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Design Responsibility:

Five Myths and Six Directions

One cannot build life from refrigerators, politics, credit statements and crossword puzzles. That is impossible. Nor can one exist for any length of time without poetry, without color, without love.

ANTOINE DE SAINT-EXUPÉRY

Industrial design differs from its sister arts of architecture and engineering. Whereas architects and engineers routinely solve real problems, industrial designers are often hired to create new ones. Once they have succeeded in building new dissatisfactions into people's lives, they are then prepared to find a temporary solution. Having constructed a Frankenstein, they are eager to design its bride.

One basic performance requirement in engineering hasn't really changed too much since the days of Archimedes: be it an automobile jack or a space station, it has to work, and work optimally at that. While the architect may use new methods, materials, and processes, the basic problems of human physique, circulation, planning, and scale are as true today as in the days of the Parthenon.

With accelerating mass production, design has become re-

sponsible for all of our means of communication, transportation, consumer goods, military hardware, furniture, packages, medical equipment, tools, utensils, and much else. With a present worldwide need of 650 million individual family living units, it can be safely predicted that even "housing," still built individually by hand, will become a fully industrially designed, mass-produced consumer product by the end of the century.

Buckminster Fuller made an early start toward mass-produced housing with his Dymaxion House (experimentally produced by the Beech Aircraft Company in Wichita, Kansas) in 1946. Later came his Domes, which started a whole generation of "Dome freaks" busily building geodesic carbuncles with a dismaying capacity for leaking covers. Other attempts came through an intelligent reappraisal of trailers stacked vertically three units high. These experiments were carried out under grants from Housing and Urban Development in Lafayette, Indiana, in the mid-sixties. The most promising mass-produced house now is manufactured in Japan by Misawa Homes. These buildings can be put together in hundreds of different configurations, are inexpensive and quickly built, and are made with a new kind of concrete.

Even now the contemporary architect is frequently no more than a master assembler of elements. *Sweet's Catalogue* (twenty-six bound volumes that list building components, panels, mechanical equipment, and so forth), occupies an honored place on the shelves of an architect's working library. With its help, he fits together a puzzle called "house" or "school" or whatever by plugging in the components—designed, for the most part by industrial designers, and listed conveniently among the 10,000 entries in *Sweet's*. Quite naturally architectural offices use computers and merely feed all of *Sweet's* pages, as well as the economic and environmental requirements of the job, into the computer. The computer assembles all the bits, relates all the information to square-foot costage, and comes up with the solution. With endearing candor, some architects have taken pains to explain that "the computer does an excellent job."

By contrast, as in the case of the TWA Terminal at Kennedy International Airport, the architect may create a three-dimensional trademark, an advertisement through which people are fed, but whose function it is to create a corporate image for the client, rather than provide comfort and facilities for passengers. Having myself been trapped at the TWA Terminal during a fifteen-hour power blackout, I can vouch for the inappropriateness of this sculptural environment to process people, airplanes, cars, food, water, waste, or luggage.

The lacy mantles and Gothic minarets of Edward Durell Stone and Yamasaki are little more than latter-day extensions of the Chicago Fair of 1893. Frothy trifles, concocted to reinject romanticism into our prefabricated, prechewed, and predigested cityscape, can nonetheless be revealing. For who could see Yamasaki's soaring Gothic arches at the Seattle Science Pavilion without realizing that here science was at last elevated through glib design clichés to the stature of religion? One almost expected Dr. Edward Teller to appear one Sunday morn, arrayed in laboratory vestments, and solemnly intone "$E = mc^2$."

One of the difficulties with design by copying, design through eclecticism, is that the handbooks, the style manuals, and floppy disks continuously go out of style and become old-fashioned and irrelevant to the problem at hand. Furthermore, it is not just aesthetics that is eliminated in designing via *Sweet's* and/or the computer. "The Concert Hall and the Moonshot Syndrome," by William Snaith in his *Irresponsible Arts*, gives an excellent example of how design fails when it relies exclusively on copying and computer-generated models.

If the need for some 650-million housing units around the world is to be met, surely the answer lies in rational rethinking of what housing means—or can mean—and the developing of totally new processes and concepts.

The architect as heroic master builder and the architect who

defiles this fair and pleasant land with gigantic sterile file cabinets ready to be occupied by interchangeable people are both anachronisms.

When Moshe Safdie designed and built Habitat, an example of a radically new type of shelter, for the Montreal Exposition of 1967, he was among the first architect-planners who attempted to use a modular building system intelligently. Habitat has often been faulted for being both too expensive and too complex. In reality Habitat is probably the least expensive and at the same time most varied *system* that can be devised, and it is instructive to note that the Canadian Exposition Board made it impossible to build more than one-third of the units. The strength of Habitat lies in the fact that once a large amount of money has been invested in basic building and handling equipment, the system then begins to pay for itself as more units are built. For a fuller understanding of the Habitat system, see Safdie's two newer projects in Puerto Rico and Israel (see also R. Buckminster Fuller's *Nine Chains to the Moon*, p. 37).

Modular housing, shown first in the terraced houses and gardens of Habitat Montreal, then on the first site of Habitat Puerto Rico on San Patricio hill in Hato Rey, San Juan. Courtesy: M.I.T. Press and Tundra Books of Montreal. Photos by Jerry Spearman.

In clothing design, as in architecture, the industrial designer has entered the field through the back door, creating disposable work gloves (2,000 to a roll), ski boots, space suits, protective throwaway clothing for persons handling radioactive isotopes, and scuba gear. Lately, with the introduction of "breathing" and therefore usable leather substitutes, much of the boot, belt, handbag, shoe, and luggage industry, too, is turning to the product designer for help. New techniques in vacuum forming, slush molding, gang turning, and so forth, make mass-production design possible for products traditionally associated with handcrafted operations.

