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Technology and Rights

STEPHEN PETRINA

University of British Columbia, Department of Curriculum Studies, 2125 Main Mall, Vancouver, BC, Canada, V6T 1Z4; E-mail: stephen.petrina@ubc.ca

KENNETH VOLK

Hong Kong Institute of Education, Canada

SOOWOOK KIM

University of British Columbia, Canada

ABSTRACT: What do we know about technology and rights? This article provides a fairly comprehensive overview of current issues regarding this topic. We explore and analyse a wide spectrum of rights that are challenged in this current era of technological convergence. We use the United States Bill of Rights as an example of the vulnerability of legal protections for rights against particular political and technological changes in this post 9-11 climate. New streams of rights acting as a safeguard against further incursions of technology into civil liberties are explored. We also address intellectual property rights and international trends in copyright, patent and trademark laws. We question whether these issues of technology and rights have a place in current technological literacy scenarios.

Keywords: bioethics, biotechnology, ethics, intellectual property rights, politics of technology, rights, technological literacy

> History teaches that grave threats to liberty often come in times of urgency, when constitutional rights seem too extravagant to endure (Thurgood Marshall 1989).

INTRODUCTION

Prior to September 11, 2001, it was easy to be complacent about mundane things like technology and rights. It once seemed that privileged cultures could always take rights for granted. Now, the luxury of complacency is gone, throwing all – literacy, technology and rights – into question. Charter and constitutional rights, civil rights and human rights – tenuous as they are for most in the world, are seriously compromised and intensified by our new technologies in this post-9-11 era. However, the relationship between technology and rights is complex, as individual rights protect the development, selling, purchasing and use of the new technologies. For some, new technologies underwrite greater rights and freedoms. For others, the same rights are eroded, suspended or limited. The convergences of biological, communication, information and medical

technologies with the control of production, markets and politics are powerful forces on our ability to appreciate or exercise civil liberties and human rights. It can be said that the aphorism behind this convergence is that the individual rights of the few out-weigh the human rights of the many. But the reverse is equally true in many cases where the individual rights of the many outweigh the human rights of the few. To be literate about technology is to be literate about the implication of rights in the convergence of new technologies.

The promise of technological literacy, if it is to contradict a surrendering of responsibilities to elite decision makers, requires an informed citizenry. One extremely significant, albeit overlooked, component of technological literacy is knowledge of rights. In the *Standards for Technological Literacy*, for example, the only reference to rights within an otherwise fairly exhaustive coverage of issues is to the copyright on the monograph. What does technological literacy have to do with rights? What should high school and university students or citizens know about technology and rights?

Although there is an active tradition in researching the intricacies of technology and rights, there is *not* a condensed, comprehensive source on the topic. The few general sources that exist emphasize a single orientation in areas such as ethics (McGinn 1994; Tatum 1996), law (Volk 1994), political philosophy (Doppelt 2001; Feenberg 2001) or privacy (Brin 1998). Rights analysts traditionally address technology through specialized topics, such as bioethics and cloning (Rollin 1999; Schurman & Kelso 2003), child labor (de Berry 2001; Myers 2001), economics and globalization (Nickel 2002; Pogge 2000, Weeramantry 1993), infoethics (Smith 2001), the patenting of nature and traditional knowledge rights (Haraway 1997; Mashelkar 2001; Shiva 1997, 2001a, b), reproductive technology rights (Institute of Women and Ethnic Studies 2000) and robot rights (Freitas 1985).

Our aim in this article is to explore and analyse a wide spectrum of technology and rights through specific cases related to the Bill of Rights of the United States (US) Constitution. The Bill of Rights is a convenient example of the vulnerability of legal protections for rights against particular political and technological changes in this post 9–11 climate. We use international trends in copyright, patent and trademark laws to demonstrate the power and vulnerability of intellectual property rights in this era. We employ critical discourse analysis to examine the guarantees of rights in national and international charters and threats to these rights from the convergence of new corporate formations and technologies. A new stream of rights acting as a safeguard against further incursions of technology into civil liberties is addressed. We question, *a la* McGinn (1994) and Tatum (1996), whether majoritarian ethics are adequate in guiding minoritarian rights. In the final analysis, we localize the topic of rights in terms of technological literacy. What do we know about technology and rights? What ought we know?

MASTERS AND SLAVES OF TECHNOLOGY

Modern scientific inquiry and political science converged in the work of Francis Bacon (1561–1626). In his *Instauratio* and *New Atlantis*, Bacon was confident in the ability of humans to subdue and dominate nature (Whitney 1989; Weinberger 1976). His scientific method, inductive reasoning, was originally defined as a means of extracting knowledge from nature and developing this knowledge for the practical aims of technology. Bacon's absolute confidence in science and technology was epitomized in his *New Atlantis*, where an advanced society is dominated and guided by rational reason, acts and accomplishments. Highly trained and specialized individuals with names such as 'merchants of light', 'depredators', 'pioneers' and 'interpreters of nature' create new knowledge and maintain social order. These specialists also decide through consultations 'which of the inventions and experiences which we have discovered shall be published, and which not' (Bacon 1914, para 87).

A few centuries later, Shelley (1818) romanticized science and technology in her famous novel and stage play. In *Frankenstein; or the Modern Prometheus*, the protagonist, scientist Victor Frankenstein, creates a monster to extend his power and amend his shortcomings. Frankenstein anticipated that he would be master of the technological slaves he would create. However, once the monster is given life, Frankenstein loses control, abandons responsibility and refuses to acknowledge that the monster itself embodies the scientist's power and exceeds his ability to control it. Shelley's story suggests that expertise is never adequate for the creation and control of the technologies – the monsters – we unleash. The technologies haunt and taunt their masters. Perhaps coincidentally, at the same time that *Frankenstein* was published, governments began to pass laws to regulate technologies and technologists that were granted freedoms in bills of rights penned in the late eighteenth century.

In the next century, following the ravages of two world wars, Orwell (1948) published *Nineteen Eighty-Four*, a bitter satire of the state of the world. Many students and critics of technology held the novel as a harbinger of a world that would soon transpire. Big Brother and surveillance, thought police, political facts disappearing into a memory hole and the corruption of language through Newspeak are just some of the techniques that Orwell anticipated in late twentieth century governments. The technologies in *Nineteen Eighty-Four* were the powers behind imperfect bureaucracies led by experts. While Orwell inaccurately presupposed the development of three totalitarian world powers, he accurately described an entire system of media, management and surveillance that would threaten civil liberties and human rights (Bennett 1986).

