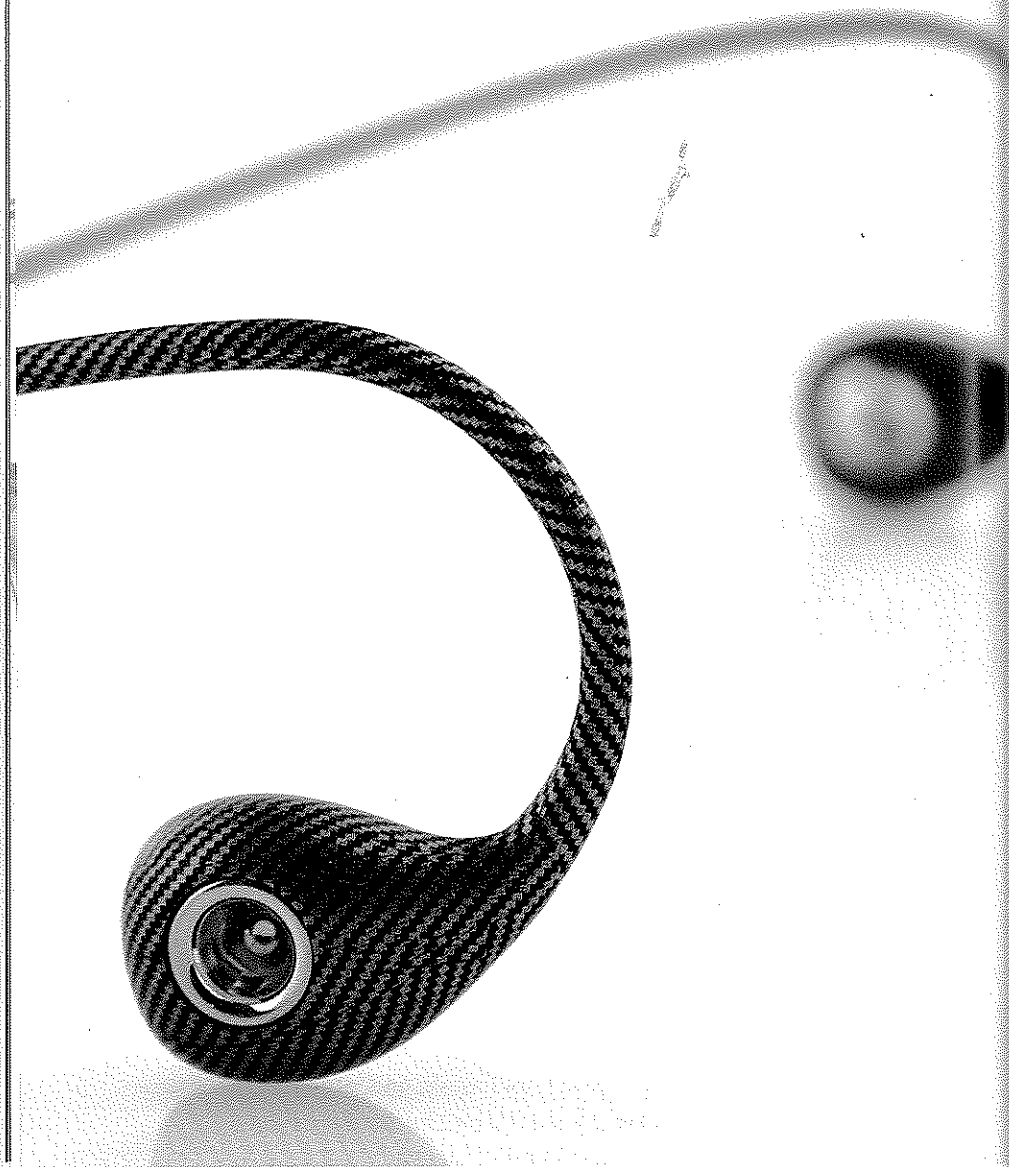
The Beauty of Inner Space designed by Ross Lovegrove for RNID
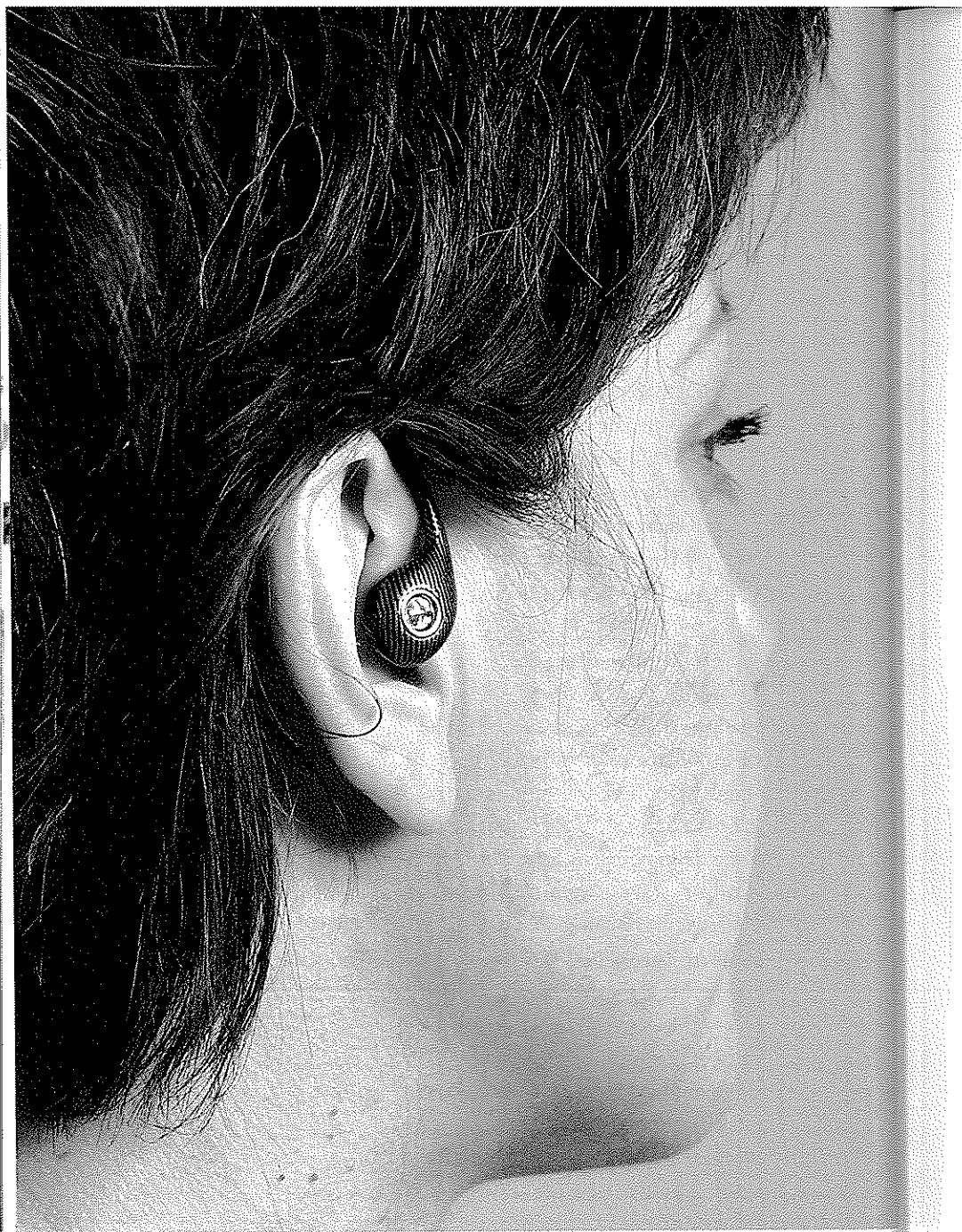
HearWear project

