Leaf Blowers and Antibiotics:

a Buddhist Stance for Science and Technology

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Introduction

Sustainable technology, like mindfulness, requires cultivation. It is a process of constantly attending in the face of considerable distraction, a process that leads to a self-balancing wholesome state that has beneficial properties for both self and others. This brief essay begins with a consideration of science, scientism and technology. I will then use a handful of examples to consider how technologies appear to behave autonomously, often perverting the good intentions of their inventor or revealing unexpected opportunities for wholesome behavior. In many cases, it seems that apparently neutral technologies fit together with unwholesome tendencies, locking humans and machines into an accelerating and apparently unstoppable destructive dance. I will then propose a general strategy for engaging technologies which draws on traditional Buddhist practices, with two particular objectives: to gain insight into, and maintain awareness of, the actual bias of any particular technology, and to discover tactics for

interrupting the destructive cycles which are the cause of the ecological crisis in our world.

Debts

In trying to understand the "slippery" nature of new technologies I must offer my thanks to the many people with whom I have worked in the development sector over the past two decades. I had the privilege of helping those engineers who, for a few fascinating years, worked to transplant the shoots of the emerging digital revolution into the developing world and into the hands of those whom the emerging internet threatened to disenfranchise. I was witness to a process of social and technological transformation on a global scale, and part of an ethical response to that transformation. The project succeeded and has been supplanted by other less obvious challenges, such as wresting control of the Internet infrastructure from the multinationals and national surveillance services. My thinking on how technologies embed constructively or destructively in social contexts has been informed in part by an essay of Roy Rappaport, "Adaptive Structure and Its Disorders" (1979:145-172). Though I have surveyed some of the literature in the social science of technology such as Pinch and Bijker (1984) and its successors, it is oddly divorced from ethical questions.

Assumptions

I take it as a given that sustainable technology is a good thing. Human civilization is a fact in which we live, a part of the given situation within which I am writing this article, and it proceeds by technological advances: language, fire, smelting, money, guns, margarine and spandex. The conflict between human technologies and the survival of life on this planet has

become the defining crisis of our age. It is a simple fact that none of us may have great-grandchildren because the planet has become uninhabitable for humans within three generations. If that seems too alarmist, then extend the timeframe to, say, three hundred years and most people will agree that the change in climate, the steady increase in radioactive contamination, the emergence of new diseases and the loss not just of species but possibly of entire classes of organism will have had drastic consequences for the viability of all species, not just our own, on this planet. I will return to a more precise definition later, but for now I take sustainable technology to be a term indicating choosing to develop and adopt only those technologies that reverse the damage already done, or at a minimum inflict no further harm. A different study of sustainable technology might aim to strike a balance between economic development and ecological health, but this is fundamentally misguided in proposing that there ever could be economic development in the absence of a thorough and sudden movement to repair the planetary ecosystem. Mine is a crisis definition. In medical terms, we need triage or the patient will die.

Science? Technology?

I see no conflict whatsoever between science and a healthy planet, or between science and Buddhism. Science proceeds by the scientific method, the proposal and careful testing of hypotheses. It makes no unwarranted assumptions and holds to a healthy mix of curiosity and skepticism—indeed not too different from Buddhism, though with rather different rituals and iconography.

Scientism, by contrast, is an irrational belief in the authority of a, by definition incomprehensible, cloud of theories and doctrines, said to be discovered and defended by scholastics called "scientists." Very few such

"scientists" actually exist, but scientism tends to assign physicists, biologists and other scholars who use the scientific method to this category. Most biologists or physicists in fact believe that what they do is, and should be, both comprehensible and subject to constant revision in the light of empirical data. Adherents of scientism often confuse other adherents, such as politicians, industrialists, technicians or their employees, with real scientists. They tend to believe that these scholastics can always find technological solutions to human suffering, and indeed the industrialists and technicians work very hard at creating compelling new technologies that seem to address specific kinds of suffering. David Loy has described this religion-like behavior in terms of a neurotic response to the lack of a perduring self:

> We have forgotten what we are doing because our understanding of our lack has been displaced, and therefore our approach to resolving it. Instead of being the crux of creation and history, where the traditional Christian story placed it, our lack has been marginalized by our preoccupation with new technological powers and possibilities. We no longer depended upon the structure of the cosmos for our salvation, but tried to achieve it by ourselves. In place of the traditional nonduality between cosmos and history—providing us with an intricate spiritual obstacle-course to be followed according to fixed rules—we began to live in a open-ended universe where we had to set up the goals and decide which way to go. We decided to run into the future, and called the new game progress. (Loy 2002)

The term "scientism" has actually been used to describe a number of different attitudes, though it is almost always a bad thing. A good discussion

of this term can be found in the opening pages of (Haack 2003:17-8); the sense in which I am taking scientism is not that of "an inappropriate mimicry, by practitioners of other disciplines, of the manner, the technical terminology, the mathematics, etc. of the natural sciences."[2] I am, rather, concerned with what she describes as the "honorific" use of the term, in two varieties. The first is the unthinking expectation that "science" will provide the answers to the problems of the present age. The second, far more deliberate variety, is the cynical manipulation of that expectation and the authority usually granted science by politicians and marketers seeking a firmer foundation for their less plausible statements.

Technology, by and large, is a term of adoration used within scientism, and borrowed unthinkingly by its critics as an epithet to be hurled. By itself technology simply means studied craftsmanship, engineering, the sort of thing that Daedalus was so good at. When quantified, however, the term has a somewhat more precise meaning: it is an engineered innovation that engages with human behavior. We do not refer to a termite mound or the waggle dance of bees as "a technology," but yurts and cuneiform are indeed called "technologies," and it is in this sense that I use the term "technology" here.

However, in my first sense of scientism, the astonishing technological innovations of the past two centuries are taken to provide a basis for the belief that technological progress can solve major problems. After all, in the late Victorian period we had no telephony, no high-speed travel, and no transatlantic flights. Then again, none of these lacks were perceived as problems. Cholera, which *was* perceived as a terrible threat, was first controlled in London through a combination of careful reasoning that proved, in the case of the 1854 outbreak, that the disease was spread

through water. John Snow did not invent a cure for cholera; rather, he took the handle off the pump that supplied the bad water. If we take a careful look, we discover that most major technological changes of the past hundred years (the telephone, the car, the airplane) were not invented in order to solve perceived problems—but once they had been invented, these devices were embedded in attitudes and uses such that they became desirable and spread through the creation of markets. Yet the belief that technologies will emerge to solve present crises persists.