In many ways, modern societies reflect the models envisioned by Bacon, Shelley and Orwell, with scientific, technical and political specialists exerting a command over the direction of 'progress' while governments indulge in the technologies of fear and surveillance. While technological progress is often

seen in utopian or dystopian terms, control over technology ultimately translates into power. Power, networked through interest groups including scientists and technologists, determines which technologies are designed, adopted and abandoned (Evans 2001, p. 69). Civil liberties and human rights are generally secondary to globalisation, innovation and development. In a Master–Slave dialectic where the human masters amass power over and through their technological slaves (Winner 1977), the few elite decision makers and special interests controlling certain technologies can easily hold power over the rights of many citizens or workers (see Saul 1997, p. 36).

Rights, especially natural rights, were once thought to be inalienable and free from the effects of technological change. This, of course, is no longer the case, with the convergence of new technologies profoundly affecting natural rights and freedoms, civil rights, civil liberties and human rights. Enlightenment philosophers, such as John Locke, considered 'natural' rights to be decreed by God, inherent in human nature or defined by reason. This included property rights, defined by that with which an individual 'mixed one's labour'. Individual or natural rights were claims to life, liberty and property to which one was justly entitled. Natural rights were enshrined in the English Bill of Rights in 1689, the US Constitution in 1787 and the French Declaration of the Rights of Man in 1789. The US Constitution, like charters in many countries, defines the natural rights and a number of specific rights of each US citizen. Of course, US history presents a case in point where not everyone's rights are equally protected. Civil rights typically refer to the legal rights of groups protected under the law of charters and constitutions in individual countries. Civil liberties refer to commonly accepted individual or natural rights (life, liberty, property, free expression, freedom of religion, etc.). In his classic essay 'On Liberty', Mill (1859) argued that freedom of expression, freedom of taste and pursuits and freedom of association are the three basic liberties that define a free society. Quite often freedom is a relative concept, depending on the degree that rights are granted and protected or how one individual's freedom restricts another's.

Human rights, particularly after World War II, broadened traditional conceptions of rights and freedoms. Charters of human rights typically endorse 'positive rights', or rights to education, health care, social security and work. Bills of natural rights typically refer to 'negative' rights, or protections from heavy-handed governmental actions (Coleman & Sullivan 2002). While the United Nations' Universal Declaration of Human Rights recognizes that 'the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world' (United Nations 1948, preamble), many of the human rights endorsed by the signatories have never been enforced in even the most democratic of countries. With the convergence and globalisation of new technologies, rights watch groups prescribe vigilance in protecting the entire spectrum of rights for world citizens.

In our world of globalisation, media, and technology, the operative word is 'convergence'. Convergence gives a trajectory to globalisation and

concentrates power. We are currently witnessing the convergence of a wide range of technologies in a number of economic sectors. In manufacturing, the technologies of design, production, marketing, transportation, consumption and operational standards have converged into single, accessible databases. In biotechnology, the technologies of agriculture, eugenics, genetics and medicine are converging into powerful techniques for creating and controlling life. As we are witnessing in the communication, media and information industries, convergence does not merely refer to technologies. What is converging in these industries is actually

- Technologies (e.g., computer, copier, fax, messaging, phone, printer, audio & video player or etc. convergences).
- Modalities (e.g., image, print, sound, etc. convergences).
- Practices (e.g., art, business, communication, design, fashion, film, marketing, medicine, programming, technology, etc. convergences) and
- Corporate formations (e.g., cable & internet providers, music, newspaper, radio & television convergences).

In other words, convergences are occurring within the four key elements of technology: artefacts, processes, sets of knowledge and organizational structures (Pacey 1983; Winner 1977). Of course, there has been and continues to be intended and unintended consequences associated with these convergences (Tenner 1996). These convergences of biological, communication, information and medical technologies have a profound effect on how we act on and think about technology and rights (Volk 1990). The US Bill of Rights exemplifies how the new technologies affect the most fundamental rights, liberties and freedoms of citizens.

TECHNOLOGY AND THE UNITED STATES BILL OF RIGHTS

In this post-September 11 era, the delicate balance between rights and national interests is extremely important and difficult to maintain. Just 6 weeks following the terrorist attack on the Pentagon and World Trade Centre, the US Congress passed the USA PATRIOT Act, granting the government near total legal authority to spy on US citizens, employment permit holders and tourists. The new law empowers intelligence and law enforcement officials to, among other things, intercept a broad range of telephone communications, access private records (e.g., business and social transactions, personal files), review educational testing records of any suspect and detain non-citizens based on extremely vague definitions of a threat to national security. Rights watch groups note that the law is a tremendous blow to civil liberties and human rights or, more specifically, to the US Bill of Rights (ACLU 2003). The new security powers exercised by the US are dependent on the powers of the new technologies for surveillance, both remote and intimate. Civil rights complaints spiked in the US during the

1990s and since the PATRIOT Act, complaints have increased at record rates (Bohn 2003; Litras 2000).

Spelled out in the Bill of Rights, or the provisions of the first ten amendments to the US Constitution are the most fundamental elements of democracy. The First Amendment secures freedoms for the expression of opinion and thought.

> Article I
> Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the government for a redress of grievances.

The First Amendment occupies a preferred position in the constitutional order. It protects some of the most sensitive areas of natural rights and personal expression: religion, ethics and political philosophy. Nonetheless, the Supreme Court never interpreted freedoms of religion, speech, press or assembly to be without limitations. Constitutional rights are not absolute; hence, the courts of law try to weigh the rights of individuals against the interests of government. Constitutional interpretation is complicated as decisions are made within the context of conflicting rights and economic, scientific and technological might(s). Technologies that amplify individual expression or intensify the capabilities of individual and mass communication challenge First Amendment interpreters to come to terms with the limits of free speech and the press (OTA 1988a).