of fashion or its wearer fancies a change may be anathema to them. Certainly, fashion designers are rarely part of teams even developing wearable medical products, which is incredible considering the specialist skills they could bring as well as their experience and sensibilities. But if we are serious about emulating the success of spectacle design in other areas, we need to involve fashion designers, inviting them to bring fashion culture with them.

hearing aids

Compare glasses with hearing aids, devices developed within a more traditional culture of design for disability where discretion is still very much seen as the priority. Discretion is achieved through concealment, through a constant technological miniaturization. The evolution of the hearing aid is a succession of invisible devices: objects hidden under the clothing, in the pocket, behind the ear, in the ear, or within the ear. As the hearing aid has grown ever smaller, it has occasionally broken cover only to migrate from one hiding place to another. What has remained the same is the priority of concealment.

Such miniaturization has involved amazing technological development, but it is not without a price. Brian Grover, a technology expert at RNID, says that hearing aids' performance is still compromised by their small size and that they could deliver better quality sound if they weren't so constrained. This is how fundamental the priority of discretion can be. Yet for many hearing-impaired people, their inability to hear clearly is far more socially isolating than the presence of their hearing aid.

Where total invisibility is impossible, the last resort has been to mold hearing aids in pink plastic, betraying a white, Western bias in itself. Somehow this is the epitome of the medical model, perhaps echoed in the very term hearing aid. While this can set up an interesting countercultural appeal,

The Beauty of Inner Space designed by Ross Lovegrove for RNID
HearWear project

apart from the singer Morrissey, few people have been known to wear a hearing aid for show when they do not need one.

Recently, hearing technology manufacturers have discovered an alternative model. Many are turning to wireless cell phone earpieces as an example of positive imagery for technology worn in the ear from mainstream consumer product design. This is a welcome broadening of approach, but the mistake is to overlook the strong cultural associations of these devices—associations not easily perceived from within research and development departments: the trend for futuristic wireless earpieces in silver plastic with blue LEDs is aimed squarely at a technological early adopter, a market eager to emphasize its technical sophistication. These overtly technical products send out strong cultural signals that not everyone would be comfortable with, while largely ignoring the sensibilities involved in spectacle design.

HearWear

If anything, you might expect hearing aids to be less challenging than glasses: they don't obscure the face; there are strong traditions of ear adornment and jewelry in most cultures; and we all reach for earphones and headphones from time to time. But somehow, rather than adopting a diversity of design approaches, the hearing technology industry has remained conservative, perhaps because it is preoccupied with its perpetual technological development.

That is why RNID and Blueprint, the architecture and design magazine, launched HearWear, setting leading designers the brief to consider hearing aids and hearing technology from a fresh perspective. As Henrietta Thompson, deputy editor of Blueprint put it, "Over the decades there has been an amazing amount of technical development of hearing aids, but in that time little or no design investment has occurred."[9]

Hence the name HearWear, to emphasize a move away from considering hearing aids as technology. We had discussed

whether *earwear* was more appropriate, being the direct analogy of eyewear, but opted for *hearwear* to open up the possibility of ideas that weren't just worn in the ear itself. One example is an experimental hearing aid developed in the United States that comprises an array of microphones on a necklace, providing high-quality, directional sound.

Sam Hecht of Industrial Facility is an industrial designer who has practiced in Tokyo, San Francisco, and London, and these influences combine in his typically strong yet quiet designs. Hecht makes the most direct connection with the design of eyewear by incorporating hearing technology into the arms of a pair of spectacles, with the arms branching to support integral earpieces. But he goes one step further than conventional hearing aid configurations, proposing an array of microphones, not just one on each side, thereby supporting superdirectional hearing when the signals from each are processed together. What it means to design a hearing aid changes if normal human ability is being surpassed, not just restored, and the design plays an additional role in expressing these augmented capabilities.

Product and furniture designer Ross Lovegrove brought his subtle, organic forms to a new visual language for wearable noise-canceling technology, in his response *The Beauty of Inner Space*. His design mixes biological forms appropriate for a prosthesis with the overt technology of carbon composite and the ambiguity of gold—at once a high-tech and traditional material with associations with both hi-fi and earrings. Like jewelry, the design seeks to complement the body rather than attempt to be camouflaged against it. Notice that the earphones are recessed to present an ear apparently open to sounds from the outside world, whereas a more convex form might have signaled that the wearer is listening to something else. The sparing use of gold at the earpieces accentuates their sensitivity.

WearHead*Phone designed by Hulger for RNID HearWear project

Nic Roope of Hulger is known for the playful P*Phone, full-size retro telephone handsets that can be plugged into cell phones or computers for voice-over Internet protocol. The *WearHead*Phone* is an enormous set of headphones with a military camouflage paint job. Whatever the technical justification for their size, they also represent a supreme gesture of self-confidence—the antithesis of current hearing aids. The camouflage is a reference to street culture, but could also serve as an ironic commentary on the attempted camouflage of pink plastic hearing aids that are conspicuous but pretend to be invisible.

Of all the product designers who submitted concepts, seventeen in all, Hulger engaged with the brief in a way we would have seen more of had fashion designers also been invited. Fashion designers would probably have gone further still. Even after HearWear, there is still value in provoking yet more extreme approaches, just as eyewear is constantly pushing its own boundaries.

