Teachable ethical issues can arise from our interactions with even the most ordinary household devices. Consider how contemporary life is shaped by the flow of information. Yet details about how everyday household devices operate are often withheld from consumers. The withholding of such technical information affects our lives in significant ways. It maintains us in a state of ignorance and dependence, exacerbates economic inequities, violates property rights, and fuels a sense of alienation from everyday objects. I propose that the reasons for withholding technical information are not sufficient for placing consumers in a position of relative helplessness. Instead, this practice turns out to be rooted in misguided and unimaginative design decisions. These designs require re-examination, particularly in light of the desperate need to rethink our relations to products from the standpoint of ecological sustainability.

A WORLD OF WONDER

While living in a large apartment building several years ago, I met a young boy who had no idea about the source of the heat wafting from the building's radiators. We walked down to the basement and I showed him, but he didn't believe me. This brings to imagination an entire society in which individuals are surrounded by devices and appliances of which they have little knowledge or understanding. Things just operate in a magical sort of way. When they break down, a technician must be called who can repair them. If the shahman cannot repair the appliance (or if it is too expensive to do so), then it must be replaced, the original generally being discarded.

Is this society so imaginary? Like my young neighbor and the radiators, we are surrounded by mysterious devices beyond our comprehension. A sense of alienation from everyday objects is mixed with a feeling of uncomprehending wonder, at least while the objects are still new and
functioning. But then the photocopier begins to leave streaks on the paper. We open it up, and a sticker immediately warns us to beware of high voltage, extreme temperature and noxious chemicals. Timidly peering inside the machine, we are confused by the dark apertures, the tightly-packed rollers, and the spaghetti maze of wiring. Limited help screens only lead to further confusion. Better close it and call the repairman. As the sticker on the back of the TV, DVD, or dishwasher warns, “No user serviceable parts inside.”

We are increasingly surrounded by devices which are beyond our comprehension or ability to service and maintain. The use of integrated circuits, sensors, and solenoids not just in traditional electronic equipment, but now also in vacuum cleaners, washing machines, refrigerators, and automobiles places these devices beyond the ken of even many licensed electricians.

Personal computers would seem to be the exception. It is still possible to trade out memory chips, video-cards, and even motherboards on many home computers. Games can be hacked and networks tweaked for optimization. However, leaving aside gamers, hackers, and those who grew up in the rigors of the DOS age, most computer users barely understand the basics of file management, operating systems, virus checkers, or computer networks. For this reason, Windows by default hides its system folders (such as the fearsome “registry”). Even Apple users have been finding that newer operating systems such as OS-X have become less user-configurable.

In the remainder of this article, however, I will focus upon the technological inscrutability of everyday household appliances, rather than PCs—objects such as refrigerators, dishwashers, blenders, vacuum cleaners, and televisions.

DESIGNING FOR INACCESSIBILITY

In freeing ourselves from manual labors, we have come to rely heavily upon technological devices which, by and large, we do not understand. This quality of impenetrability by the normal consumer intellect—a kind of “technological opacity”—is reinforced by design decisions and by the failure, reluctance, or refusal of manufacturers and distributors to make technical background information available. In fact, we are discouraged from attempting to understand, let alone manipulate, the internal states of most household technology. In at least three ways, individuals are systematically denied the access needed to escape the “world of wonder:”
(a) Products are designed and manufactured in such a manner that their “innards” cannot be readily observed, comprehended, or serviced. Key parts, including those requiring regular maintenance, are placed in inaccessible locations so that only those possessing special tools and equipment can check or replace them. Many cheaper items are made so that they cannot be opened for inspection (the insides are encased in rubber or in a riveted metal shell); when they break, they must be thrown away.2

(b) Information necessary to understand and repair many everyday items is not given to the customer along with the product, nor is it readily available from the retailer or from parts stores. Gaining the necessary information to make comprehension possible is made difficult by the fact that it is contained only in professional service manuals which are not sold on the retail level. Product websites provide crude diagrams useful only for ordering parts; they rarely explain the operations of the item or detail steps for diagnosis or repair.3 Technical assistance phone numbers offer long waiting times on hold, a labyrinth of automated responses, or a condescending referral to the local dealer for repairs.