The lesson of this book, to design for people's *needs* rather than their *wants*, can be applied to clothing design as well. Fashion design is much like automotive styling in Detroit: applying Band-Aids to cancerous sores. Women have been permanently disabled by wedgies, elevator shoes, stiletto heels, and pin heels. The influence of girdles on women's diaphragms, digestive systems, and pulmonary abilities could lead to a book by itself. But there are genuine needs here as well: the design of clothes for handicapped children and adults making it possible for them to dress or undress themselves—resulting in greater pride and self-confidence. Most fashion is designed for people who are seventeen years old or, more disastrously, their middle-aged brothers or sisters fancying themselves as teenagers. Little or no clothing is designed for the elderly, the obese, people who are unusually short or very tall.

Satisfying the need for tools, shelter, clothing, breathable

air, and usable water is not only the job and responsibility of the industrial designer but can also provide enormous new challenges.

Mankind is unique among animals in its relationship to the environment. All other animals adapt *autoplastically* to a changing environment (by growing thicker fur in the winter or evolving into a totally new species over a half-million-year cycle); only mankind transforms earth itself to suit its needs and wants *alloplastically*. This job of form-giving and reshaping has become the designer's responsibility. A hundred years ago, if a new chair, carriage, kettle, or a pair of shoes was needed, the consumer went to the craftsman, stated his wants, and the article was made for him. Today the myriad objects of daily use are mass-produced to a utilitarian and aesthetic standard often completely unrelated to the consumer's need. At this point Madison Avenue must be brought in to make these objects seem desirable.

How the smallest change in design can have far reaching consequences can be explained through example. Automotive designers in Detroit might set themselves the goal to make car dashboards more pleasing through a symmetrical arrangement of all control knobs, and by relocating ashtrays, air conditioning controls, and wiper and heater switches. The results? *As many as 20,000 people killed outright and another 80,000 maimed on our highways during any given five-year span.* These 100,000 deaths and accidents would be caused by the driver having to reach only eleven inches further, diverting attention from the road for an extra second or two. These figures are an extrapolation of the Vehicular Safety Study Program at Cornell University. In 1971 a General Motors executive said: "GM bumpers offer 100 percent protection from all damage if *the speed of the car does not exceed 2.8 miles per hour.*" (Italics supplied.) Meanwhile the president of Toyota Motors has built a $445,000 shrine to "honor the souls of those killed in his cars" (quoted in *Esquire*, January 1971). By 1982 I saw many small shrines and memorial tablets

built by the president of Honda in Japan to victims of accidents in their cars.

In late April 1983 the National Highway Traffic Safety Administration stated that General Motors might have to recall 5 million midsize cars and trucks made in 1978–1980. Should this recall be ordered, General Motors would have the distinction of having been involved in the three biggest recalls in history: in 1971 6.7 million GM cars and light trucks had to be recalled, followed by a recall of 6.4 million midsize cars in 1981. This would mean that GM had to recall a total of nearly 19 million vehicles—*or nearly half of its entire production*—due to design and engineering mistakes.

Consider the home appliance field. Refrigerators are not designed, aesthetically or even physically, to fit in with the rest of the kitchen equipment. Rather, they are designed to stand out well against competing brands at the appliance store and scream for the consumer's notice. Once bought, they still shrilly clamor for attention in the user's home—destroying the visual calm and unity of the kitchen.

Through wasting design talent on such trivia as mink-covered toilet seats, chrome-plated marmalade guards for toast, electronic fingernail-polish dryers, and baroque fly-swatters, a whole category of fetish objects for an abundant society has been created. I saw an advertisement extolling the virtues of diapers for parakeets. These delicate unmentionables (small, medium, large, and extra large) sold at one dollar apiece. A long-distance call to the distributor provided me with the hair-raising information that 20,000 of these zany gadgets were sold each month in 1970.

In all things, it is appearance that seems to count, form rather than content. Let's unwrap a fountain pen we have just been given. At first there is the bag provided by the store. Nestled in it is the package, cunningly wrapped in foil or heavily embossed paper. This has been tied with a fake velvet ribbon to which a pretied bow is attached. The corners of the wrapping paper are secured with adhesive tape. Once we have

Advertisement for diapers to be used for parakeets. Author's collection.

removed this exterior wrapping, we come upon a simple gray cardboard sleeve. Its only function is to protect the actual "presentation box." The exterior of this little item is covered with a cheap leatherette that looks (somewhat) like Italian marble. Its shape conjures up the worst excesses of the Biedermeier style of Viennese cabinetry during the last and decadent stages of that lamentably long period. When opened, the vistas thus revealed would gladden the heart of Evelyn Waugh's *The Loved One*, for they match the interior appointments of a Hollywood-created luxury coffin to a nicety. Under the overhanging (fake) silk lining and resting on a cushion of (phony) velveteen, the fountain pen is at last revealed in all its phalliform beauty. But wait, we are not yet done. For the fountain pen itself is only a further packaging job. A recent confection of this type (selling for $150.00) had its outer casing made not of *mere* silver, but of "silver obtained by melting down ancient 'pieces of eight' " recovered, one must assume, at great expense from some Spanish galleon fortuitously sunk near the Parker Pen factory three centuries ago. A (facsimile)

map, giving the location of the sunken ship and tastefully printed on (fake) parchment, was enclosed with each pen. However, whatever the material of the pen-casing, within it we find a polyethylene ink-cartridge (manufacturing cost, including ink, 3¢) connected to a nib.

In the case of the silver pen cited above, the retail price of the silver pen in its package is approximately 145,000 percent higher than the cost of the basic writing tool. We may say that inexpensive pens are, after all, available and that the example mentioned merely illustrates "freedom of choice." But this freedom of choice is illusory, for the choice is open only to those to whom the difference between spending $150 or 39¢ is immaterial. In fact, a dangerous shift from primary use and need functions to associational areas has taken place here, since in most ways the 39¢ ball-point pen outperforms the $150 one. Additionally the tooling, advertising, marketing, and even the materials used in packaging represent such an exercise in futile waste-making that it is not acceptable except to a pampered elite.

This is *not* an argument against comparatively high prices that are a result of outstanding quality. My own fountain pen (a German *Mont Blanc*) was given to me by my father on my tenth birthday; it has given me excellent service—with two minor repairs—for nearly forty-four years and is still working well and is unusually handsome.