When the Ontario courts ruled favourably on equal marriage rights on June 10, 2003, a number of gay and lesbian couples took advantage of the opportunity to have a legal marriage ceremony and license. Among the first couples were Michael Leshner and Michael Stark, who were married on the day of the ruling in a ceremony conducted by a justice of Ontario's superior court. Driving in from the US, Beth Hayes and Pam Trainor were married 3 days later. Photos of some of the first gay and lesbian couples to legally marry in North America were pictured on (Gay-Bi-Lesbian-Trans-Queer(GBLTQ) web sites as well as on the dozens of homophobic sites across the world. Cyberhate, like pornography, tests rights to free speech to its very limits. The Ku Klux Klan posted the first cyberhate site in 1995 and cyberwatch groups now estimate that there are over 2000 cyberhate sites, with about 300 that are posted and shut down each day. Civil liberties groups advocate for rights to free speech and against censorship, noting that cyberspace provides a public forum for fighting back that is not always available in real life (Cohen 2000; Griffor 2003; Hays 2003).

The very principle of freedom of the press is ambiguous when the press is redefined from (1) authorities that broadcast information from centralized presses to many individuals, to (2) many individuals, *via* the World-Wide Web (Web), acting as decentralized presses that broadcast information. Legal interpretation is grappling more than ever with the problem of who or what are the press, non-media and media. The definitions of 'public' and

'private' are changing. Other problems relate to ownership of the media, concentrations of power *via* access to the media, breach of privacy, editorial control, liability, national security and the open circulation of knowledge. The underground presses no longer operate underground and their highly visible presences on the web are catalysts for public action. The web provides unprecedented opportunities to establish 'zines' and publish controversial or 'unpatriotic' wikis or weblogs. Each individual blogger or other netizen who hosts a web site is a decentralized publisher. Web sites blur the lines between local and remote, making judicial decisions on First Amendment rights extremely difficult to make. Within the PATRIOT Act, the definition of 'national security' has been expanded, placing new checks on free speech and making transgressions of national security relatively commonplace. Much of what once passed as open knowledge, whether with economic or military implications, is now illegal to communicate. The PATRIOT Act expanded, at the same time, the scope of classified government files, making public scrutiny much more difficult, and the areas where the government can monitor personal transactions.

The First Amendment protects, among other activities, the right to protest without punishment or revenge unless a crime has been committed. Freedom of assembly, or protest, is not a criminal offence, although it is commonly treated as one in venues in Europe and North America. In many ways, the PATRIOT Act treats freedom of assembly as a crime in that protestors can be searched, punished and their property seized without legal reason or appeal. But rights to assemble freely were becoming increasingly more tenuous through the 1990s as globalisation was gaining momentum. For example, at the APEC leader's Summit in 1997 at the University of British Columbia (UBC), Canadian police isolated protestors and used tear gas to protect the perimeter fence surrounding the summit building which was one half mile away and invisible from any perimeter point. At the World Trade Organization (WTO) meeting in 1999 in Seattle, police set up a perimeter similar to the UBC fence and tried again to defend it with tear gas and rubber bullets. The result was a riot with extensive property damage. In Europe and North America, it is increasingly common for police to monitor urban areas with hidden cameras. Post-September 11, these types of checks on assembly with cameras, chemical technologies, clubs and guns are repeated the world over.

Freedom of speech, typically threatened in crises, is at direct odds with the practices and new technologies of censorship and surveillance. Resembling the psychological constraints inherent in Bentham's Panopticon described over 200 years ago or Orwell's *Nineteen Eighty-Four* (Bozovic 1995), citizens who once enjoyed constitutional rights are finding themselves censored or at the risk of censorship *via* surveillance practices of their governments. Surveillance practices threaten both the First and Fourth (privacy) Amendments. The new surveillance infrastructure and exploitive technologies offer incredible powers to monitor the expressions and movements of individuals and their social groups (Table I):

TABLE I
Surveillance technologies

Remote Sensing Technologies	Intimate Sensing Technologies
Satellite surveillance (global satellites)	Data surveillance
Drones (mid range cameras)	Transponder tracking
Video, impulse and thermal surveillance	Chip implants
Microcameras	Biochemical (e.g., urine) Analysis
Artificial noses	Pharmaceutical testing
Thermal imaging	Genetic (DNA) screening
Data surveillance	Reproductive screening
Wire and wireless taps	Biometrics
Tempest	Finger printing
Data tapping	Retina scanning
Data cracking and mining	Facial contouring
Clipper chips	Voice printing
Data banking	Hand geometry
Digital dossiers	Wrist-vein recognition
Identity cards	Racial profiling
Surveillance dust	Medical imaging

The Fourth Amendment protects rights to individual privacy and against the practice of arbitrary power and surveillance. The Fourth Amendment is stated as follows:

> Article IV
> The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

Satellite systems, drones, video surveillance cameras, impulse sensors and thermal imaging empower commercial owners and governments with the abilities to monitor and manipulate public and private activities. Data cracking and mining hardware and software provide the means to track and trail the cultural and financial activities of citizens. For citizens who opt for encryption to protect their privacy, the US government countered with the Clipper Chip, which standardizes encryption and provides a key for deciphering messages. It is an example of governmental intervention to keep options for eavesdropping open. One protection built into the Fourth Amendment is the requirement of a search warrant for intruding into a US citizen's home. Police may be bypassing the need for a search warrant by opting for technologies that provide pseudo 'X-ray' capabilities, such as artificial noses and thermal imaging devices. The US Supreme Court recently heard a case that challenges the use of thermal imaging devices for

home surveillance without a search warrant. In this case, narcotics agents raided the Florida home of Danny Lee Kyllo after detecting excessive heat loss from the house. The end (busting a hi-tech marijuana grow operation) justified the means (thermal surveillance) for the Florida court system. The new systems for remote sensing are complements to the new intimate sensing technologies.

Intimate sensing provides the government – police or an intelligence agency – rivate companies, with the means to detect identity and monitor bodily functions such as the use of drugs or sexual activities. Biometrics, such as fingerprints, retinal and voice recognition, semen, urine and DNA analysis, and 'smart' identity cards are just some of the new technologies that threaten privacy protected under the Fourth Amendment. The power to intrude into the very core of personal privacy and autonomy is accessible to nearly any public or private institution. One outcome of intimate sensing is that insurance companies are refusing coverage if citizens are prone to certain diseases. Statistical forecasting techniques commonly used by these companies are complemented with genetic forecasting. Canadian and US governments are currently moving towards national databases that will centralize biometric and identity information. National identity cards will be required for tracking quotidian activities such as business and medical transactions. Rights groups now seriously question whether privacy is possible in this developing infrastructure of remote and intimate surveillance (Brin 1998; Marker 1987; OTA 1987; Tatum 1996).