(c) Few serious attempts are made to educate consumers sufficiently that they might understand, maintain and repair the items on which they depend. DIY home improvement stores such as Home Depot or Lowes offer one-time workshops, but no instruction is offered in how to maintain the various tools and appliances sold. Manufacturers no longer assume that it is safe or wise for consumers to make their own repairs. It is now widely presumed that consumers prefer to allow dealers and repair shops to exercise this function exclusively. We have been “freed” from having to fix things ourselves.

IN PRAISE OF CONSUMER IGNORANCE

At some time during the past century, our society concluded that consumer comprehension and repair was no longer desired or desirable. In defense of this change in attitude several plausible justifying reasons can be offered:

1. the risk-reduction strategy of removing technical knowledge and access from the public so that an incompetent minority (majority?) will not endanger themselves
2. the belief that no consumer education programs could possibly cope with the increasing complexity of modern technological devices

3. the perception that modern, urbanized “genteel” consumers do not care to understand household devices, nor to exercise the option of repairing them themselves

Let us consider each of these reasons in turn.

(1) THE ETHICS OF RISK REDUCTION

The first justification holds that there is an increased risk created by offering service information to clueless and careless amateurs. This point might be supported by noting the more deadly nature of such modern technologies as the internal combustion engine (highly explosive) and devices operating on household current (high voltage potential). Isn’t a measure of paternalism appropriate if it might prevent injury to even just a handful (if not hundreds or thousands) of bumbling consumers?

Historically, the effort to reduce risks began with regulating to remove consumer items which were negligently or sloppily produced. Items were removed where no apparent thought had been given to possible dangers posed by the product in normal use. This was expanded to asking manufacturers to voluntarily recall products that generate an unusual number of complaints or injuries, whether due to defective materials and construction or unintended design consequences. The goal was to remove faulty products from the market.

Consumer product safety standards have since expanded to require that users be warned of potential dangers and shielded from the worst hazards. A “reasonable person” liability standard has tended to dominate. Manufacturers are given considerable latitude, provided their products pose no harm in normal use by sensible adult consumers. Thus they are not prevented from making light bulbs out of glass for fear that a frat boy might try to swallow one in a stunt or that the sexually desperate might thrust a bulb into a bodily orifice (something that is reported with disturbing frequency by ER physicians). Products made for infants or children must meet higher standards of protection because their usage cannot safely be considered rational.

But when it comes to user access and repair, the “normal use” standards are traded in favor of a regimen of paternalism. Employing an “ignorant person” standard, consumers are assumed to be stupid, reckless, or both. The “technical opacity” approach is installed, minimizing
the bad consequences of potential consumer misbehavior by adopting maxims like “the consumer should have nothing to do with 110 volts,” “consumers cannot understand microprocessors,” and “consumers are not capable of soldering.” As technology becomes more complex and powerful, we accordingly lower our estimates of general competence. This ethical concern for protection from injury not coincidentally promises a reduction in vulnerability to successful litigation. Ironically, consumer “product safety” regulation and litigation may have unintentionally disempowered consumers by encouraging manufacturers to parentally keep out of their customers’ hands anything that might be considered remotely dangerous.

These practices are unquestionably paternalistic. Manufacturers assume that most people do not want to know how a product operates, wouldn’t want to maintain or repair it themselves, nor would they be capable of doing so. One class of people, the service staff, is now elevated in virtue of its superior training. Few attempts are made to share this training with customers. It is assumed consumers would misuse the information, causing harm to themselves or the product. Buyers are instead encouraged to sign expensive maintenance agreements at a handsome profit to the dealer.

Is it necessary to adopt this “play it safe” strategy to remove the most serious risks? On the one hand, it seems justified. As noted above, emergency room staff can attest to the amazing and unbelievable feats individuals will attempt, often at their physical peril. It is statistically undeniable that a certain significant percentage of overconfident or technically incompetent consumers will, if allowed to tamper with their products, cause injury to themselves. Would making products more technically accessible not devalue the health and safety of these individuals?

