

This is a preprint version of the following article:  
Brey, P. (2007). 'The Technological Construction of Social Power,' *Social Epistemology* 22(1), 71-95.

## The Technological Construction of Social Power

*This essay presents a theory of the role of technology in the distribution and exercise of social power. It studies how technical artifacts and systems are used to construct, maintain or strengthen power relations between agents, whether individuals or groups, and how their introduction and use in society differentially empowers and disempowers agents. The theory is developed in three steps. First, a definition of power is proposed, based on a careful discussion of opposing definitions of power, and it is argued that a theory of power should have two components: a theory of power relations and a theory of empowerment. Second, an analysis of power relations is presented, in which five basic types of power relations between agents are distinguished, and this analysis is applied to technology, resulting in an account of the possible roles of technical artifacts in power relations. Third, it is analysed how technology can lead or contribute to empowerment and disempowerment, and what resistance strategies are possible against disempowerment through technological means.*

*The theory of technology and power presented in this paper is claimed to be an essential ingredient of a critical theory of technology, which is a theory that analyses and critiques the role of technology in the distribution and exercise of power in society. In the last section of this paper, it is argued that the theoretical analysis of power and technology presented in this paper provides an adequate basis for the further development of such a critical theory of technology. It is studied how it may, specifically, be used to develop strategies for the democratization of technology.*

*Keywords:* politics of technology; social power; empowerment; critical social theory; resistance to technology; democratization of technology

### 1. Introduction: Power and the Politics of Technology

A critical theory of technology<sup>1</sup> is a theory that interprets and evaluates how technology functions in society in order to arrive at independent normative judgments about this functioning. Critical theories of technology are motivated by either political, social, cultural, or religious ideals. The tradition of political critique of technology, which is continued in this paper, began with the works of Karl Marx and has since then included the neo-marxist technology critiques of the Frankfurt school (Marcuse, Adorno,

---

<sup>1</sup> In this essay, I will use the notion of 'technology' in a restricted sense to denote technical artifacts (manufactured products, devices and systems). I will not include technical knowledge and skills as species of technology, although I believe that much that I will say about artifacts also holds for technological knowledge and skills; such knowledge and skills are, after all, human-made artifacts as well.

Horkheimer and others), other critiques of technology indebted to Marx's thought like those of Ivan Illich, David Noble, and Manuel Castells, as well as (largely) independently developed political critiques such as those by Lewis Mumford and Michel Foucault. Contemporary political critiques of technology are often influenced by work in the interdisciplinary field of science and technology studies (STS) or are simply part of this field (Winner 1980, 1986; Sclove 1995; Feenberg 1995, 1999).

The central notion in political critiques of technology is undoubtedly the notion of *power*. Definitions of politics often revolve around the concept of power, describing politics as the process of acquiring and exercising power in order to settle collective affairs. The question 'How is technology political?' is therefore answered in large part by answering the question 'How does technology affect the way in which power is distributed and exercised in society?' Many contemporary critics of technology claim that technology has become a principal means through which power is distributed and exercised in contemporary society. Technological infrastructures and artifacts are believed to help determine the outcome of political outcomes, not just at the formal level of political representation but also outside the formal political arena. Technology is engaged in what Ulrich Beck (1999) has called *subpolitics*, which is a politics outside and beyond the representative institutions of the political system of nation-states.

A critical political theory of technology, then, is a theory that interprets and criticizes the role of technology in the distribution and exercise of power in society. A critical theory of this sort requires the development of an answer to four questions: (1) *the theoretical question*: how can technology play a role in the distribution and exercise of power? (2) *the factual question*: What is the role of technology in the distribution and exercise of power in contemporary society? (3) *the normative question*: What role should technology have in the distribution and exercise of power in society? and (4) *the practical question*: What steps can be taken to move closer to this ideal? The first three questions set the stage for the development of policies and practices for the realization of a society in which technology is a force for empowerment rather than for domination. In this essay, my main aim is to answer this first question, and to do so in a way that carefully distinguishes the different ways in which technology relates to power so that subsequent policies and practices can take this diversity into account. I will only provide very sketchy answers to questions two to four.