What the project demonstrated so successfully was that wherever an orthodox approach seems self-evident, there are always radical new perspectives that can challenge this. Designers are particularly skilled at breaking new ground in this way, but also at cross-fertilizing different fields. So ironically, medical engineering might particularly benefit from the involvement of designers who are not experts in medical products but bring fresh approaches from other consumer markets. And in turn, these designers would be afforded fresh perspectives to enrich and inspire subsequent work in their own areas.

bodywear

In many ways a more challenging area of design for disability is prosthetic limbs. Glasses are worn over the eyes, but they are not replacements for the eyes themselves. Similarly, hearing aids augment the ears. But prosthetic limbs are extensions of the body, not distinct products to be picked up and put down, and as such their design is more sensitive. In some ways it is the body itself that is being redesigned.

Given a challenge of this sensitivity, it is surprising to find that a role for any designer other than design engineers is not even widely acknowledged within prosthetics. A recent contract issued by the U.S. Defense Advanced Research Projects Agency to develop a prosthetic arm made no mention of anything needing to be *designed*, other than a human form and capabilities being achieved. Correspondingly, the call for proposals demanded an impressive multidisciplinary team of engineers, technologists, and clinicians, but made no mention of industrial designers or interaction designers, let alone sculptors.

legwear

A striking and memorable image of a different attitude to prosthetics is that of the athlete, model, and actress Aimee Mullins, seen here wearing her carbon fiber running legs, tracksuit bottoms, and nothing else. It is taken from the cover of the fashion magazine *Dazed & Confused*, an edition guest edited by fashion designer Alexander McQueen around a theme of fashion and disability, titled "Fashion-able?"[10] I have always liked this photograph for walking what I saw as a fine line between self-confidence and sensationalism. But in conversation, Mullins explains that it was not premeditated, and arose naturally out of a collaboration between McQueen, herself, and the photographer Nick Knight. "Our intention was to explore a body with a serious intent and create a beautiful image."[11] The pose and the clothing were aesthetic considerations.

Mullins could be said to have become an icon of the capable and glamorous disabled person, yet she is clear herself that the best thing she can do for people with disabilities is not to be thought of as a person with a disability. Returning to visual impairment, she admires Ray Charles as a musician,

Aimee Mullins photographed by Nick Knight for the cover of *Dazed & Confused*, guest edited by Alexander McQueen

not for having been a blind man. Likewise, Mullins does not like being looked at as a *disabled* athlete, and has resisted what she refers to as a NutraSweet emphasis on achievement in the face of adversity.

The unashamed artificiality of Mullins's prostheses is still controversial (perhaps even more so when worn by a woman? But gender-related issues, among other significant political and economic concerns, are not the focus of this book). Their abstract elegance challenges the duality that has existed for so long between aesthetics and functionality. Conventional wisdom is that prostheses should either be made for *appearance*, so-called *cosmetic* limbs that are an accurate copy of the human body, with optimized functionality within this constraint, or for optimized *functionality* above all other considerations, as are tools. But Mullins's legs show this to be too simplistic. Her legs have a beauty of their own, not just as objects, but also in relation to her body and posture. Many attributes of even a functional prosthesis affect the image its wearer will project—implications that may not even be treated as conscious design decisions. But they could be, and designers could play a valuable role.

She thinks that fashion designers and jewelry designers should be involved in design for disability as a matter of course. "Discreet?" she sniggers. "I want off-the-chart glamorous!"[12] For her, modern luxury is less about a desire for perfection as a desire for options. Her wardrobe is made up not only of different clothes that can make her feel a different way but also different legs: there are her carbon fiber running legs, various silicone cosmetic prostheses, and a pair of intricately hand-carved wooden legs. "I'm thinking about what I'm going to wear them with: jeans and motorcycle boots, or my Azzedine Alaïa dress if I want to feel amazing."[13] Her legs too can make her feel amazing in different ways: a pair of silicone legs that are several inches longer than her own legs would be, make her (even) taller and more elegant on the catwalk,

Aimee Mullins's carved wooden legs

while her eerie glass legs have an element of magical realism. This very choice becomes part of her individual identity and also a collective experience, shared with her friends: "Which ones are you wearing today, Aimee?" From the perspective of the health insurance companies, Mullins says that "every single pair of my legs are considered *unnecessary*." But an element of fantasy among the practicalities of everyday life is important to her. Even, as she wryly puts it, to express *a certain shallowness*.[14]

Someone with quite different attitudes to his prostheses, Hugh Herr, shared a platform with Mullins at the h2.0 symposium, subtitled "new minds, new bodies, new identities," that sought to blur the distinction between "able-bodied" and "disabled."[15] Herr heads the biomechanics group at the MIT Media Lab, where this event took place in May 2007. He lost both of his legs in a climbing accident when he was seventeen years old. As he came to terms with his disability, his prostheses became an important part of his self-image. But he still thought of himself as a climber, not an amputee. He fashioned himself climbing prostheses that gave him a foothold where others couldn't even gain a fingerhold, and telescopic legs that could be extended during a climb to be any length, shorter or longer than his original legs—even each leg a different length. Then he witnessed the reaction of his fellow climbers turn from pity to calls for him to be disqualified from competitive free-climbing for having an unfair advantage.