I’m not convinced that we are faced with a choice between paternalism and consumer endangerment. Suppose, instead, that products were designed to allow for safe accessibility. These products would enable consumers to diagnose problems and replace the usual problem-components with a minimum of technological knowledge or specialized tools. Readily providing user-friendly technical information would further reduce the risk. Such designs would preserve the value of reducing potential injury while also empowering consumers who wished to understand and maintain their possessions. In the concluding section, I will outline some preliminary design specifications in an effort to show that such products are indeed conceivable.
(2) TECHNOLOGICAL COMPLEXITY

The second justification reminds us that we no longer live in the days when a child would construct a crystal radio or a go-cart with a few parts. Not everyone could do their own repairs in the horse and buggy days. For example, a blacksmith’s services were often required. But individuals generally were able to understand their household machinery if they wished to do so. Today, many devices are engineered and fine-tuned by computers. They involve intricate systems of inputs and outputs determined by algorithms and logic charts. Staying abreast of the nature of these systems is a futile task for the busy consumer. This is particularly the case for an American society that is demonstrably technologically illiterate, and likely to remain so.

Two other factors contributing to technological complexity are miniaturization and durability. The space program energized the quest to concentrate more technology in a smaller and lighter package. Moore’s Law has accelerated this evolution. But miniaturization often occurs at the cost of accessibility. Jamming components into increasingly small spaces leaves little room for tools, fingers, or viewing angles. Likewise, the quest for lightweight durability has meant encasing components in solids and soldering parts that could come loose during use. As a result, it is almost impossible to replace key components without breaking the case. Soldering, for example, of logic chips is almost impossible to undo because of the use of robotized multiple soldering points.

How do we assess the capacity of consumers to comprehend the inner workings of increasingly complex household devices? Given the current state of affairs, it is difficult to measure our capacity to achieve sufficient technological literacy because a context has been created which is so hostile to this goal. Devices are designed so that only limited isolating, testing, and replacing of parts is possible. Only a token effort is made to provide technical information to consumers; this is often in the form of a cheaply printed, poorly translated diagram or set of instructions. Consumers naturally are unaccustomed to understanding such information even when it is made available.

Given these constraints, it does seem doubtful that consumers can, in general, gain a sufficient knowledge base apart from specialized training. But these constraints are contingent ones, based upon past decisions to leave consumer knowledge out of the design and repair process. In other words, it is unfair to judge the potential for mass consumer technical education on a context structured on the assumption of illiteracy and dependence.
(3) DON’T MAKE ME FIX THAT!

Regarding the third justification, it would indeed be foolish to suggest that every consumer should be saddled with maintaining every technological device in his/her possession. It must also be acknowledged that as developed countries increasingly back away from manufacturing and generate their business activity in the service sector, there might be detrimental economic consequences were most consumers to begin doing their own repairs. It is difficult to predict whether most people, if given the choice, would exercise the option to do so. Is it not desirable, though, that consumers at least have the opportunity to make this choice, particularly should they find themselves in a situation where they cannot rely upon the help of technicians?

It is also not clear that no one wishes to do their own repairs. Clive Thompson, in a recent Wired article, notes the resurgence of DIY hobbyists and the development of resources such as Make magazine. There has long been an underground flow of DIYers, as evidenced by Popular Mechanics, The Mother Earth News, The Whole Earth Catalog, and the Firefox book series. Rather than fighting this and turning hobbyists into relative outlaws, the industry might embrace, enlarge, and empower this practice.

THE COSTS OF TECHNOLOGICAL DEPENDENCE

The most serious concern about the paternalistic model is that individuals are placed in a position of simultaneous dependence and ignorance. Though they find it difficult to manage in modern society without the technological devices that are a part of our way of life, most consumers are discouraged from seeking the information to maintain and repair them. While this may seem trivial when compared to, say, being denied medical information, it nonetheless has consequences. It is a sharp departure from the traditional goal of “self-reliance,” a value that once shaped the American way of life. Even if this goal is no longer so essential to us, I wonder if we realize the extent to which we have let it pass.