The example of pens could be easily duplicated in almost any other area of consumer goods: the packaging of perfumes, whisky decanters, games, toys, sporting goods, and the like. Designers develop such trivia professionally and are proud of the equally professional awards they receive for the fruits of such dedicated labor. Industry uses such "creative packaging"—this, it is useful to note, is also the name of a magazine addressed to designers—in order to sell goods that may be shabby, worthless, or just low in cost, at grossly inflated prices.

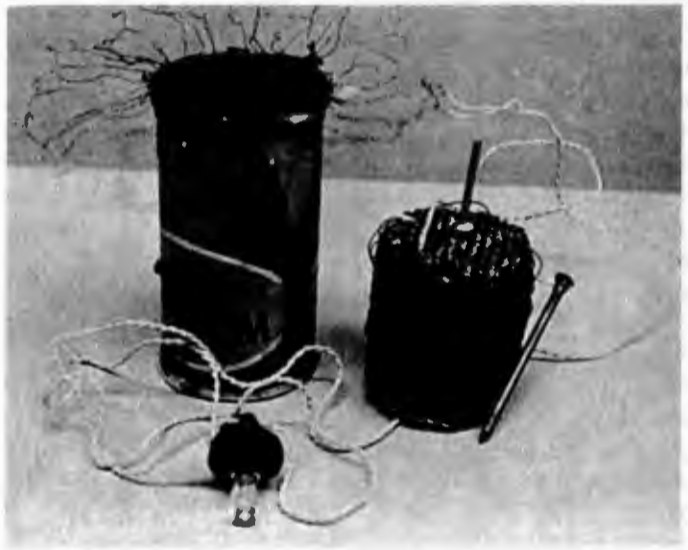
In 1981 Americans for the first time paid more for the packaging that contained their food than was paid to farmers as net income, according to the Department of Agriculture's

Economic Research Service. Twenty-three billion dollars was paid for food packaging by consumers in 1981 compared with a net farm income of nineteen point six billion. This is expected to rise year by year. Here are some examples:

- A beer can (or bottle) costs five times as much as the beer it holds.
- A potato chip bag, table syrup bottle, chewing gum wrapper or soft drink bottle cost twice as much as the foods they contain.
- A breakfast cereal package, soup can, frozen food box, baby food jar, or dessert box costs one-and-one-half times as much as the foods inside. (Associated Press, 20 September 1982; Department of Agriculture *National Food Review*, 7 July 1981).

In communication and transport, other new challenges emerge globally. Nearly twenty-two years ago I was approached by representatives of the United States Army and told of their practical problems concerning parts of the world (like India) where entire village populations were illiterate and unaware that they lived in, and were part of, a nation-state. Unable to read, and without enough power for radios or money for batteries, they were effectively cut off from all news and communication. In 1962 I began to design and develop a new type of communications device.

An unusually gifted graduating student, George Seegers, did the electronic work and helped to build the first prototype. The resulting one-transistor radio, using no batteries or current and designed specifically for the needs of developing countries, consisted of a used tin can. (As illustrated in this book, a used juice can is shown, but this was no master plan to dump American junk abroad: there is and was an abundance of used cans all over the world.) This can contained wax and a wick that burned (just like a wind-protected candle) for about twenty-four hours. The rising heat was converted into enough energy (via thermocouples) to operate an



Radio receiver designed for the Third World. It is made of a used juice can and uses parafin wax and a wick as power source. The rising heat is converted into enough energy to power this nonselective receiver. Once the wax is gone, it can be replaced by more wax, paper, dried cow dung, or anything else that will burn. Manufacturing costs on a cottage-industry basis: 9 cents. Designed by Victor Papanek and George Seeger at North Carolina State College.

earplug speaker. The radio was, of course, nondirectional, receiving any and all stations simultaneously. But in emerging countries, this was then of no importance: there was only *one* broadcast (carried by relay towers placed about fifty miles apart). Assuming that one person in each village listened to a "national news broadcast" for five minutes daily, the unit could be used for a year until the original paraffin wax was gone. Then more wax, wood, paper, dried cow dung (which has been successfully used as a heat source for centuries in Asia), or for that matter anything else that burns could continue to keep the unit in service. All the components: earplug

The same radio as on previous page but decorated with colored felt cutouts and seashells by a user in Indonesia. The user can embellish the tin-can radio to his own taste. Courtesy UNESCO.

speaker, hand-woven copper radial antenna, an "earth" wire terminating in a (used) nail, tunnel-diode, and thermocouple, were packed in the empty upper third of the can. The entire unit was made for just below 9¢ (1966 dollars).

It was much more than a clever little gadget, constituting a fundamental communication device for preliterate areas of the world. After being tested successfully in the mountains of North Carolina (an area where only *one* broadcast is easily received), the device was demonstrated to the Army. They were shocked. "What if a Communist," they asked, "gets to the microphone?" The question is meaningless. The most important intervention is to make information of all kinds freely accessible to people. After further developmental work, the radio was given to the U.N. for use in villages in Indonesia. No one, neither the designer, nor UNESCO, nor any manufacturer, made any profit or percentages out of this device since it was manufactured as a "cottage industry" product.

In 1967 I showed color slides of the radio at the *Hochschule für Gestaltung*, at Ulm in Germany. It was viewed with dismay because of its "ugliness" and its lack of "formal" design. Of course, the radio *was* ugly. But there are good reasons for this. It would have been simple to paint it (gray, the people at Ulm suggested). But painting it would have been wrong: I felt that ethically I had no right to make aesthetic or "good taste" decisions that would affect millions of people in Indonesia, members of a different culture.

The people in Indonesia decorated their tin-can radios by pasting pieces of colored felt or paper, pieces of glass, and shells on the outside and making patterns of small holes toward the upper edge of the can. In this way it has been possible to bypass "good taste" and to design directly for the needs of the people by "building in" a chance for them to make the radio truly their own through design participation.

It is more than twenty years now since the tin-can radio was first used. Two decades later, the people of Indonesia use normal broadcasting channels; in Bali and Java ordinary stereo AM-FM radios are used by nearly everyone—much as anywhere else. One of the original tin-can radios is still on view as a sort of historical artifact in the museum at Jakarta. However I am told the radio is still used in West Irian (the Indonesia-ruled western half of Papua New Guinea). West Irian is at a stage of development comparable to that of the rest of Indonesia two decades ago.