This is not to say that technology only advances by accident; my point, rather, is that the technologies which have deeply shaped the way we live were not adopted through a process of deliberation and choice based on their contemporary utility. In retrospect, we think, "How did we ever get by without the telephone?"; but there was no crisis pre-telephone that was resolved by its development. We create a fictional lack and project it back into imaginary history as part of the social process of making a new technology feel ordinary. It is just such a sentimentalized and deeply false sense of technological progress that, for example, George W. Bush invests his faith into when he proposes that technological innovation is preferable to restraint as a solution to global warming. About the United States, Siva Vaidhyanathan writes:

> In lieu of deploying deliberation and recognizing complexity at the roots of social and political problems, we operate, it seems, in a techno-fundamentalist cloud, waiting for someone to invent the next great things that can clean up the air, reverse obesity, and magically stop missiles from landing in our cities. (Vaidhyanathan 2006:556)

Let me now turn to my second sense of scientism, that is, a deliberate cultivation of the naive trust in "scientific progress," what Vaidhyanathan calls techno-fundamentalism. It is here that we find the strongest link between "scientism" and technology. In our age it is the creation of markets that proves decisive in institutionalizing technologies. It may once have been, as with the shift to bronze tools, that the simple advantage of having bronze weapons and tools spoke for itself. For us, though, technologies take hold when they attract middlemen to promote them. When there is a person or company who stands to benefit by persuading others to use a technology, then that technology is far more likely to spread.

In our time, the creation of markets has become an end in itself. This is an unavoidable and deeply corrosive feature of the globalizing, late capitalist world in which we now live. It determines not just the economic game, but also the structure of the social world within which we must find a solution to ecological crisis.

The challenge is substantial, then. We are led not only to overlook the social construction of technology, but we have invented an entire industry whose job it is to persuade us that unsustainable growth is an acceptable long-term trade-off for the satisfaction of short-term, illusory wants. That industry demands more innovations around which to construct new markets, and seeks to construct new markets that can be occupied by new devices. The only sustainability on offer is sustainable development, a rose-colored version of the myth of endless growth and continual progress. What sort of response can Buddhism offer here?

The tradition itself offers an answer. The first move must be a careful analysis of unsustainable technology, both in its particular manifestations and in general. Such an analysis will expose the roots of the problem and

show where and how to solve it. The last step is, of course, the Path. By the end of this paper I hope to have come to a useful definition of the phrase "sustainable technology." As I have already suggested, however, it is neither a term circulating within scientism, nor is it a noun at all: it is a verb, a process, a vigilantly maintained dynamic attitude.

Leaf Blowers

Leaf blowers were discovered by accident. According to the Echo Corporation, workers using a backpack-mounted portable pesticide-misting device in plantations noticed that it also whisked away leaves and other debris, "doing a better job than a rake or a broom." Once its marketability was recognized it was advertised as a tool for commercial gardeners, and the rest is history. "The leaf blower has become indispensable."(Echo Inc 2003:4)

For those unacquainted with the leaf blower, the device consists of a two-stroke gasoline engine in a backpack used to drive a powerful fan; the air is directed down something like a vacuum cleaner hose. The air stream drives all lightweight debris, including leaves, clippings, dirt, insects and anything else moveable before it. Depending on the operator, the resulting bank of organic material is either pushed into a neighbor's yard or, in industrial applications, collected for removal by large purpose-built trucks that use a large vacuum mechanism to suck everything up for transfer to a municipal waste site. Although they have been banned in several parts of the USA and some cities in Europe, their use is hotly contested and there have been legal battles lasting for decades over their regulation. The manufacturers have recently begun to introduce eco-friendly electric leaf blowers, so called because they are quiet. Commercial garden maintenance

workers and enthusiastic home users argue that nothing can do the work of a leaf blower as efficiently, or indeed as thoroughly, as a leaf blower.

Doing the job

Why is a leaf blower so much better at doing the job than a rake or a broom? What makes them so very indispensable to their proponents? Putting aside the profit motive for the manufacturers, the answer is somewhat curious. The job leaf blowers do is not a job that needed doing before the existence of the leaf blower; nor is it a job that any experienced gardener would wish to undertake. It is, simply, to clean away all loose organic matter from the surface of the earth—and the promise of this ideal, however poorly it fits with plant ecology, created a new ideal in the mind of the garden-tool consumer.

This is the sort of ultra-cleanliness that is the outdoor analogue to the indoor use of virulent disinfectants on every surface. It appeals to the consumer who is horrified to learn about the bacteria in their intestines and the mites on their skin. It is an artificial level of cleanliness that strips away the garden's ability to regenerate its own nutrients, to provide a food source for foraging birds and earthworms, or even to provide shelter for seedlings. Keep your garden this clean and of course you will need to provide lots of extra fertilizers and pesticides. To add insult to injury, this entire process is powered by highly polluting two-stroke engines whose screech penetrates every window.

No sensible gardener would ever want to strip away their garden's ability to regenerate its topsoil through the accumulation of leaf mold. Granted, a garden is not wilderness; it is managed, and most gardeners will clear up each season and drop the leaves onto the compost heap. That practice is a

way of managing the natural regeneration of the garden's ecosystem while minimizing habitats for unwanted pests—slugs, for instance—but to strip off all the loose matter and throw away all the compost is a brutal act of waste. At my university the wonderful Scottish autumnal colors are met by a phalanx of leaf blowers that leave the wretched soil as naked as the branches.

What is extraordinary, though, is the way in which the debate over banning leaf blowers has been framed. The ideal of an unhealthily clean garden has been accepted without any significant protest, and the various claims and counterclaims that ricochet through the town councils are all phrased in terms of the side effects of the technology. It is loud and it is polluting, and for those reasons leaf blowers should be banned. In a sense, the objectors have strongly endorsed the technology, for they have not questioned the job it was designed to do. Announcing a 2006 law regulating leaf blowers in Westchester County, New York, for example, Andy Spano said, "I think many people would be astonished to learn that a leaf blower operating for 30 minutes puts out more emissions than an automobile traveling 2000 miles"(Westchester County 2006).