The invasive technologies also threaten rights protected under the Fifth, Sixth and Eighth Amendments. These amendments protect US citizens accused, convicted or suspected of crimes. The Fifth Amendment protection of due process of law is undermined when pre-trial publicity surrounding suspected criminals is discretely or indiscriminately leaked or released to the media. The convergence of communication and information technologies help undermine these protections for many suspects. The Eighth Amendment protects against cruel and unusual punishments. Transponder tracking technologies, such as microprocessor implants or security bracelets allow law enforcement officials to track the movement of criminals on bail or probation. However, the massive increases of prisoners in the US during the 1980s and 1990s along with the PATRIOT Act made the prediction of criminal behaviour and recidivism a common practice. The new forensic technologies offer governments incredible powers to try and predict who is and who is not a threat to national security or policing. Racial profiling, and biometrics and genetic screening provide the incentive to identify determinants of criminal behaviour and the temptation to intervene prior to the commitment of a crime. Through these technologies for proclivities profiling, suspected criminals could be tested to determine their disposition toward criminal behaviour. In other words, they are accused or suspect before they have done anything (OTA 1987, 1988b, c).

The Second Amendment is consistently under controversy, and cited by the National Rifle Association (NRA) as the principal protection of the right to bear firearms. In the constitutional order, the Second Amendment refers to militia defence: 'A well regulated militia being necessary to the security of a free State, the right of the people to keep and bear arms shall not be infringed'. Exactly what kind of firearm is protected under this article? Are handguns and M-16s important to a well-regulated militia? The Second Amendment conjures up some of the most fundamental questions of technology: do technologies have politics and power in and of themselves? Do technologies actually change human beings when in use? In bald terms, the NRA states the issue this way: Guns don't kill people; people kill people (see Latour 1999, pp. 176–183, for an interesting discussion of this). The Third Amendment protects citizens from the intrusions of the military into their homes and private lives: 'No soldier shall, in time of peace, be quartered in any house, without the consent of the owner, nor in time of war, but in a manner to be prescribed by law'. While not typically an issue in most democratic countries, post-September 11 times raise questions about the rights protected in this amendment. The NRA is able to command the support of current gun laws at a cost to a majority that feel threatened and vulnerable in a society loaded with firearms. The second amendment represents a classic case where the rights supported by a minority impinge on the majority. However, majoritarian ethics are also inadequate in dealing with technology and rights.

MAJORITARIAN ETHICS AND MINORITARIAN RIGHTS

The Ninth Amendment of the US Constitution operates on a presumption of fundamental liberty for US citizens, and protects the freedoms and human rights of citizens not spelled out in the Constitution. It is difficult to interpret exactly what rights are to be enumerated and protected under the Ninth Amendment: 'The enumeration in the Constitution of certain rights shall not be construed to deny or disparage others retained by the people'. The Ninth Amendment is submitted to active debate as new technologies threaten human rights in the US and across the world (Barnett 1993). The fundamental liberty to pursue a livelihood is threatened by technologies of automation that the government supports and regulates. For example, the tomato-picking machine developed at the University of California in the 1990s was responsible for the elimination of 32,000 tomato picking jobs. The question is whether this government-sponsored infringement on the rights to a livelihood for tomato pickers was justifiable, even if the technology was profitable and promised a net benefit to society (Tatum 1996). Exemplifying majoritarian ethics, experts calculated that the automated tomato picker would have a net benefit to society. Would a more responsive approach to minoritarian rights be, instead of direct capital for labour trade-offs, a regulation of the sizes of the tomato fields that justify investments into this

type of automated machinery? Regulation would limit property rights in agribusiness, help place a higher value on small farm labour and create fairer agricultural markets.

Majoritarian ethics, or a calculation of what is good for the greatest majority, are ineffective in resolving the dilemma of the infringement of technology on human rights. Majoritarian ethics derive from utilitarianism, meaning that we judge an action or technology based on a calculation of the 'greatest good for the greatest number'. For instance, we decide on an action or technology that will provide the greatest happiness or pleasure for the greatest number. One issue is who the 'we' is that decides. Under majoritarian rule, it becomes difficult to sustain the rights of minorities and the underprivileged in the world. Although there is nothing ethically wrong with consequentialism *per se*, it tends to emphasize prudential over moral action. We calculate our decisions and actions to avoid risk. The other option in ethics is to act on a basis of duty and obligation toward principles and rules, higher spirituality or an intuitive sense of what is good and right. Acting on a principle of human rights to a livelihood will produce different results than acting on a cost-benefit analysis of a particular innovation. Philosophers such as Jonas (1984) note that 'future-oriented' ethics allow us to delay decision of right or wrong. For Jonas deontological ethics oriented toward principles such as posterity force us to immediately deal with questions of right or wrong. Deontological ethics emphasizes intentions over consequences. What is right or wrong is based on our intentions since consequences are beyond our control (see Tenner 1996, p. 36). We hold individuals responsible for their intentions, where consequentialism and utilitarianism tend to absolve individuals from responsibilities for consequences.

Ethics based on the principle that we should always maximize the technologies we want or those technologies we think are good for all, *unless* tempered with global justice and a sense of demographics, will be blind to an equitable distribution of human rights (Ferré 1988; McGinn 1994). Privilege and duty go hand in hand. A primary problem in this world of massive inequities in the distribution of justice is how to temper the individual rights and *wants* of the many when they impinge on the human rights and *needs* of the few (Waldron 2000).

Natural or individual rights, specifically property rights, are increasingly implicated in the tension between wants and needs. A primary problem is demographics. The claim to a growing arsenal of technologies by a large and increasing number of rights holders creates problems never envisioned by Enlightenment philosophers. A minority that seeks fast profits and shortcuts to occupational health and safety often compromises rights to a decent standard of living for a majority of people of the world. But the tension between needs and wants is not merely manifested in global capital and labour relations. For example, increasing numbers of individual vehicle owners with claims to property and mobility rights are reducing the quality of life in many cities throughout the world. Traffic congestion, smog and highway expansion

are three of the problems created. Vehicle property rights claimants are an increasing majority of North Americans for which a minority must sacrifice their rights to clean air and health. Over the past decade, there has also been a proliferation of private all-terrain vehicles, snowmobiles and personal watercraft encroaching on fragile environmental areas owned by the public and infringing on rights to a clean environment (McGinn 1994).