The story of the tin-can radio shows that it is possible—or at least was possible—to practice decent and ethical design intervention in a developing country. But it must be emphasized that the intervention was small and on a village level. Large-scale design in the Third World by outsiders has never worked. During the fifties large design offices, such as Joe Carreiro of Philadelphia, Chapman and Yamasaki of Chicago, and others, performed design development in Third World countries at the request of the State Department. But

most of their work was a sort of "win the minds and hearts of the countryside" operation: they helped to design and manufacture craft-based objects that would appeal to American consumers. In other words, they did not design for the needs of people in India, Ecuador, Turkey, or Mexico; instead they worked for the fancied wants of American consumers. The fallacy of this approach has been shown in an earlier chapter. During the seventies and early eighties similar large-scale designs have been carried out in developing countries, this time predominantly by architects. When a developing nation is cluttered up with large buildings and consumer objects all designed and developed somewhere else, the effects tend to be disastrous. The verdict is already in for Iran; it is about to be pronounced in the Philippines; for most of Latin America the jury is still out.

If we turn from the real and fancied needs of developing countries to our own cities, we see a similarity between expectations that constantly rise and a decaying reality.

Our townscape bears the stamp of irresponsible design. Look through the train window as you approach New York, Chicago, Detroit, Los Angeles. Observe the miles of anonymous tenements, the dingy, twisted streets full of cooped-up, unhappy children. Pick your way carefully through the filth and litter that mark our downtowns or walk past the monotonous ranch houses of suburbia where myriad picture windows grin their empty invitation, their tele-vicious promise. Breathe the cancer-inducing exhaust of factory and car, watch the strontium-90 enriched snow, listen to the idiot roar of the subway, the squealing brakes. And in the ghastly glare of the neon signs, under the spiky television aerials, remember: this is our custom-designed environment.

How has the profession responded to this? Designers help to wield power to change, modify, eliminate, or evolve totally new patterns. Have we educated our clients, our sales force, the public? Have designers attempted to stand for integrity and a better way? Have we tried to push forward, not only in the marketplace, but by considering the needs of people?

Listen in on a few imaginary conversations in our design offices:

"Boy, wrap another two inches of chrome around that rear fender!"

"Somehow, Charlie, the No. 6ps red seems to communicate freshness of tobacco more directly."

"Let's call it the 'Conquistador' and give people a chance for personal identification with the sabre-matic shift control!"

"Jesus, Harry, if we can just get them to PRINT the instant coffee right on to the paper cup, all they'll need is hot water!"

"Say, how about roll-on-cheese?"

"Squeeze-bottle martinis?"

"Do-it-yourself shish-kebab kits with disposable phenolic swords?"

"Charge-a-plate divorces?"

"An aluminum coffin communicating 'nearness-to-God' (nondenominational) through a two-toned anodized finish?"

"A line of life-sized polyethylene Lolitas in a range of four skin shades and six hair colors?"

"Remember, Bill, the corporate image should reflect that our H-bombs are always PROTECTIVE!"

These imaginary conversations are quite authentic: this is the way designers talk in many offices and schools, and this is also the way in which new products often originate. One proof of authenticity is that of the eleven idiocies listed above, all but two—charge-a-plate divorces and protective H-bombs—have by now become available.

Is this just a hysterical outburst, directed toward some of the phonier aspects of the profession? Aren't there designers working away at jobs that are socially constructive? Not enough. Few articles in the professional magazines or papers presented at design conferences deal with professional ethics or responsibilities going beyond immediate market needs. The latter-day witch doctors of market analysis, motivation research, and subliminal advertising have made dedication to meaningful problem-solving rare and difficult.

The philosophy of most industrial designers today is based on five myths. By examining these, we may come to understand the real underlying problems:

1. *The Myth of Mass Production*: In 1980, 22 million easy chairs were produced in the United States. Dividing this number by the 2,000 chair manufacturers, we find that, on the average, only 11,100 chairs could have been produced by each manufacturer. But each manufacturer has, on the average, ten different models in the line; this reduces our number to only 1,000 or so chairs of one kind. Since furniture manufacturer's lines change twice a year (in time for the spring and autumn market showings), we see that, on the average, only 500 units of any given chair were produced. This means that the designer, far from working for 235 million people (the market he is trained to think about), has, on the average, worked for 1/5,000 of 1 percent of the population. Let's contrast this with the fact that in underdeveloped areas of the world there exists a present need for close to two *billion* inexpensive, basic seating units in schools, hospitals, and houses.

2. *The Myth of Obsolescence*: Since the end of World War II, an increasing number of responsible people at the top levels of management and government have voiced the myth that, by designing things to wear out and be thrown away, the wheels of our economy can be kept turning *ad infinitum*. This nonsense is no longer acceptable. Polaroid cameras, even though new models routinely replace earlier ones, don't become obsolete since the company continues manufacturing film and accessories for them. The German Volkswagen has moved into a leading position in supplying the transportation needs of the world by carefully refraining from major style changes or cosmetic jobs. The Zippo lighter sells far better than all other domestic lighters combined, even though (or could it be because?) the manufacturer guarantees to repair or replace its case and/or guts for life. There is ironic justice in that. For it was in 1931 that George Grant Blaisdell, a nonsmoking American, noticed that some of his friends carried windproof, dependable, Austrian cigarette lighters that

sold in chain stores for twelve cents. He tried importing them directly and selling them at one dollar apiece, but, with a public unwilling to pay that much during the Depression, he stopped. He waited for the expiration of the Austrian patent and began producing it in 1935 with a lifetime guarantee. The Zippo lighter has moved from an item made on $260 worth of secondhand tools, in a $10 room in Brooklyn, to a production level of 3 million units per year. Since so many of our products are made obsolete by technology, the question of *forced* obsolescence becomes redundant and, in terms of scarce raw materials, a dangerous doctrine.