To emphasize the normative importance of a critical theory of technology, however, I will start with a brief and preliminary answer to the third, normative, question. The three political virtues most frequently associated with a good society are democracy, freedom and justice. A good society, it is believed, is *democratic*, meaning that its citizens have a roughly equal say in collective decisions. It is also *free*, in that its citizens are free to pursue their own goals in life and make their own decisions without interference or restraint. And finally, it is *just*, meaning that its citizens have an equal claim to basic rights and liberties and equal opportunities in the pursuit of social benefits. Political critiques of technology often focus on the relation between technology and one or more of these three political virtues.

It is not difficult to see the relation between these ideals and the organization of power in a society. Democracy requires a roughly equal distribution over citizens of powers to make collective decisions, or at least a roughly equal distribution of powers to appoint delegates who make such decisions and who are accountable to their electorate.

Freedom requires power over one's own life, including the power to make one's own decisions, and the absence of asymmetrical power relations in which one's freedom is constrained by others. This is not to say that asymmetrical power relations are always wrong. There may be good reasons for limiting someone's freedom through the asymmetrical exercise of power. It is widely accepted, however, that such limitations should either be imposed by democratically elected institutions or voluntarily entered into by agents through a contractual arrangement. Justice, finally, requires the organization of power in society such that citizens receive equal protection of their basic rights and liberties, and are equally empowered, to the extent possible, in their pursuit of social benefits. The preliminary answer to the normative question is hence that the role of technology should be such that it aids in the arrangement of power so that the ideals of democracy, freedom and justice are attained as well as possible.

The structure of the remainder of this paper is as follows. In sections 2 and 3, I undertake a careful analysis of the notion of power, including a distinction between different ways in which power is exercised in power relations and different ways in which power can be acquired and lost (empowerment and disempowerment). In sections 4 through 6, I apply this analysis of power to technology. In section 4, I discuss the role of technology in power relations and the asymmetrical exercise of power. In section 5, I discuss its role in empowerment and disempowerment. In section 6, I study how technology that is perceived by agents to disempower them can be resisted by them. In a concluding section, I return to the ideals of democracy, freedom and justice, and ask whether democratization approaches to technology, in which political power over technology is organized more democratically, can lead to the development of technology that is more supportive of democracy, freedom and justice.

## **2. Defining Power and Empowerment**

I will defend a particular conception of power by going through some of the main disagreements on the nature of power that are visible in the literature and by staking out my own position. A first point of disagreement in the literature on power concerns the question whether it is a relation between *agents* (individuals or groups) in which one agent exercises power over another, or whether it is a property of *social structures* that work to generate systemic outcomes that affect the behaviours and interests of agents in society. This disagreement corresponds to the classical structure versus agency debate in social theory, which revolves around the question whether it is the actions of agents or the workings of social structure that are the main determinants of human thought and behaviour. In this essay, I will assume that power relations are both established by the actions of agents and by the workings of social structures. Usually, these forces will work in concert, but it will often be possible to distinguish either agency or structure as the dominant principle in the exercise of power or realization of a power relation.

A second point of disagreement in theories of power concerns the question whether the exercise of power is necessarily *intentional*. If power is embedded in a social structure, rather than exercised by an agent, then obviously it is not always intentional. But this still leaves us with the question whether the exercise of power by agents is necessarily intentional. If an agent *A* forces an agent *B* to do *x*, must *A* therefore also

have intended *B* to do *x*? Lukes (1986, 5) argues that this is not the case. He claims that power relations may bring about all kinds of behaviour in power endurers that work to a power holder's advantage but that were never explicitly intended by the power holder. For example, a servant may prepare his landlord a nice dinner to gain favour with him, without the landlord having intended the servant to do so. However, it would surely be wrong to claim that this is an example of the *exercise* of power by the landlord. Rather, it is an example of how an existing power relation, whether intentionally brought about by a power holder or the result of larger social forces, may cause power endurers to perform certain actions. By definition, however, the *exercise* of power by power holders is always intentional, because it involves actions by a power holder aimed at carrying out his *will* and attaining some desired *end*. I conclude therefore, that although power *relations* do not require intentionality, the *exercise* of power always does. This is a mere matter of definition, however; I choose to define exercises of power as intentional acts by power holders.