A contradiction of majoritarian ethics and minoritarian rights recently culminated in response to the British Columbia (BC) government's proposal to lift a 43 year moratorium on off shore drilling for oil and gas in the waters off the Queen Charlotte Islands/ Haida Gwaii. Exercising Aboriginal rights over the utilitarian economics of the government, in 2002 the Haida Nation formally launched a groundbreaking claim to their First Nations title to the archipelago of islands, including the seabed east into the Hectate Strait and 320 km west into the Pacific Ocean. Representing a democratic majority, the BC neo-Liberal government wants the right to economic expansion into an environmentally sensitive area while the Haida, distrusting the government and drilling technologies, want their minoritarian rights to self-determination and protection of the Haida Gwaii environment (Battiste & Henderson 2000; Cole in press; O'Riley in press; Staff 2003).

Digital remailers are an opposite example, where the protection of individual rights for a minority of citizens impinges on the majority. Remailers reproduce e-mail messages and send these messages anonymously by creating fictional return addresses that cannot be traced. Remailers are responsible for a vast amount of spam (junk mail) that eventually makes its way into millions of in-mail boxes each day. Most charters and constitutions protect this right to free speech for the minority of netizens who use the remailers. Auto-dialers, a similar technology that automates phone calls, were banned by a congressional law in the US in the early 1990s but court judges blocked its enforcement to protect rights to free speech.

How can we empower ourselves against increasing technological powers and incursions on rights? Recent trends related to the impositions of civil liability on economic enterprise are signs that limits are being placed on technological rights and liberties taken toward the expansion and globalisation of capital. Individuals, businesses, industries and governments are increasingly held accountable for the reasonably foreseeable adverse consequences of their technological choices. Legal means and opportunities to litigate for liabilities offer opportunities for some, but not all citizens and groups. Under this scenario, new bills of rights (e.g., animal rights, consumer rights, reproductive rights) are established at the grass-roots level to empower citizens and inform new policies and laws.

TECHNOLOGY AND NEW BILLS OF RIGHTS

We commonly speak of human rights, children's rights, the rights of women, worker's rights, civil rights, aboriginal rights, disability rights, the rights of

the downtrodden of the world or economic welfare rights, gay and lesbian rights, animal rights and environmental rights. New bills of rights issue from the invasive and pervasive characteristics of a convergence of new technologies and corporate formations: consumer's rights, new technology rights for workers, digital technology user's rights, traditional knowledge rights and various trade related economic rights. For some, such as Glendon (1991), we speak of rights much too casually. Nevertheless, as the scale and scope of technology becomes increasingly invasive and pervasive, the interrelations between technology and the full range of rights become more pronounced. In many ways, the new stream of rights protects people from further incursions of technology into their lives – they buffer against globalisation and the convergence of new technologies with the ways and means of capitalism. Today, individuals and rights-watch groups are vigilant about technological infringements on rights. Whereas in the past technology may have had indirect effects on rights, today those effects are direct. Every group of rights, from inalienable rights or individual rights to human rights or the social contract and moral rights, is in some way affected by technology (Figure 1).

The Digital Consumer's Bill of Rights, for example, was crafted in response to encroachments on rights to privacy, and rights to freely generate, use and share information. This bill is the consumers' solution to the Digital Millennium Copyright Act (DMCA) and the Sonny Bono Copyright Term Extension Act (CTEA), both of which are overly sympathetic to corporate intellectual property (IP) rights. President Clinton signed the DMCA into law in 1998 but enforcement has been nearly impossible in most jurisdictions of web access. The DMCA attempted to shore up the ownership of digital property for large lobby groups, such as the music recording industry. The CTEA was also signed into law in 1998, effectively adding 20 years of copyright protection for works produced prior to 1976. Critics dubbed it the Mickey Mouse bailout bill because it coincided with the year that Disney's Mickey Mouse copyright would have expired. The CTEA added another 20 years to Disney's most coveted copyright.

Copyright lawyers have attempted to accommodate cyberspace by merely calling it a conveyance – another shell or format – for the content of expression (Petrina 2003b). For example, copyright law extends ownership, distribution and reproduction rights for music copied from record to tape to CD to MP3. Extension of copyright is one thing; protection is something entirely different. As Barlow (1994, p. 1) has asked, if digital property can be 'infinitely reproduced and instantaneously distributed all over the planet without cost, without our knowledge, without its even leaving our possession, how can we protect it?' One issue implicates disability rights: If virtual spaces are not 'brick and mortar' spaces, can accommodation laws extend to cyberspace (Blank & Sandler 2003)? Another issue is that the forces of globalisation, the DMCA and CTEA are matched by the uncontainability of digital property along with a heightened sense of rights (e.g., economic, human, legal, trade related, etc.) to public knowledge and IP.

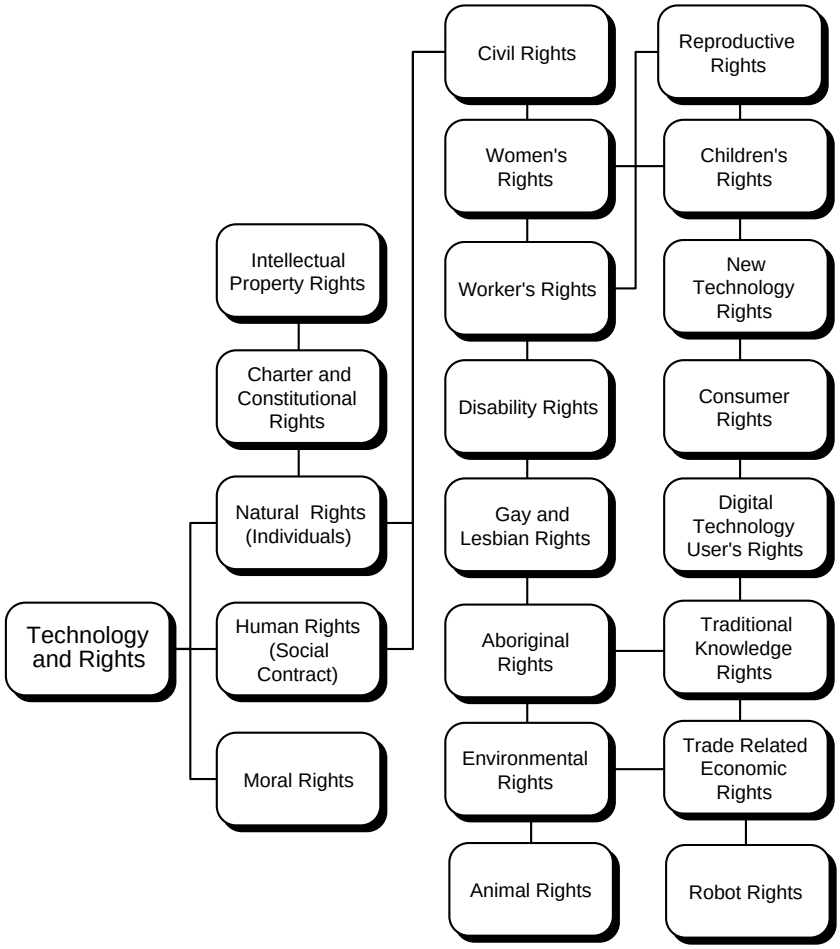

Figure 1. Technology and rights.