In those early days he was quite prepared to draw attention to his new legs, decorating them with polka dots in order to shock people. These days he's more restrained in both his dress and the aesthetics of his prostheses, but just as passionate about his team's work. If one individual's own attitudes have evolved over time, how much more does prosthetics need to embrace and accommodate a diversity of attitudes? Populations of people with disabilities can be every bit as diverse as society in general.
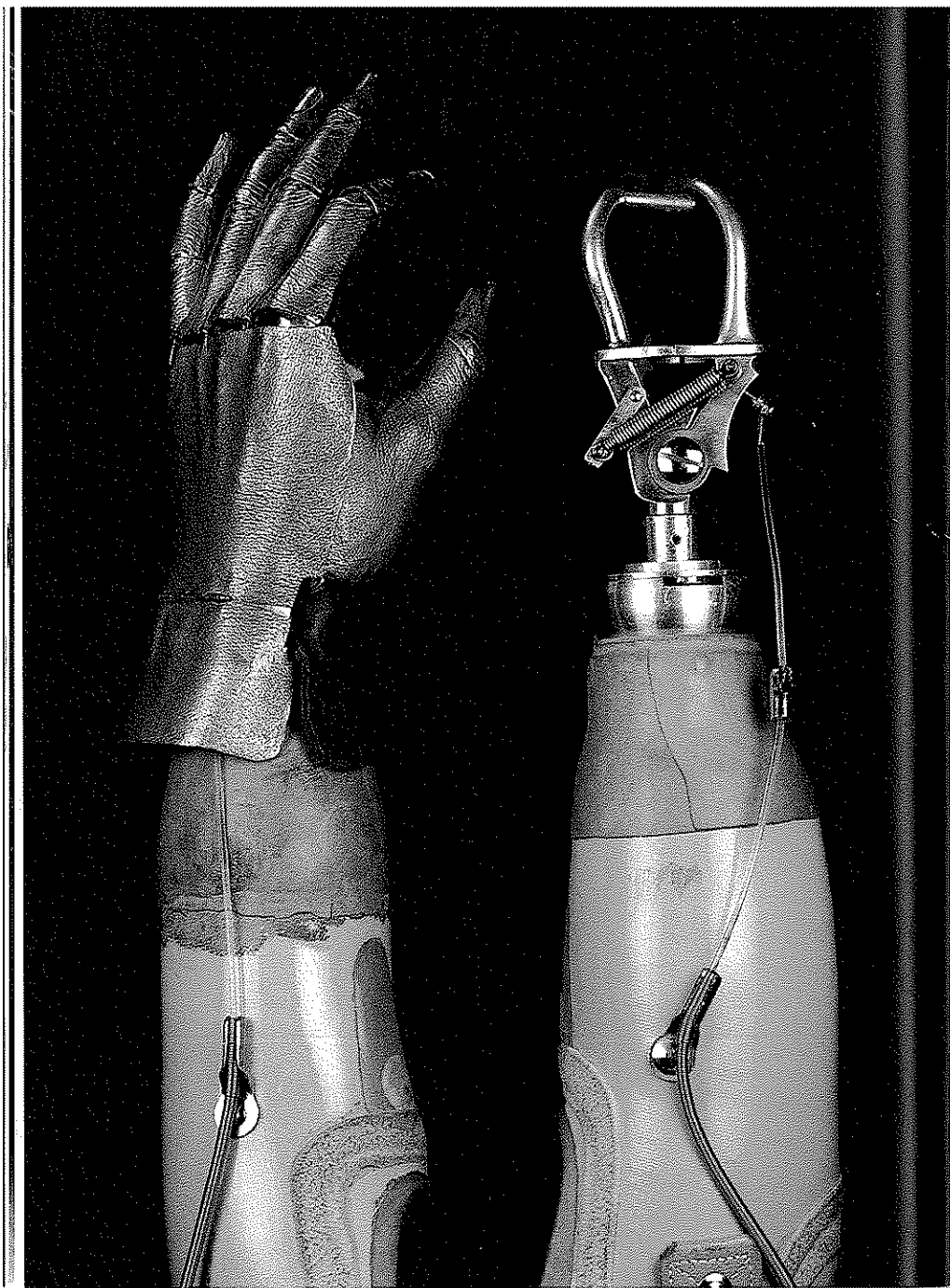
golden prosthetic hand by Jacques Monestier alongside a conventional
split hook

Herr agrees that art school–trained designers could play a valuable role as prosthetics moves forward, especially into exciting new territory in which human abilities are not just restored but surpassed. And when prostheses become not just replacement human limbs, then their design will help determine and communicate just what they are instead.

armwear

Prosthetic hands are even more intimate than prosthetic legs, yet again it seems that there are only two common approaches: those of *realism* and *functionalism*. The realistic approach is defined as a visual imitation of a human arm, and so the materials are chosen for their ability to be formed to visually represent human skin: PVC plastic and silicone in shades of pink and brown with molded wrinkles, nails, and sometimes even veins. But the static visual appearance is only one aspect of the aesthetics of any object. Some amputees have spoken of not liking the *feel* of their hand. They, like anyone, unconsciously cradle one hand in the other, yet the materials chosen for their visual resemblance to skin are rubbery and clammy to the touch, and can feel dirty somehow. Some amputees even complain that their prosthesis *smells* unpleasant.

The opposite, functional approach prioritizes how well a prosthesis works over how it looks, and has resulted in split hooks. These may work well as tools, but any hand is more than a tool—it becomes part of the wearer's body image, a visual as well as a functional termination of their arm. Yet the design of split hooks barely acknowledges the wearer's body or their clothing.

Sculptor and creator of automata Jacques Monestier has created a prosthetic hand that represents a provocative alternative to both hands and hooks; it is a design that simultaneously acknowledges its role yet also its artificiality. The back of his golden hand is cast in the likeness of a human hand, but from an alloy; the palm is upholstered in soft, luxuriant

golden prosthetic hand by Jacques Monestier

leather. As Monestier explains, "Amputees often suffer a loss of self-image. I wanted to transmute what might be considered a disfigurement into something marvelous and exotic. I wanted to create a hand that would no longer cause shame and repulsion. I wanted the amputees themselves to be proud to have a prosthetic hand and pleased to look at it. And for the people around them, I wanted the prosthetic hand to be an object of healthy curiosity, a work of art."[16]

Monestier worked with leading prosthetist Jean-Eric Lescoeur, but was also inspired by a sixteenth-century painting of a surgeon fixing an artificial hand to an injured soldier: "It was an armored gauntlet, like a golden hand. A beautiful, vibrant, quasi-mythical object—nothing like those dead, pink, plastic hands which pretend to imitate human flesh. This was the hand I wanted to create, with the added refinements of modern materials and technology."[17]

New possibilities need not be seen as a rejection of existing devices, which so many users are happy with: some prefer their prosthesis to be an overt tool; others feel most comfortable wearing no prosthesis at all; and others still do want the discretion of a cosmetic hand above all things. But some amputees are not so comfortable at present. I have talked with an amputee who didn't like wearing her prosthesis because it would initially "fool" new acquaintances, for them only to realize later it was artificial, and she dreaded reading their moment of realization. Monestier's hand gets this moment out of the way right at the start.

It seems important to continually challenge existing approaches, just as this is the way in which every other area of design, art, and science progresses. All too often attitudes are spoken of as if homogeneous. "Amputees want discretion." Well, not everyone. Not always.

embracing fashion

The evolution of glasses from medical appliance to fashion accessory challenges the notion that discretion is always the best policy. Hearing aids, prostheses, and many other products could be inspired by this example. More confident and accomplished design could support more positive images of disability.