A third and final point of disagreement concerns the question whether power necessarily involves a *conflict of interests*. Those who claim that it does, like Steven Lukes (1974, 2005), hold that power is a relation between two agents with conflicting interests, in which the more powerful agent generates outcomes that are in his interest but against the interests of the other agent. This conception of power has been severely criticized. As Ball (1993) has argued, exercises of power do not necessarily promote the interests of the power holder or harm the interests of the power endurer. A parent or teacher may exercise power over a child or pupil for its own good and without necessarily reaping any benefits from it. I will follow Ball in assuming that a proper definition of power does not require reference to conflicting interests.

In this paper, I will initially restrict myself to an analysis of power relations between agents and the way in which power is exercised in these relations. This analysis will take place in sections 3 and 4. An agent who has or exercises power is called a *power holder*, and an agent on whom power is exercised a *power endurer*. My aim in sections 3 and 4 is to investigate different kinds of exercises of power between power holders and endurers, and to examine the role that technological artifacts and systems play in such relations. Later, when I move to a discussion of empowerment in sections 5 and 6, I will lift this initial restriction and discuss more broadly how both agents and social structures work to empower or disempower individuals and groups.

Many scholars have observed that power, as an ability of agents, is referred to in two ways. First, power is referred to as an ability of agents by which they can get things done. 'Power' here means: power to realize a certain outcome. For instance, someone may be said to have the power to knock an opponent to the floor or to sign a bill into law. Second, power is being referred to as an ability to exercise control over someone or something, without any reference to outcomes. For instance, someone can be said to have power over her husband, or power over her own life. 'Power' hence appears in two forms: '*power to*' (the power to realize outcomes) and '*power over*' (control over a person, thing, or process). Following Dowding (1996), I will call the power to realize outcomes *outcome power*. To have outcome power is to have the power to bring about certain events or state-of-affairs, for instance an opponent being knocked to the floor or a bill being signed into law.

I will call power through which control over someone or something is exercised *control power*. Upon further analysis, control power reveals itself as a special form of outcome power: it is the power to determine outcomes *for* someone or something. To have power over an entity is to be able to determine what happens to it. Parental power over a child, for instance, is the ability of parents to determine what happens with their children: whether they get to visit friends, receive candy, watch television, and so forth. Power over sentient beings frequently implies control over their behaviour, rather than just control over their condition or circumstances. It implies the power to determine a specific type of outcome in relation to them, which is their performance of certain actions, as well as any further outcomes that may result from these actions.

Control power that is exercised over an agent's behaviour may be called *behavioural control power*. In behavioural control power, someone's agency is made into an object of control. Control power that is exercised over aspects of an agent other than his behaviour (e.g. physical appearance, health, social status, resources, abilities, physical location) may be called *situational control power*. This is the power to determine aspects of the situation an agent finds himself in. In practice, an exercise of behavioural control power will often imply an exercise of situational control power as well, as actions by the controlled agent will often change the situation this agent finds himself in. For example, if an agent *A* wants another agent *B* to leave an area, he may do so in one of two ways. First, he may bring it about that *B* is physically apprehended and removed from the area. He then exercises situational control power over *B*, resulting in a new situation for *B*: his being removed from the area. Agent *A* may also coerce *B* into leaving the area by threatening *B*. *A* then exercises behavioural control power over *B*, resulting in *B*'s behaviour of leaving the area. *A* may here be said to realize a desired outcome through *B*'s actions. Yet, this behaviour also results in a new situation for *B* and is therefore also an exercise of situational control power.