False consciousness

In other parallel debates, such as the discussion of chemical and mechanical ways to make people prettier, it did not take long before the misplaced ideals were exposed. Feminists have pointed out that advertising, beauty magazines and pornography now use digital techniques to show impossibly beautiful women, thus calling into question what we have been led to think of as beautiful. Rather like the cartoon character who, distracted, walks off the cliff and hangs for a moment in the air before

falling, this is an example of a tantalizing ideal that carries its believers well beyond common sense.

This sort of deluded thinking is usually called "false consciousness," and it is very familiar to Buddhists. As soon as we see that the leaf blower depends for its popularity on an unrealizable ideal, we can see that it is an unsustainable technology. We also see that the leaf blower would not exist by itself—the peculiar and destructive ideal of lifeless, compostless and spotless gardening is inherent in the machine. A person who buys a leaf blower is buying into the ideal it claims to achieve, and in so doing they are distorting their ability to see the world as it really is: a world of decomposing compost, hungry slimy worms, fresh new seedlings and trees that drop their leaves all over the lawn, every year.

The case of the leaf blower is useful precisely because it is so exaggerated. From it we can see that a technology depends on suppositions about the world and that it both depends on and can reinforce specific mental attitudes. Leaf blowers depend on a model of garden ecosystems in which the garden is like a Formica countertop to be wiped clean and shiny; and they encourage an attitude, in the context of human-ecosystem relations, in which humans treat ecosystems in the way that they treat cleanable household appliances or automobiles. The garden is an object, not an organic system, and certainly not an organic system that includes the human.

A worldview that condones the use of leaf blowers is not informed by investigation of the empirical; rather, it is a deluded worldview in which, just as "science" in the guise of lab-coat actors tells us how to clean our kitchens with new and powerful solvents, "science" can show off an impossibly clean lawn whilst overlooking the energy cost, noise pollution

and topsoil damage. Once we can see the way in which a technology is constituted together with attitudes and practices, we can see that something like a leaf blower is genuinely destructive: it isn't just the noise, it's how it makes you think.

Antibiotics

Medicines are a class of technology that has a very respectable Buddhist pedigree. Zysk (1991) has shown the relationship between the emergent class of scientific medical practitioners and the Buddhist monasteries. In a striking passage from the *Sivi Jātaka* (Cowell 1990:vol. IV, p. 250), the physician Jīvaka elects to use drugs rather than surgery during an eye transplant operation. Buddhist physicians were (and are) constantly searching for effective new botanical preparations, and I assume that, just as Fleming was delighted with his accidental discovery of the bactericidal properties of bread mold and worked to isolate the key ingredients, so too Jīvaka would have done the same.

During the Second World War, the introduction of antibiotics saved countless lives that would have been lost through infection. As penicillin was deployed more widely, penicillin resistant strains of common pathogenic bacteria emerged and the battle was on. Pharmacists worked to discover new antibiotics and the bacteria evolved to meet the challenge, with the result that we now have multiple antibiotic resistant strains of common bacteria, such as TB, gonorrhea and Staphylococcus.

Yet it would be difficult to argue that antibiotics are linked inextricably with an absurd worldview in the way that the leaf blower is. Even if the initial deployment of antibiotics encouraged hopes of disease control, the fact that it only took three years for resistant strains of bacteria to emerge

meant that the promise of antibiotic therapy was always understood, at least by scientists, in a thoroughly pragmatic way.

To understand the pervasive misconceptions surrounding antibiotics, we need to look at a broader picture, and to return to our definition of scientism. Scientism, in my first sense, holds that most if not all human ills can be solved by technological innovations. As public awareness of antibiotics spread, they became an icon for the all-purpose medicine. Patients visiting their doctors would ask for antibiotics for almost any ailment, and doctors, under pressure to keep their patients happy, would often prescribe them. In countries such as Mexico and Nepal where access to medicines is not constrained by a prescription system, the inappropriate use of antibiotics is now a routine part of folk medical practices. Indeed, I had a colleague in the United States who would routinely travel to Mexico in order to buy antibiotics for self-prescription, rather than pay the fees for a doctor's visit, and something similar is common practice among tourists and researchers in Nepal. The standard trekker's guidebook to Nepal even lists the antibiotics to buy. It would not be overstating the case to say that antibiotics are now perceived as a substance that people want to get, even if doctors want to regulate and constrict the flow of these powerful substances into the community. How did such a strange and magical view of these drugs emerge?

Although scientists certainly did and do understand the limits and dangers of antibiotic therapy, these drugs are products and they are manufactured for sale by multinational pharmaceutical industries. Such firms are happy to market their products as "magic bullet" solutions if it encourages demand—and here we can see the transition to the second, more vicious form of scientism. Marketing material produced by industry

agencies is routinely filtered into the popular scientific press. A good example is the press release of the American Chemical Society, published with little alteration in *Science Daily*, which describes a new class of antibiotic which will be effective even against antibiotic-resistant Streptococcus bacteria (American Chemical Society 2004). The title promises "The End of Pneumonia."

Recognizing the danger of this attitude, the British National Health Service began a public information campaign in 1999, using 1950's style posters to drive home the fact that antibiotics are useless against viral infections. This has been coupled with strong directives within the National Health Service itself urging general practitioners not to prescribe antibiotics unless necessary. There is even a related primary education
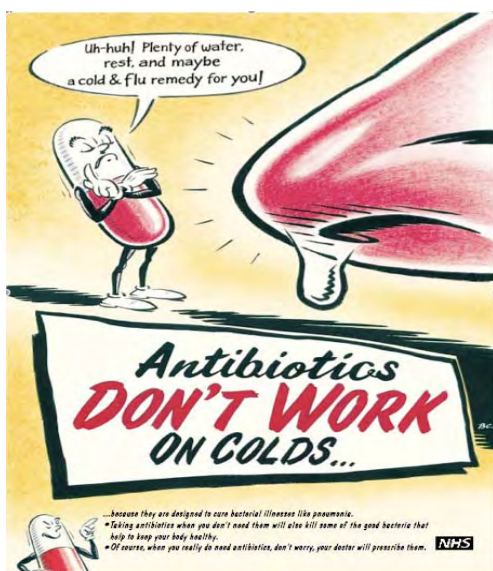
campaign within the school system. In the United Kingdom, where there is national control of both the delivery of medicines and the understanding of medicines, it is possible to bring public attitudes into line with best practice, even though that requires managing the delivery of a complex message: "Antibiotics are powerful medicines that can save your life, but they must only be used when really needed or they will lose their efficacy." Such a public awareness campaign has not been mounted in the United States or in any developing country that I am aware of, although health professionals are certainly acutely aware of the problem. Where the

free market dominates the spread of ideas, it is the perceptions fostered by the pharmaceutical companies that take root.