Eyewear has come about by adopting not just the language of fashion but also its culture. If medical design wishes to emulate this success in other areas, it needs to appreciate that fashion often moves forward through extreme and even controversial work, and to welcome this influence within design for disability. We have to do more to attract fashion designers to collaborate on designs for people with a disability, and bring their perspectives to both the practice and culture of inclusive design. At times this will expose cultural differences, but these are healthy tensions, well worth embracing and harnessing.

exploring meets solving

Marcel Breuer, Shin Azumi, Tomoko Azumi, Jasper Morrison
David Constantine, Shelley Fox, Li Edelkoort, and Bodo Sperlein
Bath chairs and Gouty chairs, chairs and wheelchairs inspired by bicycles
chairs from Milan, chairs from Japan and wheelchairs from Cambodia
Blind design and braille for the sighted

keeping the design in design for disability

If there is a welcome change in our approach to disability, from a medical to a social model, it follows that the role of design needs to change too, and therefore the nature of design teams must change as well. Design processes need to become more inclusive in several ways, involving not only disabled people themselves but also a greater diversity of designers.[15] If we aspire to the qualities and quality of mainstream design, this will require the sensibilities as well as the skills of those who create mainstream design. Art school design disciplines are as essential to the mix as engineering and human factors.

Mediocrity must be avoided. In design for special needs, mediocrity can result in people being further stigmatized by the very products that are intended to remove barriers for them, thereby undermining the highest goal of social inclusion. In inclusive design, any inclusive but otherwise mediocre design might only prove attractive to users who are currently excluded. If so, it would become design for special needs by default.

If design for disability positions itself as something quite distinct, even somehow in opposition to mainstream design, it will inevitably be less influential. An implicit message that designers have no part to play in design for disability will become a self-fulfilling prophesy. If design for disability seeks to marginalize design in general, it will marginalize itself instead. If many designers are not engaging with disability, seeing only an encroaching legal obligation that will stifle their creativity, the way to change these attitudes is by more collaboration, not less.

It is important that we keep the *design* in design for disability. This might prove as challenging within design for disability as disability can be within a wider design community, but it is a challenge that both cultures need to rise to.

simple meets universal

Jonathan Ive, Steve Tyler, Bruce Sterling, Christopher Frayling
James Leckey, Steve Jobs, Roger Orpwood, and Naoto Fukasawa
Apple iPod and Apple iPhone, gizmos and spimes
the flying submarine and the Woosh chair, simple radio and Muji CD player

Apple iPod shuffle

universal

Design for disability is often under pressure to be universal. On the one hand, when designing for special needs affecting small percentages of the population, there is a strong business argument not to further fragment the potential market. The next chapter, identity meets ability, will challenge whether it is appropriate for a single design to accommodate everyone with a particular disability.

Within inclusive design, on the other hand, the contention may be one of principle. Also known as *universal design*, inclusive design has been defined as *design for the whole population*.[1] This definition mixes two issues: the first is that different people have different abilities, and so may be excluded if a design is not accessible to them; and the second issue is that different people have different needs and desires *irrespective of their abilities*, and so may just want different things from any product or service.

The first issue is often addressed by multimodal interfaces with a redundancy of visual, audible, and tactile cues to accommodate people with impaired touch, hearing, and/or sight; the second is frequently handled by multifunctional platforms containing many features in an attempt to accommodate as broad a range of uses as possible. Surely the more a product does, for more people, the more inclusive it can be said to be. But does this type of universal design then risk becoming a complicated design? And how inclusive is it then?

simple

As individuals rather than populations, we may take a different perspective. In an increasingly complex world, we value simplicity in many forms: functional, visual, and interactive. *Fitness for purpose* not only implies that something does what it needs to well but also that it is not compromised by doing more than it has to; a design pared down to the minimum can be quiet, yet iconic; and the simplest of interactions can

be refreshingly direct and immediate. We perceive and appreciate the thoughtfulness that lies behind an elegant design.

tension

Both qualities sound admirable, but once again there is a tension between them that needs to be confronted. Despite a proliferation of technology and consumption that is so worrying in other ways, many people remain excluded and disabled by design that does not acknowledge their abilities. And being seen to be user centered can also imply incorporating the needs and desires aired at early focus groups—a pressure reinforced by consumer markets that compete on the basis of so-called features.

So should comprehensive functionality take precedence over simplicity? Or should we disentangle the two aspects of universality, separating the effects of disability from the wish to design anything to be *all things to all people*? What might the effect on inclusion be if we placed more emphasis on simplicity?

This chapter starts with a familiar example of a simple yet popular design, and then hears several different voices discussing the balance. It ends with an extreme trade-off between simplicity and universality—one that could inspire alternative aspirations for inclusive design in the future.

icon of simplicity

Apple's iPod is as good a candidate as any for a product that epitomizes good design, as understood by both the design profession and the public. It has earned the most prestigious international design awards, the ultimate peer recognition for designers: iF, IDSA, D&AD, Red Dot, and more. But unlike many award-winning designs, it has also been a huge market success, with the announcement in April 2007 that the total iPod sales worldwide had reached one hundred million units since the first one was sold in November 2001.[2]

Apple iPod

The iPod's physical design is iconic. Its minimal geometric form has been pared down to straight edges and radiused corners, complemented by a subtle choice of materials and finishes. On the fourth- and fifth-generation models, the plain front moldings were back sprayed in a carefully tinted white, seamlessly set into a stainless steel back etched with a logo and the words "Designed by Apple in California."

This attention to detail continues into the interaction design. Over successive generations of the classic iPod, the controls were distilled into a single circle, cleverly combining discrete commands and navigation. Pressing down at the cardinal points (the north, south, east, and west of the dial, as it were) triggers playing and pausing, skipping to the next or previous track, while scrolling around the wheel navigates through menus and other controls, with a button at the center to make selections. The track wheel feels beautifully direct and responsive, although not since the mechanical scroll wheel on the first-generation iPod has it actually rotated. Yet its tactility is reinforced by discreet audible clicks that you can imagine you are feeling through your fingertips. Overall, the industrial design and interaction design are beautifully integrated, conceived with respect to each other, in contrast to so many other products in which the physical design and the interface have obviously been created by different design teams.

How can it be that despite its ubiquity and many imitators, the iPod still appears so refreshingly simple? Jonathan Ive's design team at Apple is notorious for its relentless pursuit of every last detail, and the time and effort needed for even a good team to do justice to a design should not be underestimated. The iPod falls victim to its own success, being so obvious in hindsight, belying the effort that was required to achieve it. Many iterations of the design were needed to achieve this apparent lightness of touch, another manifestation of the quotation, "If I had had more time, I would have written a shorter letter."[3] Simple things are not necessarily easier to design.