CYBERSPACE AND THE SYSTEM OF INTELLECTUAL PROPERTY RIGHTS

Intellectual property rights (IPRs) are protected in countries such as Canada, Japan and the US by a system of copyright, patent, trademark and trade secret laws. In the US, IPRs were defined similar to other natural rights in first article of the Constitution and were enforceable by law. The US Congress was given the power to 'promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and inventions' (Article 1, Section 8, Constitution of the United States 1787). The first Copyright Act was passed in 1790, granting authors and proprietors the right to print, re-print or publish their work for a period of 14 years and to renew for another 14. The law was intended to encourage an open circulation of knowledge and

provide an incentive for artists, and scientists and writers to create original works. The ownership of information eventually translated into a monopoly for publishers. In 1793, the first US patent law was passed and defined a patentable invention as 'any new and useful art, machine, manufacture, or composition of matter, or any new or useful improvement thereof'. Except for the replacement of the word 'art' with the word 'process' in 1952, the definition remains the same today. Copyrights and patents were, in theory, legal protections of IP and, since the information was to be openly circulated, promotions of the public good. However, the commercialisation of IP throughout the nineteenth century undermined the original intent (Allen 1990; Noble 1977, pp. 84–109). IPRs became a means to monopolistic control; trade secrecy, rather than the open promotion of science and technology marked corporate practice (Kitch 1980). Patents acquired by corporations, such as AT&T, IBM, General Electric and Microsoft through consolidation, purchase, patent pools and licensing agreements allow(ed) them to monopolize their respective industries.

In the late 1990s, a number of smaller companies challenged Microsoft's dominance of the software industry through what many saw as unfair copyright and patent practices. In August 2002, Microsoft was ordered to pay $521 million to Michael Doyle and his technology company (Eolas Technologies), and the University of California at Berkeley. The court found that Microsoft infringed on a patent (No. 5,838,906) for the *concept* of viewing 'multimedia or real-time content within a Web browser rather than a separate software application' (Kanellos & Hu 2003). Doyle basically patented the use of plug-ins and applets to summons software applications to work within browsers. IPRs for software were made possible through adjustments to US patent laws in 1981 and 1989, when software was made patentable as a *process*.

The case of open source software and Linux demonstrates an open knowledge response to software monopolies. Open source refers to the processes of creating, distributing, using, modifying, and sharing software programs without the fear of patent infringements in both commercial and non-commercial environments. Proprietary companies provide licensees the rights to use software programs while the source codes are secretly closed to access. Proprietary software licensees do not have rights to modify the software they purchase. Most users rarely challenge this restriction of modification rights. On the other hand, open source programs give users absolute freedom to distribute, use, modify, and share source codes. The only restriction in open source is that any modification must be shared free of charge and without traditional IP rights under a General Public License (GPL). Linux, the heart of the current open source software movement, evolved over a dozen years ago from a simple hobbyist operating system to one of the most stable server-class systems. Along with Linux, a variety of open source software programs have been flourishing. Patented programs can also be part of open source software under a Lesser General Public License (LGPL). For example, Sun Microsystems' office suite has two

tracks: Star Office as an entirely patented program and OpenOffice.org as an open source software program. Documents can be freely created, distributed, used, modified, and shared under a Free Document License (FDL).

The GPL, LGPL, and FDL are the components of copyleft, defined as 'a general method for making a program free software and requiring all modified and extended versions of the program to be free software as well' (Free Soft Foundation 2003). Even with these open licenses, there are problems with open source software in the world of IP. SCO, a technology company, has recently filed a lawsuit against IBM, alleging that the latter infringed on its IP by copying some of their own source code into Linux. The allegation is quite controversial in several ways (Fried 2003). And the irony is that SCO itself distributed its own Linux (i.e., Caldera) under GPL. Open source software advocates, such as Bruce Perens, emphasize mutual software patent defence terms, meaning that 'if one Open Source developer is sued for patent infringement, all of the licenses of Open Source software used by the plaintiff terminate' (Miller 2003). Open source software and Linux are aligned with rights movements working against the commercialisation and globalisation of IP.

Advocates of open source anticipate open source businesses, education, governments, hardware and medicine. For example, when the Massachusetts Institute of Technology (MIT) administrators wanted to catch the economic wave of on-line courses in the late 1990s, a few faculty members contradicted the idea: why not place MIT courses on-line free of charge? In September 2002, MIT's OpenCourseWare site was launched and there are currently 500 courses on-line (http://ocw.mit.edu/index.html). OpenCourseWare responds to the increasing commercialisation of public institutions and commodification of knowledge (Willinsky 1999). While MIT still exploits their patents, the institution seems to have done the right thing with their copyrights for courses. Some of the courses are extremely popular across the world, and university lawyers have had to aggressively protect the MIT trademark in developing countries where courses are marketed and taught as MIT affiliated.

