Bethany Wang
Jeff Carlile
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Revenge of the Future
A Report on: Why Things Bite Back

The effects of technology tend to be bigger than what they were designed to be. In his book, Why Things Bite Back, Edward Tenner discusses the unintended consequences of technological advances through numerous examples in different fields. He explores revenge effects in the field of medicine, the environment, pests, the office, and in sports. He does not deny that technology has improved life over the years, but comments on the unintended consequences technology has. He seeks, through many examples, to prove that while solving more severe problems, technology brings about new subtle ones that are harder to solve. These new problems require more attention and constant vigilance, turning acute problems into dilemmas that must be managed carefully. This is quite the opposite of the idea that technology simplifies life. As we will see, some advances in technology require more time and attention – not less.

In most of his examples, Tenner cites the revenge effects of technology. Revenge effects are different then side effects. A revenge effect is an unintended consequence that is usually the opposite of what the original thing was trying to achieve. An example he cites are car security systems. The costs accrued by car owners locked out of their own vehicles are a revenge effect. There are also five specific types of revenge effects: rearranging effects, repeating effects, recomplicating effects, regenerating effects, and recongesting effects. Rearranging effects come from moving a problem elsewhere, like

how air conditioning makes being inside more comfortable, but raises the temperature outdoors (due to more pollution and global climate change), making time spent outdoors more unpleasant. Repeating effects occur when the capability of doing something faster results in it being done more often. Recomplicating effects refers to when simpler interfaces result in having to complete more complicated tasks. An example of a recomplicating effect occurred with the change from rotary to pushbutton telephones. While pushing buttons was easier then the former method of dialing, now customers can be required to do more with it, like type in credit card numbers and answer prompts. Regenerating effects happen when multiple problems arise from the solution to one. Finally, recongesting effects refer to a crowding of a system, such as the 30 to 70 thousand pieces of space debris in orbit. Not all revenge effects fall into one of these categories.

Tenner begins his exploration of technology's unintended consequences with the medical field. He's quick to point out that the overall health and lifespan of citizens in developed countries improved as their economies and standard of living improved. Advances in medical technology alone were not the cause. Ironically, it was warfare itself that led to many advances that save lives today. For example, during the American Civil War, the mortality rate from wound infections decreased from 60 percent at the start to three percent by the end, thanks to surgeons learning to dress the wounds properly. As medical technology developed, doctors were equipped with the tools to examine the body in many detailed ways. However, this can lead to an over-reliance on expensive tests at the cost of common sense.

The revenge effect of these advances is the increased demand of vigilance against errors. Machines that administer dosages or monitor functions can make fatal mistakes due to poor engineering, or coding errors in the software for example. Opportunities for human error have increased as well. As procedures become less invasive, recovery from surgery also takes less time. A procedure that may have involved massive surgery and recovery time in the past, may now be done with a small incision and fine robotic instruments. Because of this, more patients will opt to have the treatment now. This leads to an increase in the odds of hospital obtained infections, mal practice, and other complications. Contrary to the idea of technology simplifying life, more advanced tools and medicines require more supervision, not less.

Although technology allowed mankind to “master the urgent catastrophes of trauma,” it can do little in the way of some incurable diseases. In cases where medical technology cannot solve the problem, it instead allows us to manage the problem. This requires constant attention though, as in the case of virus strains resistant to antibiotics. A revenge effect of the overuse and misuse of antibiotics in their first decades led to viruses that are immune to some antibiotics and adapt quickly to new versions. Another example of managing the problem is that although hospitals are able to save two out of three major head injury cases, a growing population of those living with brain damage require life long care. Technology doesn’t always hold the answer for us. As Tenner states: “We are living longer, but thanks in part to technological advances, we are also more likely to suffer from conditions that medicine can only manage, not cure” (Tenner, 87).

Just as we have learned to manage trauma through experience, we have learned to defend against environmental disasters. With advances such as early warning, storm tracking, levees and stronger building codes, we're now building in regions prone to disaster – such as flood plains and along fault lines. This increased confidence has led to a rearranging effect that places a greater liability in the future. As exemplified by hurricane Katrina, homeowners and businesses felt protected by the levee system even though the area was extremely vulnerable to flooding. By destroying the older wetlands in order to expand the city, the natural barriers against flooding were removed.

While technology can lead to overconfidence, it is also credited for saving many lives. According to the study done by Anders Wijkman and Lloyd Timberlake, countries with lower average incomes had over 3,000 deaths per disaster on average. Wealthier countries accounted for less than 500 deaths per disaster. (*Natural Disasters: Acts of God or Acts of Man?*, London: Earthscan, 1984, 26-29). This is credited to the safety measures and disaster relief plans developed from experience. As with advances in medicine, technology has solved some problems, but has also shifted acute problems to long term difficulties that must be managed carefully. The reports that clearly understood the inadequate levee system of New Orleans exemplify a tough lesson. Disasters such as Katrina are the price of neglected responsibilities – all magnified by the development of a disaster prone region.