What, then, is the relationship between this medical technology and the attitudes with which it is received? The notion that a single type of medicine could be a magic bullet, a panacea, is enormously appealing. It offers a sense of simplicity and security. Humans often want to believe that there could be a magic cure, a single solution. The analogy to meditative training is acute. It is a constant challenge within Buddhism to maintain an active, patient awareness that remains light and flexible, that does not settle into a pattern of responding to every stimulus in the same way. Among the perfections, this quality of constant and untiring vigilance is called *vīryapāramitā*, the perfection of heroism. It forms the subject of the seventh chapter of the *Bodhicaryāvatāra*. Śāntideva, in his opening definitions, considers *ālasyaṃ*, sloth, and its causes. The fourth of these is *apāśrayatṛṣṇā*, the longing for an easy refuge or a quick solution,[3] together with *avyāpara* (indifference), *sukhāsvāda* (indolence), and *nidra* (sleep). More generally, this sort of spiritual sloppiness is sometimes referred to as *pramāda*; but this usually refers to carelessness, not the specific human tendency to seek a panacea rather than encountering each challenge on its own terms.

The sense of longing for an easy refuge that Śāntideva calls *apāśrayatṛṣṇā* characterizes a great deal of human behavior, especially our religious behavior. It is precisely because one-fix solutions lead only to fixation on a false answer that Buddhist texts on the cultivation of mindfulness carry a whole quiver of responses to differing conditions. Sloth and drowsiness are to be countered with a sense of urgency, driven by reflections on the brevity of life and the rarity of a human rebirth; excessive agitation is

countered by calming practices, and so forth. To return to the medical context of antibiotics, however useful an antibiotic might be in a specific context, it is only one tool to be balanced with many others. Modern British practice as advertised in the publicity campaign above includes inhaling steam and decongestant aromatic oils, drinking plenty of fluids, taking paracetamol for fever and other rather common sense practices. In the wider campaign against multiple resistant strains of Streptococcus in hospitals, the most effective tool is simply a renewed emphasis on cleanliness and hygiene. It is a painfully sharp example of the human tendency to put our blind faith into technological solutions that, having learned the lessons of scrupulous sanitation during the nineteenth century, we have apparently forgotten them as soon as a "magic bullet" solution came along. It is, of course, far more work to attend to hygiene at all times than it is to simply take a pill once one does become ill.

Thus the example of antibiotics shows us that some technologies, even when they arise at a time when scientists are deeply aware of their limits and dangers, nonetheless hook into the general human attitudes of laziness and the desire for an easy solution. These attitudes are characteristics of "scientism" in its first sense; and in this particular case they also form marketing opportunities for the industrial combines who manufacture and sell medicines in unregulated medical markets, especially in the developing world. Where, by contrast, the limited efficacy and potential dangers of a technology are clearly understood, and relevant organizations enjoy the support of the government, it may be possible to promulgate a prudent and cautionary message that fosters a realistic attitude toward the technology in question.

From a Buddhist perspective, antibiotics are a valuable medical technology, but one that plays too easily into a natural human frailty. Fundamental Buddhist techniques for cultivating a light, supple and responsive awareness also help us guard against mis-conceiving a specific sort of antibacterial medicine as a panacea for all ills. In so doing, the Buddhist insistence on refusing easy generalizations falls very much into line with the scientific method, which tests each hypothesis in order to establish the limits of its applicability. The medical technologies they generate will by and large be sustainable technologies.[4] Both the Buddhist method and the scientific method must, therefore, suspect and be critical of the rhetoric of scientism, especially when it is used to sell medicine as a commodity.

Cars

The automobile is the single technology that has most changed the face of the earth in the past century. Film footage from Edwardian Lancashire recently broadcast on the BBC (Mitchell and Kenyon) shows broad streets lined with smoking factories and crowded with people, trams, carriages with horses, and bicycles—but no automobiles. A century on, and it is perfectly possible to walk through the center of a major city and see no pedestrians at all, only endless lines of cars.

A significant proportion of the land area of any European or North American town has been given over to paved roads—more, for example, that is given to parks or schools. Yet that asphalt, which makes up at least ten percent of the surface area of a typical town, is by definition uninhabitable space. A hundred years ago, it was a public space; now it is a deadly melee of speeding cars. Children must be carefully trained for years before they attempt to cross the road alone.

An entirely new class of village has developed, the commuter suburb, with no civic buildings or facilities of any sort, only private houses and wide roads. Old rural settlement patterns of densely packed centers surrounded by worked agricultural land have given way to an even mesh of private plots. In the United States, the majority of humans now live in suburbs. The layout and facilities of such communities are designed around the car; it is impossible for their residents to walk to their offices or even the nearest food shop. In California, it is commonly believed that a driver's license is required in order to vote;[5] and in many industrialized nations, the acquisition of a driver's license has replaced older rites of passage marking the transition to adulthood. In the ordinary transaction of buying a map, it is unthinkable to be given a map that does not show automobile roads; yet it is commonplace to be sold a map that does not show pedestrian, bicycle or train routes. It would be regarded as the act of an unpardonable crank if I were to specify, as part of my contract to shift my household goods from one city to another within the UK, that my goods travel by train as much as possible.

The advent of the car, then, has led to several other major changes in human society. It has changed where we live, how we move, and how we understand ourselves as adults. In a very real sense, life without the car is *unthinkable.* Even for the many people worldwide who do not own or drive a car, whether by choice or by circumstance, the terms on which life is lived are framed in terms of an ordinary person who, it is assumed, drives a car. The ownership of a car is a standard of wealth in developing countries. During rapid inflationary periods in South America those that can, hoard their wealth in cars; and certainly in Nepal, if you can get a car, you can set up a business. In development discourse the emergence of unsustainable consumption patterns is sometimes described as "a want becoming a need."

In this case, the want has become a need, and the need has become an irreducible social fact.