3. *The Myth of the People's "Wants"*: Never in recent times have the so-called wants of people been investigated as thoroughly by psychiatrists, psychologists, motivation researchers, social scientists, and other miscellaneous tame experts, as in the case of the ill-fated Edsel. That mistake cost $350 million and led one comedian to quip that the mistake "was being handled by the Ford Foundation."

"The people want chrome, they like change," except that Volkswagen, Honda, Renault, Volvo, Saab, Mercedes Benz, Datsun, Toyota, and Fiat have exploded that idea thoroughly. So thoroughly, in fact, that over the last twenty years, Detroit has had to start producing compact cars whenever foreign imports began to seriously affect American sales figures. As soon as foreign imports began to drop off, compact cars were again advertised as "the biggest, longest, lowest, most luxurious of them all." This stylistic extravaganza has now again increased the number of small Japanese and European imports coming into this country.

The myth of the people's wants continues to be used by industry and some designers. With the oil crises of 1973 and 1978 behind us, we are early in 1984 facing the possibility of still another shutoff due to the Iraqi-Iranian war. The people have demonstrated their wants by buying subcompacts and—insisting on quality—buying many of these cars from Japan. But in the real world of multinationals, mass unemployment in Detroit, and economic downtrends, other facts assume

A comparison of automobiles of 1949. Advertisement by Volkswagen of America, Inc.

greater importance. Three of the four big car makers in America have now associated themselves with European or Japanese companies to produce high-quality subcompacts cooperatively. Meanwhile Japan has limited itself to exporting a smaller number of cars to the United States, and this has

directly led to a fine irony: the Japanese now export larger and more luxurious cars to the United States, so that their profits can increase with a smaller number of units exported.

4. *The Myth of the Designer's Lack of Control*: Designers often excuse themselves by explaining that it's "all the fault of the front office, the sales department, market research," and so forth. But of more than 200 mail-order, impulse-buying items foisted on the public in 1983, a significantly large number were conceived, invented, planned, patented, and produced by members of the design profession.

In the magazine *Products That Think* (no. 12, JS&A Corporation), an electronically heated ice-cream scooper designed in France is offered for $24. The "Electronic Burger" (in the same issue) is, according to the description, "an AM radio shaped like a hamburger with its speaker at the bottom of the bun." One assumes the speaker has been placed there so that the sound is barely discernible. As mentioned earlier, a $30,000 solid gold telephone was available from Diners Club for the 1983 Christmas market. For $149 an overnight electric trouser-warmer is available under the title "Hot Pants."

These 1983 items recall one of my all-time favorites: "Mink-Fer," a tube of deodorized mink droppings sold at $1.95 in 1970 as a Christmas fertilizer for "the plant that has everything."

5. *The Myth That Quality No Longer Counts*: While Americans have for years bought German and, later, Japanese cameras, Europeans now line up to buy Polaroid cameras and equipment. American Head skis are outselling Scandinavian, Swiss, Austrian, and German skis around the world. Sales of Schlumbohm's Chemex Coffee Maker are diminished only somewhat by a recent German copy of it. The United States Universal Jeep designed by Willys in 1943 (since modified, and sold by American Motors) is still a desirable multipurpose vehicle; the only competition to its descendants comes from the British Land Rover and the Japanese Toyota Land Cruiser, both updated and improved versions of the Jeep.

The one thing these and some other American products that

still command world leadership hold in common is a radical new approach to a problem, excellent design, and the highest possible quality.

Something can be learned from these five myths. It is a fact that the designer often has greater control over his work than he believes he does, that quality, new concepts, and an understanding of the limits of mass production could mean designing for the majority of the world's people, rather than for a comparatively small domestic market. Design for the people's *needs* rather than for their *wants*, or artificially created wants, is the only meaningful direction now.

Having isolated some of the problems, what can be done? At present there are entire areas in which little or no design work is done. They are areas that promote the social good but call initially for high risk and, to begin with, low return. All that is needed is a selling job, and that is certainly nothing new to the industrial design profession.

Here are some of the fields that design has neglected:

1. *Design for the Third World*: With the global increase in population over the last twenty years, nearly three billion people stand in need of some of the most basic tools and implements.

In 1970 I said that more oil lamps were needed globally than ever before. By 1984 this lack has become even more acute. *There are more people without electric power today than the total population of earth before electricity was generally used.* In spite of new techniques, materials, and processes, almost no radically new oil or paraffin lamps have been developed since Thomas Edison's day. In northeastern Brazil the local population began adapting used electric light bulbs to burn oil for illumination in the late seventies. The *Nordestinos* have difficulty understanding why light bulbs have to go through an electric cycle before being cut down into a container for oil. And it is a fact that Brazil now has to import used bulbs into the northeastern states where oil lamps exceed electric bulbs.*

*See "Papanek 1983" pp. 148–149.

Eighty-four percent of the world's land surface is completely roadless terrain. Often epidemics sweep through an area: nurses, doctors, and medicine may be only seventy-five miles away, but there is no way of getting through. Regional disasters, famines, or water shortages develop frequently; again aid can't get there. Helicopters work but are far beyond the money and expertise available in many regions. Beginning in 1962, a graduate class and I developed an off-road vehicle that might be useful in such emergencies. We established the following performance characteristics:

a. The vehicle would operate on ice, snow, mud, mountain forests, broken terrain, sand, certain kinds of quicksand, and swamps.
b. The vehicle would cross lakes, streams, and small rivers.
c. The vehicle would climb forty-five-degree inclines and traverse forty-degree inclines.
d. The vehicle would carry a driver and six people, or a driver and a 1,000-pound load, or a driver and four stretcher cases; finally it would be possible for the driver to walk next to the vehicle, steering it with an external tiller, and thus carry more load.
e. The vehicle could also remain stationary and, with a rear-power takeoff, drill for water, drill for oil, irrigate the land, fell trees, or work simple lathes, saws, and other power tools.