Commentators on an earlier draft of this paper asked whether this emphasis upon “self-reliance” perhaps reflects an unwarranted assumption of individualism, as opposed to a communitarian or cooperative view of human conduct. Perhaps the self-sufficiency required to survive on the frontier is no longer a virtue for contemporary citizens. Hasn’t the uniquely American form of “possessive individualism” gone by the wayside in the face of a highly interconnected “global village?” Why would one want to “fix it yourself” when others are ready at hand to provide
their trained services? Did the kind of self-sufficiency advocated by Tho-
reau, Emerson et. al. ever really exist for most people, and is it a reason-
able or even attractive way of life for the twenty first century?

This raises the deep question of whether self-determination and
applied scientific literacy are valued in the technologically-affected
aspects of our lifestyles. My concern is that we have moved into forms of
not simply cooperation but enforced dependence that exercise a signifi-
cant effect upon our lifestyles and personal economies. An economy
built upon services to maintain non-essential luxuries would be harmless
enough. An economy sustained by services vitally linked to pervasive
aspects of everyday existence seems less attractive, if, in doing so, it cre-
ates a population of highly dependent and vulnerable individuals reminis-
cent of the helpless earth refugees in the recent Pixar film, Wall-E.

I find it difficult to accept the argument that purchasing an item
amounts to a form of “tacit consent” to the hidden costs, forms of
dependence, and imposed ignorance covertly packaged with products. A
social contract view seems more favorable, in which those entering into
communitarian relations do so by choice. This would entail that they
have some idea of the kinds of dependence upon one another into which
they are (by agreement) entering as well as being offered alternatives. I
will also propose, below, an interpretation of such consumer-empower-
ment that preserves communitarian aspects.

On an existential level, the screening off of information about
everyday consumer items maintains the average person in a state of unde-
served ignorance, powerlessness, and absurdity. Contrary to the ethical
obligation (as stated by Kant) to actualize our talents and expand our
skills, we are denied the opportunity to grasp the workings of everyday
objects in our world. A kind of alienation persists, exacerbated by our
sense of handicap, fragility, and undignified helplessness. We feel a certain
dissonance as we hear repeated calls in the media for scientific literacy,
yet find our attempts to understand the workings of the CD player, the
hairdryer, and the washing machine stunted by a concerned, “you’re not
going to try and fix it yourself, are you?”

The burden of this problem is felt unequally. Losing technical self-
determination may create little problem for those affluent enough to
afford regular service calls. Those without such resources are left help-
less, or else in the dangerous position of attempting their own repairs
with little knowledge. All of the obstacles cited above become very real
for the indigent person, attempting to coax a machine back into life with-
out access to repair information or the special tools required. In addition,
since the poor are often unable to afford regular maintenance visits, what they own suffers from needing more frequent and serious repair. Needless breakdowns and premature termination of product life result, disproportionately inflicted upon those less well off.

Contemporary society thus holds out the pleasures of owning technological devices, but limits the resources to maintain them. The decreasing price of many electronic items has made them available even to the less affluent, but repair and service of these devices has not been made equally accessible. While much has been written about the limited purchasing ability of the poor, I am raising the different problem of how the poor are to maintain the little they are able to buy. Excessively opaque product design and the withholding of crucial technical information sharply limits the ability of the disadvantaged to “make do” with what they have.

There is also a question about the exercise of property rights. Normally, paying the complete purchase price of an item entitles the buyer to full ownership of the item in every sense. But this is no longer the case. Increasingly, buying technology commits one to a long term relationship characterized by a continuing dependence on the seller. For example, music, software, and film companies have, with the support of the Digital Millennium Act and the application of Digital Rights Management tools sought to limit consumers’ ability to copy and manipulate digital media content after purchase. Similarly, manufacturers have sought to limit consumer control over what they buy. Purchasing the item no longer entitles the buyer to relevant information about the functioning and maintenance of what he/she has purchased. One receives a “black box,” access to the internal states of which is by and large defeated. Should the item break down, the manufacturers or their authorized service outlets exercise their exclusive knowledge, in the process demanding more money from the buyer for its repair. While they do not repossess the item, they maintain a certain eminent domain over its continued ability to operate. The purchaser “owns” the item but does not fully control it. He/she is, in a sense which deserves further discussion, denied its “full use.”