Max Weber famously defined power as the capability in social relationships to carry out one's own will even against resistance. In control power, it seems, the power holder is characterized by his capability to carry out his will, whereas the power endurer does not have the ability to carry out his will, but is instead subjected to the will of the power holder and has to carry out his will. Control power therefore implies some form of domination or governance which implies the ability to determine aspects of someone else's life. For instance, if *A* has power over *B*'s eating behaviour, then *A* can determine aspects of this eating behaviour. Not all forms of power exercised by agents over other agents are strong enough to qualify as control power, however. I define *influence* as a weaker form of power exercised by one agent in relation to another agent. It is not 'power over' but mere 'power to': it is the power to affect (but not determine) how others behave. To have influence on someone's behaviour is to affect his behaviour so that it is more likely to turn out in accordance to one's will. I will assume that the distinction between control power and influence is a gradual one.

Given the conceptual framework developed so far, the notion of *social power* could be defined in several ways. In its broadest sense, social power is social outcome power: the power to determine social outcomes, which are changes of any kind in the makeup of society. In a narrower and more customary sense, which will be used here, social power is the power to influence the behaviour of others. Social power in this sense is either behavioural control power or social influence: it is the power to either determine or affect

the behaviour of others. According to this conception of social power, social power is not just exercised by groups; it can also be exercised by individuals. *Group power* is social power exercised by groups, and *organizational power* is power exercised by organizations, whereas *individual social power* is social power exercised by individuals. *Political power*, finally, is a special form of social power. It is the power to determine or influence the way in which collective affairs are settled.

Agents can have more power, or less. In a very straightforward sense, the acquisition of (outcome or control) power by agents may be called *empowerment*, and its loss *disempowerment*. However, the notion of empowerment is more customarily defined in relation to a person's or group's ability to determine his or its own destiny. Empowerment, in this sense, is self-governance or self-determination, which is the attainment of control over one's own life or future. Such control can be attained in two ways. First, it is attained through the addition of relevant outcome power, including social power, to better achieve one's individual or collective goals. Second, it is attained through the development of a better resistance against social power exercised by others. A (socially) empowered agent, then, is an agent who is free to determine his own goals and choose his own actions, and who can exercise social power in relation to others to help attain these goals.

As I have claimed in section 1, an understanding of the extent to which a society lives up to the political ideals of democracy, freedom and justice requires an analysis of the way in which power is distributed and exercised in society. The distribution of power in society can be analysed through an analysis of how agents are *differentially empowered* in society: how and why certain agents have acquired more self-determination and social power than others. The exercise of power in society can be analysed through the study of the way in which power holders use control power or influence to affect others. In the following two sections, 3 and 4, I will first focus on the exercise of power as manifested in asymmetrical power relations. Section 3 will focus on five basic types of power relations, and section 4 will be devoted to a study of the role of technology in the establishment or maintenance of power relations. In section 5, the focus will shift to differences in empowerment, and the role of technology in differential empowerment.

### **3. Five Kinds of Power Relations**

*Power relations* are relations between agents in which power is exercised. Power relations can be symmetrical or asymmetrical. In a *symmetrical* power relation, agents have equal strength, relative to potentially conflicting interests, and they resolve conflicts of interest through dialogue (mutual persuasion) or bargaining. In *asymmetrical* power relations, one agent is more powerful than the other, resulting in an asymmetrical exercise of influence or control, i.e. the ability to impose one's will on others. My primary focus in this section will be the (necessarily asymmetrical) exercise of behavioural control, which is held by many authors to be the most important type of power that is exercised on other agents. I will also say some brief words on the exercise of situational control and of 'mere' influence on other actors.

The question I will try to answer is: 'How do agents exercise behavioural control over others?' In general terms, many authors have concluded, agents exercise such control by

rearranging what Dowding (1996) has called the *incentive structure* of agents, or what Lukes (1974) has called the *preferences* or *attitudes* of agents. An agent's incentive structure comprises an agent's beliefs about the costs associated with different behavioural alternatives, and the likelihoods that such alternatives will lead to desired outcomes. An agent's behaviour is determined by his incentive structure, which will cause him to choose the behaviour deemed most likely to be in his interest.