We invented and tested a completely new material, "Fibergrass." This consists of conventional chemical fiberglass catalysts but with dried native grasses, hand-aligned, substituting for expensive fiberglass mats. This reduced costs. Over 150 species of native grasses from many parts of the world were tested. By also inventing new manufacturing logistics, it was possible to reduce costs still more. Various technocratic centers were to build components: heavy metal work was to be done in Egypt and Libya, Central Africa, Bangalore (India), and Brazil. Electronic ignitions were to be made in Tai-

Mock-ups and working models of two vehicles designed and built under the author's direction at Konstfackskolan in Stockholm, Sweden. These vehicles were explorations in transporting materials over rough terrain by muscle power alone. One of them (designed by James Hennessey and Tillman Fuchs) is a proposal for an inner-city run-about and shopping vehicle. It will carry two people and 200 pounds. Courtesy: *Form* magazine.

wan, Japan, Puerto Rico, and Liberia. Precision metal work and the power train were to be done in the Chinese Democratic Republic, Indonesia, Ecuador, and Ghana. The Fiberglass body would be made by users on a village or cottage level, all over the world. Several prototypes were built (and are illustrated), and it was possible to offer the vehicle to UNESCO at a unit price of less than $150 (1962 dollars). But this is the point where ethical considerations became important: Although the prototypal vehicle worked well, and computer analysis by the U.N. told us that close to ten million vehicles could be used initially, we realized that we were con-

Off-road vehicle, discontinued for ecological reasons, designed by student team under the author's direction, School of Design, North Carolina State College, 1964.

niving at ecological disaster. The net result of going ahead would have meant introducing ten million internal combustion engines (and consequently pollution) into hitherto undefiled areas of the world. We decided to shelve the off-road project until a low-cost alternative power source was available, which still has not happened.

(Historical note: Since I do not believe that patents work toward the social good, photographs of our vehicle were published in a 1964 issue of *Industrial Design* magazine. Since then, more than twenty-five brands of vehicles of this type, priced between $5,500 and $8,000, have been offered to wealthy sportsmen, fishermen, and (as "fun vehicles") to the youth culture. These vehicles pollute, destroy, and create incredible noise problems in wilderness areas. The destructive ecological impact of the snowmobile is detailed in Chapter Ten.)

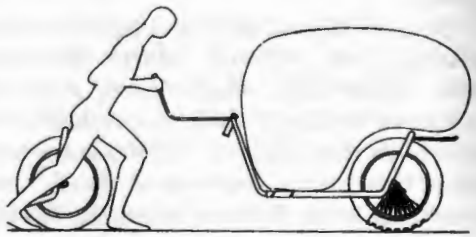
General Motors, Mercedes Benz, Volvo, and others are now manufacturing off-road vehicles for many developing countries. While these vehicles bring about some benefits to the countries involved, they also violate some of the ecological standards that made us withdraw our own vehicle. Furthermore they tie the economy of Third World countries to corporations from the rich countries through direct import or

franchise deals. There are notable exceptions to this: Volkswagen production in Mexico, Brazil, and other developing countries operates with reassuring autonomy.

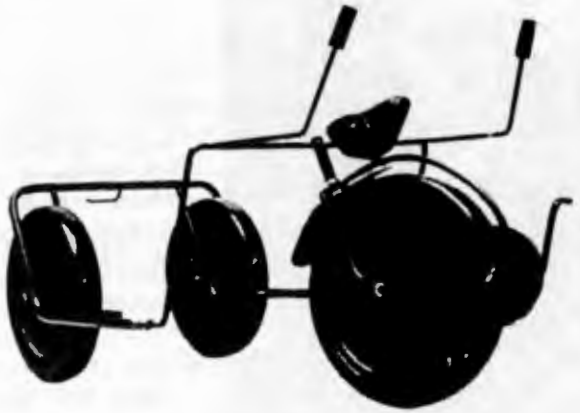
As a result of our concern for pollution, we began exploring muscle-powered vehicles together with a group of Swedish students at *Konstfackskolan* in Stockholm. The Republic of North Vietnam moved 1,100 pound loads into the southern part of that country by pushing such loads along the Ho Chi Minh trail on bicycles. The system worked and was effective. However, bicycles were never designed to be used in just this manner. One of our student teams was able to design a better vehicle made of bicycle parts. The new vehicle is specifically designed for pushing heavy loads; it is also designed to be pushed easily uphill through the use of a "gear-pod" (which can be reversed for different ratios, or removed entirely). The vehicle will also carry stretchers and, because it has a bicycle seat, can be ridden. Several of these vehicles plug into each other to form a short train (see photographs and sketches).

When students suggested the use of old bicycles or bicycle parts, they regretfully were told that old bicycles also make good transportation devices and that parts are always needed for replacement or repair. (The students may have been influenced somewhat negatively by the fact that a design student won first prize in the Alcoa Design Award Program by designing a power source, intended for Third World use, made of brand-new aluminum bicycle parts.)

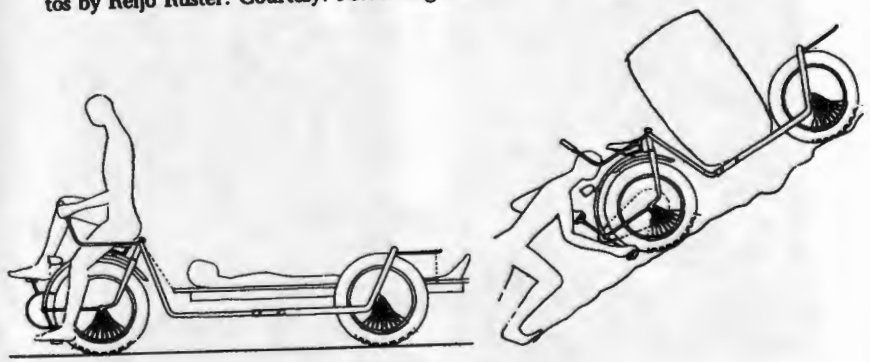
Consequently we designed a new luggage carrier for the millions of old bicycles all over the world. It is simple and can