Simplicity is not a style that has been applied to the final product. Behind the outward design, the whole concept is simple, right down to the original tagline, "1,000 songs in your pocket."[4] The physical design is then as much as anything an outward manifestation of this inner simplicity.

All design is subject to constraints. Constraints arise both from what the design is required to do (including user needs or desires) and how this might be achieved (usually technical feasibility or business viability). But part of the design process may be to deliberately further constrain the design brief—either narrowing its scope or limiting the complexity of the response. The Apple design team places a high value on the restraint of a specification, not just its comprehensiveness. In a rare interview with the *New York Times*, Ive said, "It was about being very focused and not trying to do too much with the device—which would have been its complication and, therefore, its demise. . . . The key was getting rid of stuff."[5]

appliances and platforms

The iPod is an example of what designers and others sometimes call an *appliance*: a product dedicated to a limited function, but to performing this really well. This is in contrast to *platforms*, which are conceived as multipurpose products, epitomized by personal digital assistants (PDAs) and palmtop personal computers that run a diversity of applications, from business spreadsheets to entertainment media players. An analogy is sometimes made to cutlery versus a Swiss Army knife: the latter is useful if your priority is to carry a single object to do many things, but few of us choose to eat with one in the privacy of our own homes. This is a discussion that is contentious and even subject to fashion; the iPod has definitely provided an icon for the appliance, whereas many cell phones are expanding into the territory of multifunction platforms. Indeed, Apple's own iPhone is advertised as a combination of three products: a cell phone, a media player (music and video

Apple iPhone

player), and an Internet device. It will be interesting to see how these trends evolve.

Whichever dominates, appliances and platforms continue to coexist because people have different tastes. Peter Bosher is a technology consultant specializing in speech and audio production, and Steve Tyler is a head of technical product development. Both are blind, but they have different aspirations for accessible products. They both use a Braille-Lite, a dedicated special needs product that lets them type and read electronic braille. Bosher would like an integrated platform that unites his Braille-Lite, PDA, and cell phone so that he would have less objects to carry around with him (although in this context, the multitouch display that gives the iPhone its flexibility is unlikely to be appropriate, since it relies on the user seeing each new manifestation of its visual interface). In contrast, Tyler would just like a simple but accessible cell phone, as elegant and attractive as any other, because he would feel more self-confident using this in public rather than a more conspicuous and overtly technical product. This is clearly not about technophilia versus technophobia, because both Bosher and Tyler are highly technically adept. It is more about personal tastes.

Neither is this about low-tech versus high-tech. Bruce Sterling, the science fiction author and writer on technology, design, and society, has identified a progression from *products*, mass-manufactured objects that broadly correspond to the appliances described above, to platforms, which Sterling calls *gizmos* and describes as "highly unstable, user-alterable, baroquely multi-featured objects, commonly programmable, with a brief lifespan."[6] He is more interested in the technosocial than the technological, and examines the demands this has placed on the people who use these objects. *Consumers* of products have been forced to become the *end users* of gizmos, spending their time as well as money on the "extensive, sustained interaction" of upgrades, plug-ins, and unsolicited messages.[7]
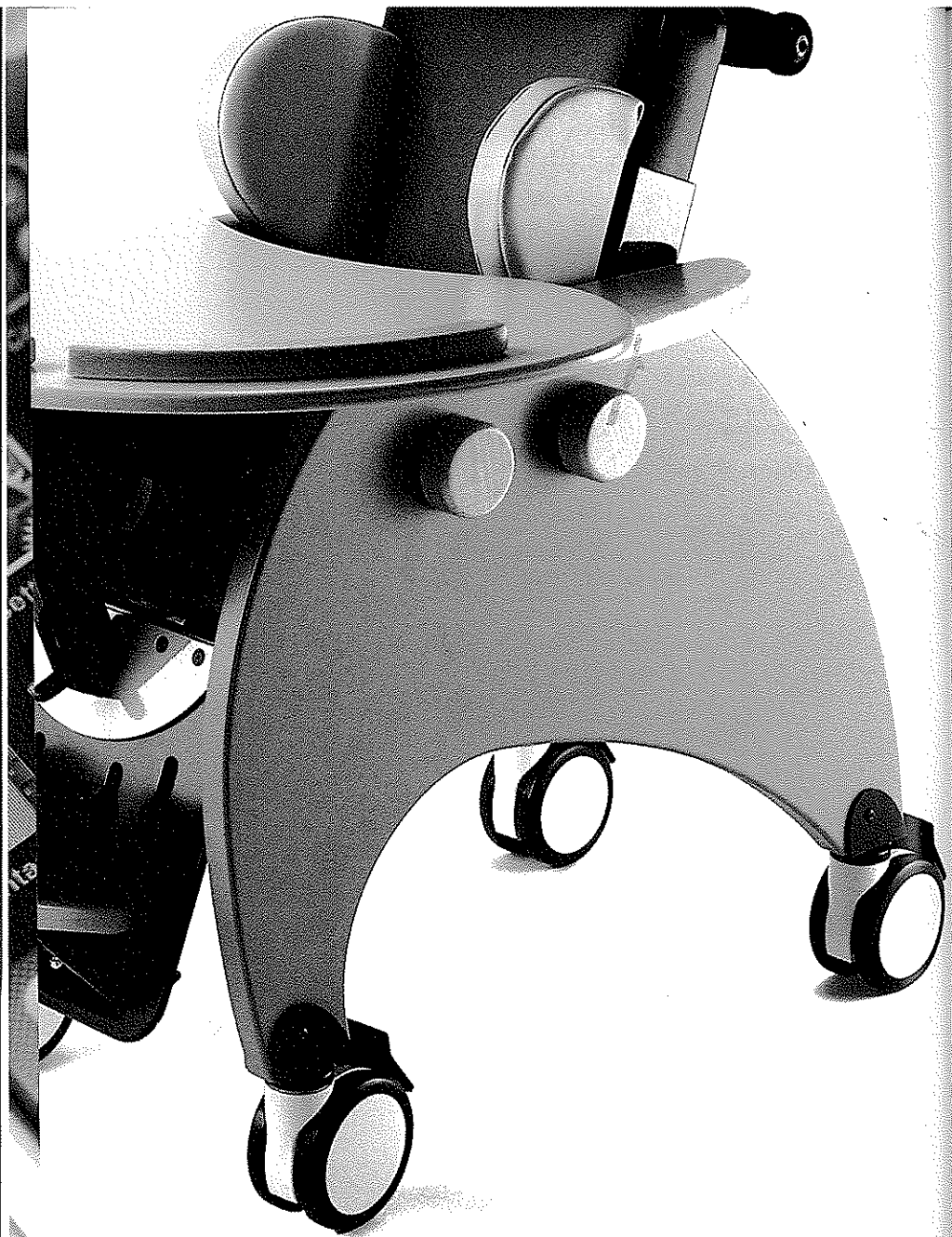
Leckey Woosh chair