The first trademark law in the US was passed in 1870, expanded in 1905 and modernized in 1946 to include the 'defensive' registrations. In other words, a protective barrier can be built around a word or string of words to block the registration of names that conflict with the original trademark. This option has become extremely important for corporations in an era of cybersquatting. Cybersquatting refers to the practice of registering domain names (e.g., microsoft.com; MIT.edu) and reselling the trademarks for large sums of money. However, to shore up IPRs for corporations, the Trademark Cyberpiracy Prevention Act was signed into law in November 1999. Under this new law, it became risky to register a domain name or even use a word that may distract from the commerce of a company that has the resources for a lawsuit. In 2001, Microsoft, which owns the word 'windows', filed a suit against Lindows.com Inc., a Linux-base software producer. Microsoft claimed that Lindows freeloaded on their investment in Windows. More and

more words and phrases are trademarked, compromising freedom of speech in cyberspace. For example, the McAfee Corporation lists over 200 trademarks on their website, claiming IPRs to 'building a world of trust', 'bomb shelter', 'cybermedia' and 'more power to you'. To demonstrate how commercialised cyberspace has become, University of Iowa assistant professor Kembrew McLeod registered the phrase 'freedom of expression'. In January 2003 he went after AT&T for infringing on trademark No. 2,127,381 in their advertisements. About 80% of all trademark lawsuits are decided in favour of the plaintiff in the US, but few cases have been successful against media giants like AT&T (Abel 2003; Ives 2003; McLeod 2001).

INTELLECTUAL PROPERTY RIGHTS, KNOWLEDGE AND NATURE

Excluding Pasteur's patent on yeast in 1871, it was not until 1930 that life forms, biological sources of medicine, were made patentable. These patents extended only to asexual non-reproducing plants, but in 1954 provisions were expanded to include cultivated hybrids, mutants and newly discovered seedlings (Haraway 1997, pp. 97–94; Kevles 2002; OTA 1989). The patenting of seeds introduced an element of IP monopoly that was somewhat avoided with the original stipulation of asexuality. Currently, there are about 6000 plants patented under US IP law and nearly one-third of these were issued in the last 5 years. This reflects the significant upward trend in biotechnological patents since the mid 1990s. DuPont, the largest global seed company, profits nicely from plant IPRs with $2 billion in annual seed sales. Monsanto has over 600 plant patents and makes about $1.6 billion in annual global seed sales. Their genetically modified seeds are designed to be invulnerable to the herbicides and insecticides that constitute the essence of these industrial chemical companies. For example, Monsanto genetically modified the canola seed so that farmers could spray Roundup on their plant without killing it. The Roundup kills the weeds that compete with the canola crop. The catch is that Monsanto sells the farmers both the seed and the herbicide; the company requires them to sign a contract to license the seed – useless without Roundup – from year to year. In 2001, Monsanto won a lawsuit against Percy Schmeiser, a 70-year-old farmer in Saskatchewan, for infringing on IPRs by growing unlicensed canola, which Schmeiser claims blew into his field from adjacent farms (Fox 2001). For the 1.4 billion farmers in the world who rely on free seeds for food security, this is devastating. Monsanto now controls food security and rights to agricultural livelihoods in several countries, including India.

In addition to an increasing debt to Monsanto, which is purchasing fresh water rights as well as licensing seeds, India is fighting trends in biocolonialism and biopiracy. Biopiracy refers to the patenting of nature and the patenting of indigenous and traditional knowledge. Biocolonialism and biopiracy are fuelled by the World Intellectual Property Organization's Patent Cooperation Treaty, with which corporations can be issued a single

patent that is valid in all 144 WTO countries. The Trade Related Aspects of Intellectual Property Systems (TRIPS) agreement of the WTO, which requires all countries to initiate national systems of IPRs, is also helping. However, TRIPS also contains an article for overturning a patent if its commercial exploitation is deemed immoral. In 1997, the Council on Industrial and Scientific Research (CSIR) in India successfully challenged the University of Mississippi's patent on the healing properties of turmeric. The CSIR claimed that the properties of turmeric were known for centuries by Indians and constituted traditional knowledge rights. This was the first time a patent was revoked on a basis of traditional knowledge rights. Indian activists also challenged biopiracy by successfully overturning patents of neem tree oil and basmati rice (Mashalkar 2001; Shiva 2001a, b).

The patenting of drugs in the US dates back to the era of the 'patent medicines' of the late 1800s, but pharming is a more recent phenomenon. Pharming refers to IPR alliances between plant monopolies, biotechnology and pharmaceutical companies; global sales of plant-based drugs are $40 billion per year. There are nearly 1500 biotech pharming companies in the US with a total value of $224 billion as of May 2002. A vast majority of biotech profits involves medicine and their monopolies are creating conditions that make it nearly impossible for impoverished people to access essential health care. The Swiss company Novartis, for example, developed a leukemia medicine called Gleevec. Although it was a collaborative project involving the Oregon Health and Science University, the University of California at Berkeley and the University of California at Los Angeles, Novartis was given the IPRs to Gleevec and set a high price for its distribution (HHMI Bulletin 2001). Even though the Gleevec International Patient Assistance Program supports some patients in financially poor countries, it supports only a small number of patients. Hence, Natco, a company in India released its own copy medicine called Veenat. South Korean leukemia patients who cannot afford to buy Gleevec desperately try to directly import Veenat. Veenat, however, is illegal in this Northeast Asian country since it is a member of the WTO, which regulates the distribution of generic medicine (Kim 2003). Although South Korea is not considered an impoverished country, most patients simply cannot afford to purchase expensive medicines like Gleevec. Countries such as South Korea need generic medicine in spite of their economic status. Impoverished African countries are faced with the same problem in the distribution of generic HIV/Aids drugs such as AZT. Thirty-nine IP lawsuits filed by US pharmaceutical companies against the South African government for importing generic antiretroviral drugs were finally dropped in 2001 (Krimsky 2003; Mehrabadi 2003).

Biopiracy of higher life forms began in 1971 when a patent was issued to Ananda Chakrabarty and General Electric for a genetically engineered Pseudomonas bacteria used to clean up petroleum spills. Prior to this patent, microorganisms and higher life forms were 'products' of nature and not patentable. Since that time, the patenting of higher life forms has

gotten increasingly complex and controversial. The first patented animal in the world was a mouse – the Harvard Oncomouse™. The patent was issued in 1988 to two professors who re-assigned their IPRs to Harvard University. Harvard's patent protects both the process by which the Oncomouse™ is produced and the end product of the process (i.e., mouse and offspring whose cells contain the oncogenes). Harvard licensed the patent to DuPont, which in turn licenses Oncomouse™ for $50–$75 per mouse to cancer researchers across the world. The mouse carries different oncogenes, making it susceptible to cancer, most notably breast cancer (Haraway 1997; Kevles 2002). Public protest forced a 5-year moratorium on animal patents until 1993; since that time, 383 more animals were patented.