Finally, there are serious ecological concerns. Since, as noted, many cannot afford to send their household technological items to the professional service person, and since these items are no longer self-serviceable, the average response is to throw them away. Technological devices are notoriously hard on the waste flow; they generally are not biodegradable and are composed of a variety of materials not easily disassembled, some of them toxic. Few waste haulers attempt to recycle discarded TVs,
stereos, shavers, etc. (nor do recyclers welcome them). Encouraging consumer ignorance thus further contributes to the degradation of the planet. The recent film, *Manufactured Landscapes* depicts the terrible costs to the disenfranchised by the growth of this technologically-rich, non-recyclable waste stream.

**DECRIMINALIZING DIY**

What is needed is an approach to consumer empowerment that preserves consumer safety, product price-point, efficiency, miniaturization and durability, community, and ecological sustainability. Some of the design standards that might help achieve these outcomes are:

- Accessibility of most frequently-replaced parts
- Standardized hardware that doesn’t require special tools
- Self-diagnostic systems designed with user-input
- Isolation and fail-safes for the most dangerous systems
- Comprehensible consumer-tested design that educates about the purpose and functionality of components (e.g. the color-coded cables used by many PC manufacturers)
- Well-written repair manuals, websites, and videos
- Technical support that educates rather than simply fixing immediate problems
- Design for disassembly and separation of recyclable materials

Consider, as an example, the light bulb. Most bulbs are designed so that they can be replaced simply. Only one kind of bulb will screw into the socket; the thread mechanism is unambiguous and guarantees that the right components come into electrical contact. The design isolates the most dangerous parts. Not all potential hazards are eliminated. One can still be shocked by putting a finger in the socket with the lamp on; hot bulbs can burn hands or be dropped on feet. But these potential injuries are acceptable tradeoffs in favor of enabling consumers to replace their own light bulbs. Imagine if it were otherwise.

Similarly, a well-designed product can preserve accessibility to consumer repair while shielding consumers from the most dangerously mistaken interventions. Function-transparent design coupled with adequate instruction represents a viable alternative to paternalism. For example, circuitry which is highly complex could be designed to include user-friendly self-diagnostic systems. Providing information about its internal states would thus be regarded as one of the normal and necessary
functions of the machine (just as some automobiles still feature water and oil pressure gauges). If anything, the trend of technological design has been to rely increasingly upon self-monitoring of internal states for efficient operation. Why not make it a goal to provide this information in a comprehensible way to the consumer?13

Another aspect of this proposal is the reconfiguring of the relationship between consumers and repair staff. An alternative to the withholding approach would be to provide technical information readily, while allowing parts suppliers or dealers to determine the level of competence of the inquiring consumer. They might then discourage, reroute or, better yet, educate those whose repair efforts appear likely to take them into harm’s way (just as pharmacists provide guidance to their customers about their medications). Repair centers might be established in which professionals work alongside consumers to assist them with their repairs.14 Rather than encouraging a mythical form of “self-reliance” this practice would build community-creating forms of interdependence that feature increased knowledge flow and higher levels of consumer confidence.

Unfortunately, this suggestion opens up the persistent liability concerns considered earlier. Giving consumers what is necessary for them to understand and repair their technological items may require making some changes in the law to allow consumers the option to take on, by consent, the liability and increased personal responsibility for risks incurred as a result of attempting their own repairs. Technical self-sufficiency can only occur as the “protect me or I will sue you” attitude is set aside. We are thus faced with the choice between assuming a measure of self-incurred but expertise-assisted increased risk, or an imposed safety at the price of a tangible loss of self-determination and personal autonomy. Our interactions with everyday household devices turn out to raise the deepest questions of ethics and political philosophy.