If, then, we wish to address the unquestionably lethal effect of the automobile[6] and its subsequent effects on the ecosystem, we cannot realistically propose that people will abandon their cars. We might as well propose that people abandon literacy or money. Those, too, were innovations that provoked significant and irreversible social changes. It may well be that, as fuels begin their inevitable steep price rise in the middle of this century, cars will become unaffordable for all but the wealthiest sectors of society; or it may be that we find some way of replacing the car with a less dangerous, less damaging form of personalized transport. Where the leaf blower carries a patently silly way of thinking with it, and antibiotics play into a natural human weakness, the advent of the automobile has actually changed the categories with which people think. To understand how cars have become so ubiquitous despite the damage they do to humans and the ecosystem as a whole, we need to consider carefully how cars make us think.

Thinking through cars

This is not to say that the new categories for thought are good. What, in fact, is it that makes a car compelling? It is the extension of personal space at the expense of participating in public space. An automobile allows an individual to project themselves more powerfully, and with less regard for consequences, than they can while simply walking or cycling. If I trampled someone to death it would be taken as intentional homicide; but I can run him down and claim that I just did not know they were there. Within my car I am protected from angry passers-by, especially if my car has darkened windows and a chauffeur. An individual within a car can move through

public spaces without participating in them. They appear to move farther, and faster, than by almost any other means. So profound is this impression that people will claim that they can travel faster by car than by high-speed rail. The sense that they are in control of the car and do not have to negotiate waiting in any public space makes them feel that they are traveling faster. A competition held in Portland, Oregon in the early 1980's, repeatedly showed that traveling across town was achieved most quickly by a cyclist, then via a bus, and slowest by an automobile. Similar races have been reported in a number of other congested cities, including London (1999), Santa Cruz, California (2002) and Albany, New York (2004), and the bicycle always seems to win. Yet the perception of speed is such that people always believe the car is quickest.

Even in areas of terrible traffic congestion, time and time again people show that they would rather sit, alone, in a car stranded in traffic rather than suffer the indignity of using public transport. For those who expect to use a car, mass transit of any sort is offensive because it is shared. This is why carpooling schemes are so rarely adopted without considerable pressure and incentive: sharing your own car with equals is almost worse than taking public transport.

Sharing a car with junior members of one's own family is better, but still not ideal. Where a family has to buy a large family car, it is perceived as unsexy, and the urge to buy a small car that "puts the fun back into driving" comes into play. What fun? Why is it more fun to drive a little car? A small sports car is fun precisely because it demonstrates that its owner is not subject to the unfortunate requirement of carrying several other people. The fun is in being seen. In fact, driving itself is not very fun after the first few minutes. The driver tends to drift off, to become distracted, to put on

music; if there are children in the car, the children get bored and fidget, and the driver will eventually become angry, as they become a distraction, or rather, the wrong sort of distraction.

Pervasiveness and addiction

When we try to understand why the car went from an expensive and impractical machine to a universal symbol of social and economic status, the model of addiction may be useful. In the discussion of antibiotics above we saw that, however much scientists took heed of the self-limiting usefulness of antibiotics, they still appealed to a natural human tendency, a desire for easy solutions. The biochemistry of intoxicants, and especially addictive intoxicants, is sometimes explained using a notion of chemical locks and keys. Heroin, for example, fits into a slot in the brain's chemistry that evolved to receive natural pain suppressants called endorphins. Although heroin fits the same slot, it is not produced within the body; it can only be supplied externally, and its effect on the receptors is very strong compared to the naturally produced pain suppressors. This natural proclivity to receive an artificial substance offers a partial explanation of the highly addictive nature of heroin.

So too, I would argue, the car fits a slot in the human psyche, although not one that is so easily mapped as a neurochemical receptor site. Cars are part of a general tendency to protect the body and increase the space it controls. They fall into a pattern of earlier innovations: clothes, armor, and horses. They lead, as did armor, to an increase in aggressive behavior, which in its worst forms becomes road rage. They cultivate an illusory sense of autonomy for the car user, who is encased in a far larger and more mobile shell than the human body by itself.

Road rage, road ignorance, road desire

The car appears to most humans to be a natural extension of embodiment, and one to which most humans either aspire or feel entitled. A person in the grip of road rage does not think, "What dreadful thing has happened to me that I feel so terribly angry?"; we think instead, "That other person has violated me and I must have revenge!" There is no sense of separation between the driver and their body-as-car, yet the non-perception of that rather obvious difference is the delusion that fuels the rage, and the implicit desire to really have a body made of metal that moves at 100 kilometers an hour completes the circle of the three poisons. There is rage, there is willful ignorance, and there is passionate desire. So, too, there is no felt gap between our perception of the opponent and the opponent's attacking-car-as-body; and just as a profoundly poisoned view of ourselves as driver leads to road rage, so to we must construct the imagined opponent. Rarely does a driver think, "Are their indicator lights broken, or is it their rear-view mirror?"; instead, we think, "Why did they cut me off?"

Car dealers

Moreover, as with the heroin vendors, so with the car marketers. We did not transform our planet into a paved, unwalkable and stinking suburb by accident: industrialists and policy makers worked hard to bring us here and to make us believe that this was progress. From Henry Ford to Margaret Thatcher, astute and powerful people have worked to displace public transport, to create a culture of car dependency, and to make the present situation seem natural. Los Angeles, now an icon of car super-urbanism, had until the 1940's one of the best light rail systems in the world; but it was purchased, and scrapped, by an industrial combine that manufactured cars. Calcutta, by contrast, still has a

staggeringly efficient tram system, built before the Second World War and as yet both cheaper and faster than any car.

Here we come, again, to difficult territory. The free market, as theorized by economists since Adam Smith, is also a technology. It has no mechanical presence; there is no windup box or flapping gadget that we can point to and say, "There is a free market." It is, instead, an idea; but it is an idea that is an innovation, and one that is embedded in a bundle of attitudes and presuppositions. Subsequent technologies, such as mass production, depend in part on the innovative technology of the free market for their conceptual coherence and practical viability. The car as we presently experience it also depends on the free market for its conceptual coherence. Technologies depend on other technologies—this is the meaning of innovation—and can inherit the problems of their parents. No free market is sustainable, as the very idea presumes either unlimited resources or a set of periodic and probably lethal crises that act to limit the supply of crucial inputs. If the humans in the marketplace die off, there will be no marketplace.