On July 5, 1996, when the Roslin Institute in Scotland cloned Dolly, a transgenic sheep, a new era of animal patents was ushered in. Geron owns Dolly, but the IPRs for cloning an unlimited number of Dollys was issued to Advanced Cell Technologies (ACT). ACT and the University of Massachusetts, which cloned two cows (George and Charlie), were issued the primary US patent (No. 5,945,577) for cloning animals in 1999. Infigen, which cloned the first cow (Gene) in 1997, and Geron are challenging patent No. 5,945,577. All three biotech corporations anticipate that earnings from the patent will be in the millions, if not billions of dollars. In 1998, Korean researchers claimed to have cloned a human embryo but terminated the experiment at the four-cell stage. Bioethicists and rights advocates note that when cloning patents are combined with human gene patents, the door is open toward the patenting and commercial ownership of humans – a literal Frankenstein scenario (Rollin 1995, 1997, 1999).

Through the systematic process of gene patenting, the commercial ownership of human life is well underway. While gene patenting accounted for a large share of all patents over the past decade, 20,000 applications were filed in this period for patents on *human* genes. Based on the mapping of the 30,000 genes in the human genome and thousands of sequences, analysts anticipate that some 3 million patent applications will claim IPRs on related medicines and uses, allowing for a 'patent family' or monopoly on human genes and their uses. The French biotech corporation Genset has claimed IPRs to 36,083 gene sequences and the US's Ribozyme has claimed 15, 863 gene sequences. As of July 2003, 1800 human gene patents have been issued in the US. The first human body part patent was issued in 1976 for a spleen cell removed from John Moore at the UCLA hospital. UCLA sold the rights to the Genetics Institute of Boston, which in turn sold the rights to the Swiss Biotech firm, Sandoz, in the mid 1980s. Moore fought Sandoz for the rights to his own cell line, but in 1990 the California Supreme Court ruled that he had no rights to his cell once it was removed from his body. The first human gene patent (No. 4,322,499) was actually in 1982. The commercial control of human life is primarily in the hands of the top ten human gene companies, which claim 70.4% of the 126,672 gene sequences with IPR claims across the world. Predictably, litigation over IPRs in US courts has increased by

50–70% over the last 2 years (American Medical Student Association 2003; Kevles 2002; Mehrabadi 2003; Nuffield Council on Bioethics 2002; Wright 1986). Noting alarming trends in genetic discrimination and biopiracy, the Council for Responsible Genetics created a Genetic Bill of Rights for grass roots civil activism against the commercialisation of human life.

Since the 1980s and especially with the PATRIOT Act, it is increasingly clear that governmental control of IPRs parallels, and often exceeds, commercial control. During World War I, some 2100 patent applications were kept secret by the US, initiating a series of executive orders and laws imposing restrictions on IP. Currently, only 1% of unclassified military patents, which number between 10,000 and 15,000 each year, are actually licensed. Even in peacetime, the US government has managed to contravene the First Amendment by restricting the circulation and publication of research conducted by federal employees. Executive orders, such as the War Powers Act (1941), Invention Secrecy Act (1951), Atomic Energy Act (1954), Export Administration Act (revised 1985), Department of Defense (DoD) Appropriations Act (1984) and the PATRIOT Act expand the scope of classified documents and place severe restrictions on the open circulation of IP. With the government's support of about 50% of all research and development in the US, and the DoD's increasing proportion of this support, an inordinate amount of IP is held captive to governmental secrecy. National security has been expanded to include economic and political threats, and executive orders, such as the PATRIOT Act, do not distinguish among the IP of economic, governmental, industrial, military or scientific institutions (OTA 1988a, pp. 37–68).

The IP rights and the open knowledge movement pose a range of ethical and legal challenges to proprietary control and secrecy. Should knowledge with potential for human welfare but also with economic potential for a corporation or government be kept secret? Facing global resistance to the TRIPs agreement and public health, the WTO recently amended policies so that impoverished countries can import generic drugs if they cannot produce them (Kim 2003; Whittington 2003; WTO 2003). The Canadian government became the first to permit generic drug companies to copy, make and export HIV/AIDS drugs to the developing world (CBC 2003). Canada is also the only country in the world to prohibit the patenting of life forms higher than single celled organisms. This is a commitment to place animal and human rights before IPRs.

CONCLUSION: A TECHNOLOGICAL LITERACY OF RIGHTS

Fiction writers such as Bacon, Shelley and Orwell chronicled an alarming convergence of legal, political, scientific and technological powers. They described the ways that science, technology and government – Interpreters of Nature, Frankenstein and Big Brother in their stories – wielded power over nature, culture and people. Not necessarily captured in these fictions,

commercial powers rose to complement science, technology and government. With the convergence of new biological, communications, information and medical technologies, we have seen dramatic changes in the structure and performance of local, national and global economies. The global reach of multinational corporations, with their vast infrastructure, makes the principle of national control and sovereignty impossible to sustain. Wide-scale global expansionism, as we are witnessing, requires unsettling military force and operations of empire.

Most charters and constitutions across the world secure the freedom for the expression of opinion and thought and protect areas of personal expression such as religion, ethics and political philosophy. Technological literacy would empower individuals to use the new technologies to express and inform themselves about the content and violations of rights throughout the world. This literacy would also enlighten citizens about technological threats to free speech and privacy. Charters and constitutions protect rights to individual privacy and against the practice of arbitrary power and surveillance. The powers of surveillance provided by the new biometric, genetic and satellite technologies offer a host of threats to privacy. Technological literacy would empower students to agitate for the regulation of intimate and remote surveillance and restrictions on government, police and security. Charters of human rights focus on positive rights, such as the right to a livelihood. Technological literacy would provide students with the ethics for demanding minoritarian, human rights across the world. Copyright and patent laws support the commercialisation and globalisation of IPRs, and the exploitation of traditional knowledge rights and human genetics. Technological literacy would side with open knowledge initiatives to challenge trends toward commercial ownership of human life, nature, food security and rights to a livelihood (Bryson & de Castell, 1996; Elshof 2003; Keirl 2001; O'Riley 2003; Petrina 2000, 2003a; Volk 1990, 1994).

There are few comforts to be found in today's political climate. We can no longer distance ourselves from the issues of technology and rights. Whereas it was once easy to change the television channel that illustrated the ill affect of globalisation on human rights and child labour, nowadays the discomfort is personal. Whether we think we are complicit or not, we now feel the weight of activism and apathy and realize what is at stake.

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