In power relations that involve the exercise of power over the behaviour of others, a power holder performs actions that change the incentive structure of the power endurer in such a way that the power endurer acts in a way intended by the power holder. This can be formulaically expressed as follows:

*A* exercises behavioural control power with respect to *B* when *A* does *x*, a deliberate causal outcome of which is that *B* does *y* which *B* would not have done without the occurrence of *x*.

This definition is a slightly altered version of a definition of power by Brian Fay (1987). Fay emphasize that 'does' in the formulation includes both positive actions and forebearances. Power can be exercised through action or through failure to act, and can cause somebody to perform an act or to refrain from performing an act. For instance, an agent may force another agent to dig a hole, but may also prevent him from digging a hole.

Bachrach and Baratz (1970) have argued that there are five basic ways in which power is exercised over others, which they call force, coercion, manipulation, authority (or leadership), and influence. This typology is adopted by Steven Lukes in his famous treatise on power (Lukes 1974). It is also adopted for the most part by Brian Fay in his influential book *Critical Social Science* (Fay 1987), although Fay does not recognize influence as a special type of 'power over'; rightfully I think, because as I argued in the previous section, influence may be exercised on others, but it is not a form of control power. In what follows, I will make use of Fay's formal definitions of the remaining four types of power. In addition, I will add a fifth type of exercise of power, on the basis of the work of French and Raven (1960), which I will call seduction. In my analysis, then, an agent *A* exercises behavioural power over another agent *B* when *A* either forces, coerces, seduces, manipulates or leads *B* to act in a certain way. I will now consider these five types of exercise of power in turn.

(1) *Coercion*. Fay defines coercion as follows:

*A* coerces *B* when, by threat of deprivation to *B*, *A* causes *B* to do *y* which *B* would otherwise not have done.

In coercion, an agent *B* performs actions because the controlling agent *A* has made *B* believe that if he does not perform these actions, he will be penalized by *A*. The penalty can be anything that *B* believes to work against his interests, including the addition of extra burdens, duties and responsibilities; infliction of pain and suffering; loss of health or life; loss of or damage to property; loss of opportunities; loss of protection against risks; negative changes in *B*'s living environment; or harm done to a loved one. Notice

that it is the threat of imposition of such penalties that causes *B* to act in a certain way, not their actual imposition.

When *A* threatens to impose only weak penalties on *B* if *B* does not carry out *A*'s will, it may go too far to say that *B* is being coerced. It may then be said instead that *B* is being *pressured* to perform these actions. For instance, if *A* says to *B* that he will be able to do less favours for *B* in the future unless *B* does a job for *A*, we would not normally say that *B* is being coerced to do this job, but rather that he is being pressured to do it.

(2) *Seduction*. Coercion involves negative incentives for action. But cannot power be exercised as well through positive incentives? A parent can either get its child to clean its room by threatening it with punishment or by promising it a treat. In either case, the parent is exercising parental power over the child. That there is a counterpart to coercive power is recognized by social psychologists French and Raven (1960), who call it *reward power*, or *incentive power*. They call reward power the ability to get people to do what one wants through one's perceived ability to deliver positive consequences or remove negative consequences in response to their behaviour. I call the exercise of reward power *seduction* or *enticement*:

*A* seduces *B* when, by promise of reward to *B*, *A* causes *B* to do *y* which *B* would otherwise not have done.

Although this definition looks like a mirror image of the definition of coercion, there is an important asymmetry in boundary conditions, caused by the fact that agents are generally freer to avoid seduction than they are to avoid coercion. As a consequence, not every type of seduction involves a genuine exercise of power. If three people *A*, *B* and *C* offer a fourth person *D* the same amount of money to mow their lawn, and *D* chooses *A* to mow his lawn, then it does not seem right to say that *A* has exercised power over *D* and the other two persons have not. Rather, one would say that *A* and *D* have entered into an agreement to mutual benefit where neither party has genuine power over the other. The situation would be different if *A* had a monopoly on employment, and the only way in which *D* could make a living is by working for *A*. Then there is an asymmetrical relation of power between *A* and *D*, because *A* has a scarce resource, employment, which *D* needs, and *D* has no good alternative to working for *A*. Seduction is hence only a genuine exercise of power when promised benefits are scarce and important to the subject of power, and there are few alternative ways to get these benefits. In such a situation, the subject of power has limited bargaining power and is therefore largely at the mercy of the power holder, who holds a relative monopoly.