Medicine for the car user

Once we understand that the car is compelling because it offers an enhanced experience of embodiment, the parallel with addiction becomes clear. Just as heroin fits into an existing biochemistry of pain suppression, so the car fits into the existing compulsion to see the body as the basis for autonomy. Just as with heroin, the sense of power and fun is illusory and short-lived, but the social (and in the case of the car, ecological) damage is far greater than the addict themselves realizes. Perhaps cigarette addiction would be a better model, inasmuch as cigarettes were, until very recently defended as innocent or at worst harmful only to the smokers themselves; and, more positively, it does seem as though cigarette smoking is on the

way out, due to concerted efforts on the parts of public health organizations and a change in the legal climate.

If the use of cars derives its satisfaction from a greatly magnified experience of the body, then perhaps the appropriate medicine is the antidote prescribed by the Buddha for the unwholesome attachment to the body. In the Four Foundations of Mindfulness, a detailed and gruesome[7] exploration of human anatomy, coupled with a precise visualization of the decomposition of a corpse, is used to shake the meditator loose from any attachment to their own body. By this line of argument, we need graphic car death meditations. Indeed, the Department for Transport in the United Kingdom has released a few quite shocking television advertisements targeted at drink driving. Perhaps every car should be prominently marked with the portraits of some of the people who died in traffic accidents in the previous year before it was sold. Although this does not establish the link between automobile use and broader ecological impacts, such as global warming, it would begin to erode the myth that automobiles provide a safe shell from within which to pursue one's autonomy.

Engaged action

Should every Buddhist then immediately abandon their car? If we take it that Buddhists should be concerned with sustainable technology, then what is the appropriate Buddhist attitude towards cars? Here we come to a distinction between levels of practice. In the earliest *Vinaya* and in the *Majjhima Nikāya,* a distinction is drawn between the standards that monks and nuns should uphold, and the standards that lay Buddhists should uphold. I take the Buddha's advice to lay people as the minimum standards that a committed Buddhist should undertake; in our present age, the line between lay Buddhists and celibate monastics has been blurred in many

ways, and I would hope that most serious Buddhist practitioners would go beyond these minimums.

Śākyamuni did not expect lay Buddhists to be renunciants. He did, however, suggest that they take the five lay precepts seriously (AN VIII.26) and make themselves an example for others, as well as follow the standards laid out in the Eightfold Path. In the *Sigalovada Sutta* (DN XXXI) he urges householders to take up the first four precepts (they are free to consume intoxicants), and not to let their actions be driven by desire, anger, foolishness or fear (Pāli: *chanda, dosa, moha, bhaya*), all four of which appear to play a part in car culture. At the same time, according to the *Sigalovada Sutta*, it is the householder's duty to look after the dependent members of their household. Although it is possible to make a case that the environmental impact of automobile use is so severe as to constitute harming life, it is also the case that an ordinary European or North American household usually has access to, and indeed usually owns, a car. Moreover the viability of the household is often dependent on that car for commuting, for shopping and procuring goods at a fair price, and for routine travel such as visiting friends or even traveling to the nearest Buddhist center. In Europe and North America, Buddhist monasteries and temples are few and far between, and rarely near railway stations.

However, in the spirit of Thich Nhat Hahn's new set of fourteen precepts, we may well take the precept of right livelihood to apply in this case. Living in a suburb that requires the use of a car to get the children to school, that requires a car to commute to work, that requires a car to get to the shops or train station: this is not a right livelihood. Thus, we should strive, where possible, to live in towns or cities. In these dense population centers with

local services no car is needed to get through an ordinary day of work, shopping and schools.

This goes against the dream of rural tranquility that many Western Buddhists hold dear, but the dream need not be sacrificed. Get together with friends and sort out a rural hideaway that is a reasonable cycle ride from a countryside railway station. The same approach can be taken to the inevitable periodic need for a car: hire one as needed, ring a taxi, or share one car among a group of friends. On the positive side, one should ride a bicycle where possible, use the train, and work together with other community members to reduce the use of petrol-driven transport generally. This may also involve choosing where possible to buy locally produced goods and to support services such as cycle messengers that reduce the need for cars. Some local authorities in the United Kingdom are actively encouraging car-free living. A major housing development, Slateford Green, was built in 1999-2000 in Edinburgh, with good cycle routes and transport links and without a single parking space (Scheurer 2001). Because the developers did not need to build in space for cars, they were able to sell the resulting properties for far less money.

For those of us who might be involved in setting up monasteries or retreat centers, it is critical that we factor in access for those who do without cars. This could range from making sure that public transport stops nearby, to working with neighbors and civic authorities to establish a pleasant pilgrim's footpath that allows visitors to walk from the nearest railway station. Perhaps more pointedly, we should encourage important Buddhist figures to set aside the car as a status symbol. Thich Nhat Hanh's insistence on walking is a far better example for Buddhists than an

important lama racing through an impoverished Himalayan village in an expensive 4x4 with darkened windows.

No-car-mind

What if you choose to abandon the car altogether? The avoidance of cars as a spiritual discipline has much to recommend it. Speaking from personal experience as someone who grew up in a very car-centric culture (I routinely drove 1000 kilometers a day during university weekends) and then had the opportunity to forget the car, I can attest to the extraordinary sense of relief that comes when, after some weeks, you suddenly realize that a whole quarter of your internal effort that was dedicated to fending off other drivers, finding parking spaces, and worrying about speeding tickets is now free for more wholesome use. It is liberating, but it is also ostracizing. Friends and family will be annoyed with you if you insist, against the grain, on not buying or using a car. It becomes far more challenging to go for lovely walks in the country, and much more difficult to zip hundreds of miles across the landscape to some other watershed to see a friend for the weekend. You become uncomfortably aware that buses are used by the young and the old, but not by people who have jobs and should, therefore, have cars. Going without the car is a humbling discipline. I heartily recommend it as part of our modern *Vinaya*, both because it is an improving spiritual discipline and because by avoiding cars we would set a good example. Indeed, these are precisely the two kinds of reasons that Śākyamuni gave whenever he instituted a new rule in the *Vinaya*: either it was conducive to wholesome mental states, or it established the good character of the *sangha.*

Reflections Thus Far

From the first example, the leafblower, we learn that a technology is not just the machine. It is a bundle of attitudes, expectations and motivations that come together with a machine. In our present age, the context for these attitudes includes both a naive belief in technological development, and the exploitation of that gullibility to create new markets for useless or even destructive devices. Although the machine itself may not look like much, the (often unacknowledged) attitudes that travel with it can lead to terrible ecological damage. To understand the technology, one must consider the cognitive systems in which it is embedded.