Another example of technological advances that have created long term problems is the revenge effects of worldwide shipping. When one thinks of these effects, oil spills usually come to mind. It is shipping itself; however, that has caused vastly more damage and environmental change. Advances in technology have greatly reduced the time required to cross the ocean. This, in turn allows stowaways, such as the Zebra Mussel, and its larvae, to survive the journeys while living in the ballast tanks of shipping vessels. When the vessels reach their destination, they release the water picked up in their homeport at their next destination. This releases the Zebra Mussel to a new environment where it quickly takes over and rapidly multiplies. Since the Zebra Mussel is so efficient at straining the nutrients from the water and reproducing, native species are quickly overwhelmed and defeated in the quest for resources.

This rearranging effect of pests also applies to fire ants which have migrated from South America to the South of the United States. Much more aggressive than their native cousins, the South American fire ants build 40 mounds per acre compared to the average five of the domestic kind. This nuisance has led to pesticide spraying campaigns such as the heavy use of DDT, an insecticide developed in the 1940's. Originally seen as harmless to animals and people, it was applied liberally to crops. As time went on however, it became apparent that DDT was causing the deaths of animals by accumulating in their tissues and affecting their reproductive systems. Several bird species were further threatened as DDT caused a thinning of their eggshells which were unable to withstand the weight of their mothers.

The use of DDT was finally halted, and it remains a suspected carcinogen to humans. A regenerating effect of the widespread use of DDT was that it actually increased the number of pests it was supposed to kill, because it also killed off the natural predators of the target pest. As in Malaysia, a plague of caterpillars bloomed when their natural enemy, the wasp, was utterly eradicated. Only by re-introducing more predators, and then managing *their* population, are the caterpillars held in check. What was once one problem is now a larger problem that cannot be solved, but must be managed vigilantly – the basic theme of technology's revenge.

We also see this in the transition to the computerized office, which has had its share of associated revenge effects. These effects fall into two major categories: problems with the body and problems with productivity. While major injuries were reduced by the move from the factory floor to the office, there has been a development of minor, chronic physical injuries among workers. These new injuries are usually cumulative trauma disorders, which come from an accumulation of many small, repeated injuries. The effects of cumulative trauma disorders can often be more severe than the consequences of treatable major injuries. Common examples of cumulative trauma disorders include back pains and carpal tunnel. Strain to the back and hands can be prevented through proper posture and body position, which led to the development of highly adjustable chairs. The problem of ergonomic chairs is they are more expensive and only make a difference if employees learn to make the adjustments necessary to take advantage of them. Tenner comments that "even comfort apparently requires study and vigilance (217)." An interesting point he makes is that the shift from the factory, to the office, to the

computerized office has been full of rearranging effects. The strain has been moved from hard physical work and manual operations to a new visual stress that comes from computer monitors.

The development of technology in the office was meant to increase productivity. Computers reduce the need for one kind of worker, but require a company to hire a new type of worker. In a type of rearranging effect, they "replace one category of worker with another (245)." Companies can either hire people trained to do things the old-fashioned way, or pay people to set up machines to do the same work with fewer of the first type of people. And while computers and technology are meant to reduce expenses and increase profit, they usually have their own associated costs. Systems have to be upgraded because often when a new system is developed, the old will no longer be supported. And old systems have very little salvage or resale value.

Software also has become more powerful, and interfaces have become simpler. Command line prompts have been replaced by graphical user interfaces. But when things go wrong, they are harder to fix. And there are recomplicating effects associated with the graphical interfaces too. One interesting example is that of icons. Icons are typically more intuitive and simpler to understand than words. But some ideas simply can't be expressed well graphically. For example, there are no decent 'push' and 'pull' symbols. Now, most programs pop a little text window up if you mouse over an icon to explain what it means, a very obvious example of a task to simplify work causing more of it.

Another area in which chronic health problems have become more frequent than major injuries is in the field of sports. For example, in professional football, plastic helmets, meant to protect players, have actually resulted in an increase in injuries. Players have been able to use their head as a battering ram to stop opposing players. As a consequence, spinal fractures, paralysis, and neck injuries have become far more common. This has since been rectified through regulation, and aggressive use of the helmet has been banned. But now, stronger vigilance on the part of the officials is required.

While improving the overall quality of life, technology comes with a price. With technological solutions come technological consequences. These consequences come in the form of revenge effects, where large problems are solved, but smaller, more subtle ones occur. It is easy to remember to avoid things that can cause life-threatening injury, but harder to remember the small day-to-day techniques to prevent smaller injuries from becoming a chronic problem. Although technology has freed us from some problems, it has also bound us more intimately with others. As technology has made life more comfortable, it has also increased the risk and complexity of many systems. Careful management and constant vigilance are the price of our advances. As we have seen, neglect of these systems can lead to much greater consequences.