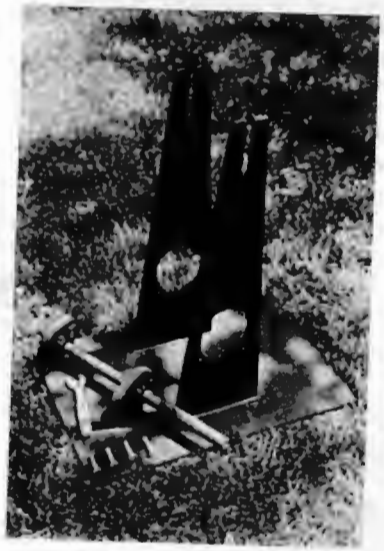
be constructed in any village. It will carry more payload. But it will also fold down in thirty seconds (see illustration) and then can be used in its other capacity for generating electricity, irrigation, felling trees, running a lathe, digging wells,



These drawings show that the muscle-powered vehicle can be plugged together into a short train. It also comes apart, and the geared power pod is reversible so that the vehicle can be pushed uphill under heavy loads. It can also carry stretchers or, with the power pod removed, be used like a wheelbarrow. Designed under the author's direction by a student team in Sweden, it could be used in underdeveloped areas to propel heavy loads, similar to the loads pushed on bicyles along the Ho Chi Minh Trail in North Vietnam. Photos by Reijo Rüster. Courtesy: *Form* magazine.



As bicycles are needed as transportation devices in the Third World, this luggage carrier was designed to flip down and be used as a temporary power source when needed. Its construction is within the scope of the most modest village technology. Designed by Michael Crotty and Jim Rothrock as students at Purdue University.



and pumping for oil. Afterward the bicycle can be folded up again and returned to its primary function as a transportation device. Except that it now has a better luggage carrier.

A Swedish student built a full-size sketch model of a vehicle that is powered by the arm muscles and can go uphill. This in turn led us at Purdue University to design an entire generation of muscle-powered vehicles that are specifically designed to provide remedial exercise for handicapped children and adults (see photographs).

2. ***Design of Teaching and Training Devices for the Retarded, the Handicapped, and the Disabled***: Cerebral palsy, poliomyelitis, myasthenia gravis, mongoloid cretinism, and many other crippling diseases and accidents affect one-tenth of the American public and their families (20 million people) and approximately 400 million people around the world. Yet the design of prosthetic devices, wheelchairs, and other invalid gear is by and large still on a Stone Age level. One of the traditional contributions of industrial design, cost reduction, could be made here. At nearly every drugstore one can buy a transistor radio for as little as $8.98 (including import duties and transportation costs). Yet as mentioned previously, pocket-amplifier-type hearing aids sell at prices between $300 and $1,100 and involve circuitry, amplification elements, and shroud design not radically more sophisticated than the $8.98 radio.

Another version of a muscle-powered experimental vehicle designed by a student in Stockholm.

Tricycle for adults with battery-power assistance. $650 each. Courtesy: Abercrombie & Fitch Co.

Hydraulically powered and pressure-operated power-assists are badly in need of innovation and design.

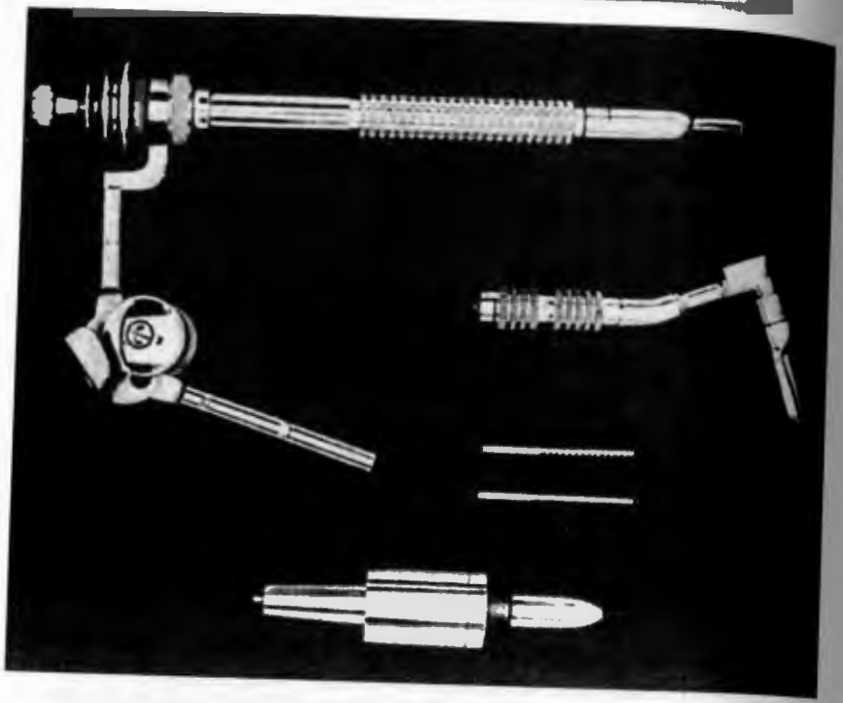
Robert Senn's hydrotherapeutic exercising water float is designed in such a manner that it cannot tip over. There are no straps or other restraint devices that would make a child feel trapped or limited in his motions. At present hydrotherapy usually consists of having the child strapped to a rope attached to a horizontal ceiling track. In Robert Senn's vehicle all such restraints are absent. Nonetheless, his surfboardlike device is safer (it will absorb edge-loading of up to 200 pounds), and the therapist can move in much more closely to the child. Later, I explain further ideas we have developed in this field.

3. *Design for Medicine, Surgery, Dentistry, and Hospital Equipment*: Only recently has there been responsible design development of operating tables. Most medical instruments, especially in neurosurgery, are unbelievably crude, badly designed, very expensive, and operate with all the precision of a steam shovel. Thus a drill for osteoplastic craniotomies (basically a brace and bit in stainless steel) costs nearly $800 and does not work as sensitively as a carpenter's brace and bit available for $7.98 at any hardware store. Skull saws have not changed in design since predynastic times in Egypt. The radically new power-driven drill and saw for osteoplastic craniotomies was tested in vet labs devoted to experiments with animals. It promises to revolutionize methods in neurophysiology.

A water vehicle designed for hydrotherapy of handicapped children. Designed by Robert Senn, as a graduate student at Purdue University.