The second example, antibiotics, shows that even if this bundle of psychosocial dispositions is acknowledged, a particular technology (in this case, a new medicine together with its embedding assumptions and attitudes) may engage with pre-existing dispositions—the "desire for an easy solution." In this case we find that the properly scientific prudence and caution with which antibiotics ought to be deployed is overridden by the vast hunger for a single medicine that cures all ills. Moreover, especially in a market economy where the producers of a commodity will be focused on maximizing their short-term gains without considering the wider effects on the ecosystem, it may well be the case that there are agencies—here marketing agencies—that have a sophisticated understanding of the interplay of these assumptions and dispositions. Directly contrary to the Buddhist understanding of what is wholesome, these agencies will use their understanding to whip up a greater desire among potential buyers of the technology, thus driving a valuable and beneficial technology out of balance and rendering it unsustainable.

Cars, our third example, show what happens once this process has reached a high degree of social integration. Although owning and using a car is dangerous, expensive and unpleasant, the lock-and-key fit between the attitudes and expectations in which the car-as-machine is embedded and the broader domain of unwholesome attitudes about embodiment that humans generally carry has become so pervasive as to appear to be an ordinary feature of the world. This almost seamless integration of a natural desire and a technology that fits with that desire but amplifies its pernicious effects by orders of magnitude is a form of addiction. As with any addiction, the dealers have no intention of letting us kick the habit or even admitting that there is one.

Even so drastic a problem as car addiction nonetheless can be understood in terms derived from the Buddhist analysis of human nature. From the long and varied tradition of Buddhist insight meditations, we can analyze car dependency in terms of unwholesome attachment to the body; and in general, I would argue that the tradition of insight meditation (taken in its broadest sense) offers us tools to detect the unwholesome dispositions that cluster around unsustainable technologies. Moreover, early Buddhist materials offer a meditation practice that is an antidote to the unwholesome and deluded attachment to the body; and both the lay precepts and the eightfold path offer some positive guidelines for living a life that is not plagued by unwholesome attachments.

Literacies

It is important to recognize that technologies may be good as well as bad, and some are inconsequential. An example of a good technology is literacy, or rather the many literacies. They did transform the way we think; arguably the introduction of manuscript literacy in the codex form in South

Asia helped give rise to Mahāyāna as a whole. Certainly it has allowed for the compilation and preservation of a vast array of enlightening material. I have written about the peculiar linkages between ways of being literate, technologies of literacy, and religious traditions elsewhere. Suffice to say that the way in which manuscript and especially print literacies developed worldwide clearly exposes the radically different ways in which a technology can embed into pre-existing attitudes and expectations. Literacy generally, though, brought about a vast expansion in the reach of human culture at relatively little material cost. Newspapers are, of course, an exception—they waste a great quantity of wood—but they are an exception.

The recent advent of digital literacy has brought about a rapid expansion in the range of textual resources a single scholar or school can refer to in the course of a single day. I now have the entire Tibetan Canon in CD-ROMs above my desk, taking up about as much space as Lamotte's *History of Indian Buddhism.* Digital literacy and the internet has given birth to a new sort of community of Buddhists, a mix of nuns and monks, scholars and practitioners who debate endlessly; it provides a home, of sorts, for the scholastic wing of the new global Buddhism. Yes, it also provides an opportunity for pretence, jealousy and bickering; but the desire to communicate, the wish to find teachers and to read the works of those now gone: these are wholesome tendencies that are enabled by literacy in all its developing forms.

Insights and Precepts

So we return again to a medical metaphor. Unsustainable technologies are not just polluting gadgets; they are innovations wrapped up in bundles of mental dispositions. To understand that a technology is unsustainable we may only need to see, hear or smell it, though often a far longer study is

required, as has been the case with greenhouse gases. To understand *how* and *why* it is unsustainable requires a very different sort of analysis, of a sort which falls somewhere between the psychological analysis of insight meditation and the cultural analysis of social anthropology.

What antidotes can we find, then, for unsustainable technologies? More importantly, how do we progress from curing illness to living well? From the example of the car the importance of both meditation (*samādhi*) and morality (*śīla*) becomes clear—not altogether surprising, given that these are two of the key aspects of the Eightfold Path. Insight meditation gives us categories by which to diagnose the pernicious attitudes and expectations that make a technology unsustainable, and it also gives us the tools to counteract those attitudes as they try to take root. Morality allows us to learn to act sustainably. Indeed, especially in the case of the car where it is, quite literally, how we use our body in space that is at issue, learning to act well is just as important in cultivating a life that tends towards sustainability.

To this end the precepts offer a valuable framework for action. Thich Nhat Hanh long ago recognized this and produced his updated list of fourteen precepts for the Order of Interbeing. So, too, John Daido Loori took the sixteen precepts and applied them to environmental questions (Loori 1997). I would argue, though, that without a commitment to careful reflection the observance of the precepts will not by itself create the kind of flexible, open awareness that can respond to new technologies without being snared by the unwholesome assumptions they may bring.

Simple is not easy

It is the enactment of morality, though, that poses more serious challenges for Western Buddhists. In our analysis of the car, above, we saw that lay

morality requires that one look to the needs of the household, but ecological morality demands that we minimize car use. These are not opposed, but they do between them amount to a rejection of a rural lifestyle—and that is an ideal deeply held by many Western Buddhists. Under this analysis, if you are prepared to forgo your car and walk or cycle to and from your croft with its self-sustaining collection of goats, fruit trees and organic garden, all well and good; but will you continue to cycle when you also have to get your children to and from school, when the nearest place to buy milk is five kilometers away, when you need to get your wife or child to the doctor? The image that we have of an eco-friendly lifestyle often contains hidden assumptions that must be questioned. In this case, the dream of splendid isolation only became attainable with the rapid conversion of twentieth century society to a car society. Certainly in the United Kingdom, there was a time not fifty years ago when it was possible to live in a rural village on a branch railway line; but the railways have all been streamlined and the villages have lost their shops and post offices. They are the domain of the wealthy commuter and the isolated elderly now, and until we achieve a rethinking of planning, housing, and transport strategy they will remain desolate islands of houses whose connection to the commercial and social world depends totally on private cars—and they are certainly not a sustainable dwelling place.