Sterling anticipates the advent of what he names *spimes*, in many ways more functionally advanced than any current platform, but in many other ways more appliance-like in their focus. Spimes, he says, will be manufactured objects with a narrow primary role, yet integrated with a world of information, recording data about their entire life span, archived in case of as-yet-unforeseen ecological benefits.[8] Objects as inert and straightforward as wine bottles could all be spimes in the future, becoming physical links to the information about their own ecological footprint and that of the wine they contain.

Design has always enjoyed a provocative relationship with technology. The ethos of the postwar Royal College of Art in London, inspired by the Bauhaus, has been summarized as "attuned to new technologies, self-confident, anarchic."[9] But it is technology as a means to an end, not an end in itself. Christopher Frayling, rector of the Royal College of Art, says that one big issue with design students is that technical constraints and technical possibilities can all too often be allowed to dominate. We should be as skeptical about doing things just because they are possible as we are ambitious about achieving difficult but desirable ends. It is time to stop letting the technology "push us around," observes Frayling. "Let's bring the users in and let's bring delight back into everyday products, because it seems to have gone."[10]

the flying submarine

The preoccupations of inclusive design can mean that products with disability in mind have a greater tendency to be conceived as platforms. The principle of universal design or design for the whole population can lead to designs that are not just accessible to everyone but that also seek to accommodate everybody's needs. But this pressure also exists in design for special needs too.

James Leckey manufactures furniture for children with cerebral palsy—furniture that has won international design

awards. Leckey's product range has to meet the needs of children of different ages, different sizes, and with a diversity of clinical conditions. It also needs to cater to different uses and contexts, to support children at school, in their homes, and elsewhere. As a result, there is enormous pressure to produce adjustable, versatile, universal solutions that accommodate the largest number of children and from a manufacturing perspective benefit from an economy of scale.

Yet Leckey has moved away from aspiring to universal solutions. Too much adjustability and modularity can result in a design that is visually complex, and that can be intimidating to the children and their friends. If one of the goals of this furniture is to enable disabled children to attend mainstream schools, then this goal is undermined if the equipment itself stigmatizes the kids among their new peers and prevents social integration. How the furniture looks and feels can be almost as important as what it does.

Leckey recognizes that these conflicting demands may be inherent in the product specification itself, and cannot always be reconciled in the design. He uses the expression *flying submarine* to represent a product overburdened with features and doomed to mediocrity in each. A machine that travels on land, water, and air sounds attractive, but we continue to prefer the inconvenience of transferring between less versatile vehicles.

In order to resist this pressure for a single product that suits everyone, everywhere, James Leckey Design has changed its entire means of production, creating instead the flexibility to build a wider range of relatively focused products. Patterns are held in computer-aided design databases, parts are individually laser-cut, and each chair is assembled to order. Within this process, making many different designs to suit different children can be almost as economical as trying to fit the children into a single design.

Leckey's in-house design team, working with Alan Marks and David Edgerley at consultants Triplicate Isis, has consistently recognized the importance of design in every aspect of the company's manufacture, service, and brand. These are common sensibilities within consumer markets, but less so within design for disability. James Leckey has been featured on the cover of *Design* magazine, which wrote that he and his company "look at cosmetic aspects; not for the sake of it, but primarily to focus on the needs of the user."[11] Simplicity in concept and simplicity of form are there for the children themselves.

simpler still

Returning to Apple, the iPod shuffle represents a further distillation of Apple's principles. When the possibility of a much smaller music player arose, rather than opt for a smaller display and a compromised version of the iPod interface, Apple courageously dispensed with a display altogether. With it, Apple relinquished the functionality that might depend on one, so the iPod shuffle does not allow the user to select individual tracks or even view the names of the tracks. It pares down the iPod interface to a product that gives the user just two choices: either playing the tracks in the order they were downloaded, or shuffling them into a random order.

The iPod shuffle challenges the notion that products always get more complex as they evolve because more and more features are added, either because this becomes technically possible or else someone asks for them. This is the antithesis of focus group–led product development that so often seems to result in ballooning functionality. After all, if people are asked whether they might like a feature, why shouldn't they say "yes"? Early on in the design process, the designers are the ones who usually have a feeling for what might be lost by incorporating more and more, and what might be gained

Apple iPod and iPod shuffle

by keeping things simpler. Whereas within the technical and clinical teams that are often pioneering design for disability, it is not universally acknowledged that designers or design even have a role to play at this stage of the process. Design is frequently seen as a downstream activity, even an optional one. "Most people make the mistake of thinking design is what it looks like," Apple chief executive officer Steve Jobs told the *New York Times*. "That's not what we think design is. It's not just what it looks like and feels like. Design is how it works."[12]

Apple represents a challenging combination of the two cultures we have considered: Jobs's vision of "the computer for the rest of us" is fundamentally inclusive in spirit.[13] Yet is Apple's design process wholly democratic, or might there be said to be a hint of benevolent design dictatorship about it? In its very conception as much as its realization, the iPod shuffle epitomizes the sensibilities of the designer. Setting the brief does not precede the design process; it is a fundamental part of the design process. Sometimes the most creative act of all is to provocatively constrain the specification.

audible media

For products designed to play media, it is interesting to compare the accessibility of the product with that of the medium itself. The user interface on the iPod shuffle has been pared down to tactile buttons: it is essentially nonvisual. In this way the music, the thing we are interested in, is accessible to many people with visual impairments. Of course, the whole picture is more complicated and complex; visual impairment does not preclude dexterity, hearing, or cognitive impairment, and the iPod interface extends to the personal computer, which allows the mobile functionality to be so simple. But the interaction design and the medium nevertheless seem somehow in tune.