The cost of health care is rising astronomically. Regardless of who absorbs these costs in the long run, the fact remains that a great deal of the high expense can be attributed directly to bad design.

From time to time, illustrations of new biomedical equipment appear. Almost invariably these are "hi-style modern" cabinets, in nine delicious decorator colors, surrounding the same old machine. Hospital beds, maternity delivery tables, and an entire host of ancillary equipment are almost without exception needlessly expensive, badly designed, and cumbersome.



System of drills and saws for osteoplastic craniotomies. Designed and copyrighted by C. Collins Pippin, North Carolina State College.

4. *Design for Experimental Research*: In thousands of research laboratories, much of the equipment is antiquated, crude, jury-rigged, and high in cost. Animal immobilization devices, stereo-encephalotomes, and the whole range of stereotactic instruments need intelligent design reappraisal.

Companies routinely overcharge governmental purchasing agencies by percentages that are incredibly high. Before a Senate Subcommittee investigating overcharges by manufacturers to Air Force purchasing agents, a simple hexagon Allen wrench was shown (a three-inch-long piece of six-sided wire bent to a right angle at one end). This sells to the public for

12¢. With one-eighth of an inch cut off and a 1¢ rubber grip slipped on, the same vendor sells the tool to the United States Air Force at $9,602 each! A piece of thin steel wire, about three inches long, was also shown. This wire sells for 1¢ per yard, hence the retail price of a four-inch chunk is about one-twelfth of a penny each. However industry sells this plain wire to the Air Force for $7,417 each under the formidable title Antennae Motor Safety Alignment Pin! Senate hearings have established that similar overcharging sometimes amounts to price increases as large as 230,000 percent—a practice that costs American consumers an estimated total of eighteen billion dollars annually. (All figures from U.S. Senate Subcommittee hearings on defense spending and the *MacNeil-Lehrer News Hour*, 2 November 1983.)

A simple electric laboratory timer made in upstate New York sells to amateur photographers for $89.50. Research laboratories pay $750 for the same device. An electric kitchen mixer is offered to consumers for $49.95 in white enamel or in stainless steel for $79.95. For lab use the *same* unit by the *same* manufacturer lists for $485. Value engineering is a subbranch of design that has to do with cost reduction and assessing the value of specific parts in a machine. These value engineering techniques could play an important part to change the pricing of machines and devices for laboratories. After enough Senate investigations, manufacturers might even decide to sell laboratory apparatus at an *honest* profit, instead of defrauding the public and research establishments alike.

5. *Systems Design for Sustaining Human Life Under Marginal Conditions*: The design of total environments to maintain men and machines is becoming increasingly important. As mankind moves into jungles, the Arctic, and the Antarctic, new kinds of environmental design are needed. But even more marginal survival conditions will be brought into play as suboceanic mining and experimental stations on asteroids and other planets become feasible. Design for survival in space capsules has already become routine.

The pollution of water and air and the problems of toxic

and atomic waste disposal also make a re-examination of environmental systems design necessary and are explored in Chapter Ten.

6. *Design for Breakthrough Concepts*: Many products have reached a dead end by now in terms of further development. This has led to "additive" design: more and more features or extra gadgets are added instead of reanalysing the basic problems and evolving new and innovative answers. Automatic dishwashers, for example, waste billions of gallons of water each year (in the face of a worldwide water shortage), even though other systems like ultrasonics for "separating-dirt-from-objects" are well within the state of the art. The rethinking of "dishwashing" as a system might make it easier to clean dishes, as well as solving one of the basic survival problems: water conservation. To this add: industrial water waste, toilets, showers.

Humidity control in homes and hospital rooms is important and can sometimes become critical. In many regions of the United States humidity levels are such that both humidifiers and dehumidifiers are needed. Such gadgets are costly, ugly, and ecologically extraordinarily wasteful of water and electricity. Researching this problem for a manufacturer, Robert Senn and I were able to develop a theoretical humidifier/dehumidifier without moving parts, using no liquids, pumps, or electricity. By combining a mix of deliquescent and antibacteriological crystals, we were able to develop a theoretical surface that would store twelve to twenty-four atoms of water to each crystal atom and release it again when humidity was unusually low. This material could then be sprayed onto a wall or woven into a wallhanging, eliminating the drain on electric power as well as noise pollution and expense of present-day systems. Experiments have continued for several years, and the device now works well. In 1982 test marketing was begun.

Problems are endless, and not enough breakthrough thinking is done. Consider the heating of rooms and houses. With heating costs rising many people have been forced to close off some rooms in their homes—especially in the Northeast of the United States—and install paraffin heaters, electric fires, or other space heaters that are only marginally safe. Add to this group of people those living in southern California, parts of Florida, Australia, and other areas where room heating is only temporarily needed. Basing my thinking on Frank Lloyd Wrights's "gravity heat," that is the fact that a warmed floor will reduce temporary and permanent heat requirements in a room, I began research in 1981 for another breakthrough answer to this. Using techniques borrowed from electric blankets, which take very little current to operate, I developed a system for modular electric rugs. Each electric rug is shockproof and measures 39 by 39 inches, and they're easily plugged together. With very low energy usage they heat a room to comfortable temperatures. They are now being experimentally worked with by one of my clients in Australia.

Breakthrough concepts are also related to people's expectations and wants, as discussed earlier in this chapter. Catheryn Hiesinger describes such a change in people's consciousness and its impact on manufacturers: "While in 1964 visitors to the New York World's Fair were presented with an exhibit of model homes called The House of Good Taste, the 1982 World's Fair at Knoxville, Tennessee, displayed TVA conservation techniques, a Victorian house remodeled with energy-saving devices and appliances, and a factory-built home with a solar-heating system, approaching if not attaining the utopia of Victor Papanek's *Design For The Real World*" (*Design Since 1945*. Philadelphia: Museum of Art, 1983).

These are six possible directions in which the design profession can and must go if it is to do a worthwhile job. Few designers have realized the challenge so far or responded to it. The action of the profession has been comparable to what would happen if all medical doctors were to forsake general practice and surgery and concentrate exclusively on dermatology, plastic surgery, and cosmetics.