Far healthier is the traditional form of the Newar cities of the Kathmandu Valley. There people live[8] in tremendously dense urban clumps surrounded by agricultural land. Because of their actual layout, they give a sense of peace and belonging at the same time. Five-story houses are typically arranged in rows around courtyards that serve four to thirty or more distinct households, often linked by family ties. The courtyards themselves occur in clusters separated by a few streets. The courtyards are

linked by arches and passageways, and to go somewhere one simply walks through courtyards, occasionally crossing streets, until arriving at the destination. Bazaars in the streets, courtyard shops and itinerant merchants walking amongst the courtyards provide most commercial needs; the ground floor of most houses holds a shop of some sort. Each household has land in terraced fields outside the city, as much as thirty minutes' walk away; and the daily routine consists of an early morning shift maintaining the agricultural plots, then a substantial late morning meal, followed by the day's work in shop, office or trade. The courtyards form the scene for social and commercial interactions and are also a shared space for communal work such as drying and cleaning grain. So successful was this arrangement that even the smallest Newar town stands out as a dense cluster of courtyards rising five stories up from the ground; there was until three decades ago no suburban sprawl.

I said above that the car carried with it, and prospered by, a rejection of shared space. Most modern Western Buddhists have been raised with a strong sense of the right to privacy and the notion that the small nuclear family is the right size. These are contingent and unsustainable attitudes. The nuclear family came to be the typical family not because people longed to leave their parents behind, but because they were obliged to. The industrial revolution brought with it demands for a highly mobile workforce, and smaller families could move to follow the shifting labor opportunities. With the advent of the car, this mobility became even more pronounced and the commuter family came into being: too small to preserve any meaningful sense of tradition, too small to provide its own childcare or even its own food needs. Now we live in a perpetually mobile world in which no one has time to cook, so fast food fills the gap, and no one is there to look after children, so (at least in the United Kingdom) the

government uses money derived from taxes on this highly mobile workforce to provide nursery places for children. How could we possibly expect to teach children the value of sustainable attitudes under these conditions?

A walking path

What is needed, I propose, is the forging of social institutions that nurture a positive spiral of continuously reinforcing wholesome behavior. This, of course, is partly why Buddhas found sanghas, so we are in good company here. I have already argued that living according to the precepts is not enough to prevent an individual or a society from being seduced into adopting an unsustainable technology. There must also be the constant practice of a flexible and critical mindfulness, not just on the meditation pillow but also in the supermarket, in the kitchen, on the sidewalk, in front of the television, on the way to school, and in the workplace.

Such a life is worth living. It is also an example for others, and this is crucial. I believe that a specific contribution Buddhists can make to heal the ecosphere is *by setting a good example.* Again, we are in good company; when Gautama instituted new rules for the sangha, he often cited the importance of setting a public example as his reason for prohibiting this or that action. If I understand his reasons, this is a very powerful historical argument for Engaged Buddhism generally: that the sangha as a whole was founded not just to foster the training towards enlightenment, but also to encourage by example. His teachings were, as he put it, "*ehipassaka*": "come and see"-ish. It was intended to be an example for the wider society; and so too we should take up this challenge. There is nothing new in this sort of suggestion; Engaged Buddhists have been arguing for the integration of mindfulness into ordinary industrialized, globalized household life for years. I would

argue, though, that such a commitment to sustainable living at the individual, visible, level really is the most powerful antidote we have to the ecological crisis that confronts us.

The cultivation of sustainable technologies is a cultivation of simplicity and a certain kind of public stubbornness. Use a rake or a broom instead of a leaf blower. Ask your local council why they permit the use of leaf blowers—and then go ask your local Friends of the Urban Forest branch what *they* think. Wash your hands and your kitchen, drink tap water (boiled, if need be) and eat a balanced diet, and you will need to resort to antibiotics far less often. Stay with friends—or even mere acquaintances—when you travel, and eat the local food. Go shopping with friends so that you can laugh at the advertising rather than being taken in by it. Take all the excess packaging off your purchases and hand it back at the cash register. Accept the natural human conditions of living in communities and walking around, and you will discover that cars can sometimes be useful, but are almost never necessary. Yet this kind of living is not easy. It means being aware, at all times, not just of the tools and technologies we use but also the mental dispositions that accompany them. Just as with walking meditation, learning to behave simply requires steady effort over a lifetime.

Notes

1. This paper was originally prepared for a joint Dongkuk University-SOAS workshop on "Buddhist Ecology and Critique of the Modern Society" held in London in February 2005. My thanks to the reviewers at JBE, Peter Harvey, Damien Keown, Robert Segal, James Leach and Hazel Hutchison for useful conversations, criticisms and suggestions during the rewriting process.

2. Haack's otherwise excellent book suffers badly when it comes to discussing the relation between science and religion; by confusing monotheism with religion, she

restricts her discussion and misses the opportunity to engage with a number of interesting modern theorists.

3. Skilton and Crosby translate this term as "longing to lean on others." The Sanskrit verbal prefix *apa* has negative connotations, and although the extended sense could well be that of unwholesome dependence on an Other (such as a deity), the point here is that it is an improper shelter or refuge. There is no explicit term for "others" here.

4. A counterexample is the overexploitation of wild medicinal and aromatic plants, which has led to the near extinction of certain species.

5. This is based on informal fieldwork carried out in 1990. Over the course of a summer, while researching something completely different, I asked a wide range of people if it was necessary to show a driver's license in order to vote; every single person said "yes."

6. The number of people killed worldwide in road traffic accidents is comparable to the numbers who die in wars. In 2003, road traffic accidents killed 3,247 people and seriously injured 28,913 just within the United Kingdom (Department for Transport 2003). By contrast, Operation Telic, the United Kingdom component of the 2003 invasion of Iraq, led to 51 fatalities (Ministry of Defense 2003) and there were 853 murders in England and Wales in reporting year 2003/4 (Dodd et al. 2004) and 108 in 2003 in Scotland (Scottish Executive 2003).

7. If there is any doubt that the sutra intends to shock, note that the consideration of gradual human decay is preceded by the image of a cow dismembered at a crossroads.

8. Or rather, "lived"; in the fifteen years that I have been studying the Kathmandu Valley, civil war and the rise of a remittance economy have created a rush to suburbanization, gated communities, and urban slums that rival the worst planning schemes in the United Kingdom. Water shortages have become chronic and the air and rivers are now heavily polluted.

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