Contrast this with the recent evolution of radios: because the Digital Audio Broadcasting standard supports text streams in parallel with the audio content, text displays have been

added to most radios. Is this an innocuous step? Well, once added, these displays are usually employed for the main user interface as well, replacing direct tuning dials with a more generic menu structure with lists that may change depending on which stations are available, and thus cannot be memorized. The result can be radios that have become less easy to use for visually impaired people. While it is important not to overstate this irony—the provocative website BlindKiss.com, of which more in a later chapter, lists "Ten Things Not to Say to a Blind Person," including "Radio must be really important to you"—the irony stands.

A common remedy is to adopt a multimedia approach, adding a deliberate redundancy of channels of information and feedback, such as an audible click to a button press that might not be felt, or a flashing beacon to a siren that might not be heard. In the case of Digital Audio Broadcasting radios, one obvious approach would be to add text-to-speech to the visual text display. Why does this remind me of the children's cautionary tale "There was an old lady who swallowed a fly. . . . She swallowed a spider to catch the fly" (and so on)? Tyler, head of technical product development at the RNIB, has learned from experience that multimodal interfaces are often pursued for their own sake. One video recorder launched with a so-called talking user interface was in fact as inaccessible as any other one. Speech technology had been added in order to differentiate the product in an overcrowded marketplace— just because it could be added, not because of why it should have been.

I believe that more thought could go into improving accessibility by simplifying an interface, not always augmenting it. Radio is still fundamentally an auditory medium. What if a radio's user interface were once again auditory, as it used to be when tuning with a simple dial? Then, at least the accessibility of the interface would match the accessibility of the medium

itself. It could even be said to celebrate the medium. Beyond accessibility, should our experiences of different media necessarily converge? I'll discuss this further in the next chapter.

simple radios

But there are other reasons for designing simple radios. The Bath Institute of Medical Engineering (BIME) is an organization that has been developing products for and with disabled people for many years. Recently, it has been exploring the use of technology within the homes of people with dementia. As radios have become more complicated, they also have become more difficult to use, especially for people with dementia. BIME has resorted to repackaging a radio, leaving just the on/ off switch visible and hiding the other controls away so that the user cannot inadvertently retune.

With a different agenda, students in the Innovative Product Design degree program at the University of Dundee have also designed single-station radios—iconic radios that reflect the content of a particular radio station. For their tutors Jon Rogers and Polly Duplock, this blurring of industrial design and interaction design is about connecting product, medium, and service.

On the front of the BIME radio, so that people know what it is, the word "Radio" is written in large letters. But a radio can also be made more or less obviously a radio through its form and materials, rather than by labeling it. Revisiting historical forms and archetypes may be particularly appropriate, as dementia can leave longer-term memories relatively intact. The preoccupations of the Milan furniture fair seem relevant: identifying and distilling the essence of a chair, a light, or in this case a radio. Designers would be inspired to work in this territory as well as having valuable perspectives and skills to contribute. And simple iconic radios could also have mainstream appeal, as manufactured by Tivoli Audio and others.

simplified radio by the Bath Institute of Medical Engineering

The head of BIME, Roger Orpwood, explains that dementia is often accompanied by a heightened artistic appreciation and emotional response. So it is likely that the beauty of the objects around individuals with dementia, both everyday objects and those designed for them, could play a part in people's experiences of living with this condition. In other words, design values are every bit as relevant as they would be in any other area of design, and perhaps even more so.

without thought

The themes of simplicity and accessibility recombine again in a piece that defines a cutting edge of design and also suggests provocative new directions for inclusive design. A wall-mounted CD player, designed by Naoto Fukasawa and manufactured by Muji, was not conceived to be accessible in the conventional sense, but nonetheless is a highly inclusive product. The designer's philosophy was to produce a product that could be used *without thought*—a theme that Fukasawa has explored in workshops and exhibitions. He is interested in objects that tap into a general cultural consciousness, not just the recent history of electronic products.

This CD player can be used without thinking because it alludes to an old-fashioned electric ventilation fan, a relatively traditional object that most people will have come across or else can intuitively guess how to use. A circular, CD-size depression on the front surface indicates that a disc be placed directly on to the spindle at the center. It is then natural to reach for the only visible control: a cord hanging down that has a light-switch pull on it, inviting it to be pulled. A tug on the cord sets the disc visibly spinning; another tug stops it again.

This simplicity supports cognitive inclusion, otherwise one of the most difficult and least understood challenges facing inclusive design. But the same simplicity comes at a cost: there is no display to tell the listener the name of the track

being played or how long it will last. There is no treble or bass enhancement, just a knurled volume control that can be felt protruding from the top surface (and as a further concession to control, forward and reverse buttons are hidden on the top surface, but these begin to feel like a bit of a compromise).

It is only this degree of simplicity that allows the design as a whole to communicate the purpose and use of the product—something impossible if either are too complex. Furthermore it creates a truly iconic presence. The design language is its essence, not just something applied, and there is a quiet humor and wit behind it all.

The result is arguably a highly accessible product, but certainly not a universal design in the sense of incorporating all the functionality that every user might have wished for. Consumers balance the qualities of any product, however, and many have decided that the reduction in features, if indeed this isn't an advantage in itself, is worth the simple delight. The whole exceeds the sum of the parts.

aspiring to a lightness of touch

Good design often requires the courage to value simplicity over being "all things to all people."[14] This might conflict with some definitions of universal design, yet at the same time it can actually make a design more accessible because simple products are often the most cognitively and culturally inclusive.

Cognitive accessibility is frequently overlooked, perhaps because it is more difficult to quantify than is accessibility on the basis of sight or hearing, dexterity or mobility. The danger of adding flexibility and complexity to achieve accessibility is that a product may become difficult to learn how to use in any of its different ways. It may be inclusive in principle, but not in practice.

Experienced designers develop a feel for the relationship between in principle and in practice, between the design brief and the design response, and most important, between the parts

Muji CD player designed by Naoto Fukasawa

and the whole. Sometimes it is better to deny the user a feature that could have been useful, in favor of a better overall experience. This is why setting the brief in the first place is a fundamental part of the design process, and why designers as well as users should be at the heart of any team from the start.

There still remains the possibility that with products and services, unlike buildings, design for the whole population might be achieved through a diversity of alternatives, each inclusive in different ways, yet still fairly limited in complexity. This discussion is continued in the next chapter.

identity meets ability

Alan Newell, Sebastien Sablé, Amar Latif, Steve Tyler, Crispin Jones
Antony Rabin, and Jamie Buchanan

Silen-T watch and The Discretion Watch, WHO and IDEO voice PDA and BlindStation, RNIB and RNID, deaf and Deaf eavesdropping hearing aids and Cat's ears, acoustic throne and Table Talk