NOTES

1 An early version of this paper was given at the Ohio Philosophical Association and was published in the Proceedings of the Ohio Philosophical Association, April, 1992; a new version was presented to the Society for Ethics Across the Curriculum (October, 2002) and has been substantially rewritten for this article in light of the helpful comments received from that presentation.
I am not referring to “proprietary knowledge,” the secrecy of which is essential to making the product in a unique way. For example, it is not unreasonable for the manufacturer of Coca-Cola to withhold its secret recipe for Coke syrup, or for IBM to withhold the source code used in some of its products. These cases are very different than, say, the information involved in diagnosing a faulty washing machine timer. The difference appears to be that the withholding of proprietary knowledge is vital to prevent product duplication by competitors. The kind of information I am concerned with here has to do with gaining a sufficient understanding of the normal functioning of the device so as to diagnose its occasional faults and make informed choices about repairs. Most of the diagrams, specifications, wiring schematics, and diagnostic routines contained in published professional service manuals (available to competitors more readily than to consumers!) would fall under this latter category.

See for example the Sears online parts site, http://www.searspartsdirect.com/partsdirect/.

In actual fact, many household devices, controlled by integrated circuits, actually function on a very low and safe voltage after household current has passed through a transformer and/or relay.

Underwriters Laboratory (UL) standards for electrical devices are a good example of such efforts to shield consumers from hazards by demanding safe designs.

My treatment of this issue has been influenced by the discussion in Shaw and Barry, (pp. 482-491). The position I'm defending, however, is my own.

I am assuming that paternalism has the connotation of being an unwarranted intrusion into individual conduct. This criticism is thus in sympathy with the view expressed so eloquently by John Stuart Mill, that “the only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others. His own good, either physical or moral, is not sufficient warrant” (Mill, On Liberty, pp.16-7). Mill himself qualifies his principle, leaving out children and “those backward states of society in which the race itself may be considered in its nonage.” Regarding the latter, however, he adds, “But as soon as mankind have attained the capacity to be guided to their own improvement by conviction or persuasion (a period long since reached in all nations with whom we need here concern ourselves), compulsion...is not longer admissible as a means to their own good, and justifiable only for the security of others,” (191). Since I do not accept the belief that most consumers are irremediably technologically illiterate, I would agree with Mill that paternalism is not appropriate for “developed” societies.

For example, the Consumer Product Safety Commission counted 160 product-related electrocutions in 2003, down from 210 in 1993. Their figures are broken down by types of appliances, but it is difficult to extrapolate how many injuries were due to attempts at self-repair. Shopping carts cause many more injuries (an annual average of 21,600) than do home appliances.

The space program, however, is instructive. Though highly miniaturized, devices are designed so that key components can be swapped out, even by clumsy space-suited hands. User-repairability on the space station may be a matter of life and death.

With durability is the quest for devices, such as refrigerators, to last longer. This creates in many the assumption that after a reasonably long time, the
device has “lasted long enough,” and need not be repaired even if it could be. Could our refusal to learn to repair these items mask the symptoms of boredom with world of conveniences we have created, as Heidegger argued in The Fundamental Concepts of Metaphysics: World, Finitude, Solitude?

11 Thompson (p. 64).

12 Many automobiles already contain such systems, reading off each computer input (sensors and ignition pulse) and outputs (solenoids); however, they are often readable only using a special meter, with the charts interpreting the readings being limited to professional service manuals. Why not a digital readout on the dash, with interpretive charts and explanations in the owner’s manual or available on-line?

13 Cheap LED screens and USB ports have made accessibility to the internal states of machines technologically feasible and affordable. What is equally important, though, is that the information provided be consumer-guided and tested.

14 In a similar attempt, auto repair garages equipped with tools were rented by the hour to consumers. These businesses proved to be commercially unviable, however, in large part because of the high cost of insurance associated with operating lifts.

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