(3) *Force*. Force is defined by Fay as follows:

*A* forces *B* when, by removing from *B* the effective choice to act otherwise, *A* causes *B* to do *y* which *B* would otherwise not have done.

Forcing someone to do something is taking away from him the very possibility of performing alternative actions. Although Fay does not explain what he means with removing someone's 'effective choice to act otherwise,' his examples suggest that he

means physically removing someone's choice: force means physical force, usually involving some form of violence or physical restraint. Some examples of the exercise of force are physically restraining someone and putting them in handcuffs, force-feeding someone, and forcibly evacuating them from their home.

These examples involve the exercise of physical force on someone's person. Yet, there seem to be other cases that fit Fay's definition of force but that do not involve such exercise of physical force. Suppose agent *A* runs a supermarket and wants *B* to purchase his groceries at this supermarket. However, *B* buys his groceries at another supermarket at the other side of town. In theory, *A* could attain this goal by buying up the other supermarket and closing it down, or by stealing *B*'s vehicle so that *B* has no transport to the other side of town, or by putting a blockade on the road to the other supermarket. In all three cases, *B* then has no effective choice but to buy his groceries at *A*'s supermarket. What they are, rather, are instances in which people are forced to do something in order to satisfy their *vital interests*. Not getting groceries is not an option for *B*, because *B* would then starve. It is hence a vital interest of *B* to get groceries. What *A* has done is define for *B* the actions that *B* must take to satisfy this interest: *B* must go to *A*'s supermarket to buy groceries. In other words, *A* has performed actions that intentionally limit the range of actions available to *B* to satisfy his vital interests. *A* has thereby deprived *B* of a number of opportunities. *A*'s actions qualify as an exercise of power because they are designed to cause *B* to do things in order to satisfy *A*'s wishes.

To conclude, forcing someone to act in a certain way is a type of exercise of power in which someone is either physically restrained or brought into motion in order to achieve certain outcomes, or in which someone is intentionally limited to act in a certain way to satisfy his vital interests.

(4) *Manipulation*. Manipulation is getting people to act in a certain way by performing actions behind their back, withholding information from them or deceiving them in some way. I here propose a modified version of Fay's definition of manipulation that covers more cases that can intuitively be defined as manipulative:

*A* manipulates *B* when, by doing *x*, *A* causes *B* to do *y* which *B* would otherwise not have done, without *B*'s knowing that (1) *A* is doing *x*, or (2) that *A* is doing *x* to cause *B* to do *y*, or (3) that *A* has reason *r* for wanting *B* to do *y*.

Manipulation may combine with coercion, seduction or leadership. People can be coerced, seduced or led in a manipulative manner. For instance, someone may seduce his grandmother to give him a valuable painting by deceiving her into thinking that he loves her, or by coercing her into giving him the painting by making false threats.

(5) *Leadership*. Leadership is defined by Fay as follows:

*A* leads *B* when, by doing *x*, *A* causes *B* to do *y* which *B* would otherwise not have done because *B* accepts the right of *A* to require *y* (i.e. because

of  $A$ 's authority) or because  $y$  is accepted as reasonable in the circumstances by  $B$  (i.e.  $A$  persuades  $B$ )

Leadership, on this definition, does not, or at least not directly, depend on punishment, reward or force, nor is it necessarily manipulative. Rather, it depends on *authority* or *persuasion*, qualities which Fay holds to stand on their own. Fay's definition may be elaborated using existing accounts of power by authority or persuasion. Max Weber (1946) has famously distinguished three major types of authority: charismatic, traditional and rational-legal. *Charismatic authority* relies on the personality or leadership qualities of the leader, and his embodiment of ethical, heroic or religious virtues. *Traditional authority* relies on belief in the sanctity of tradition and is not codified in impersonal rules but inheres in particular persons who may either inherit it or be invested with it by a higher authority (patriarchal, patrimonial and feudal in premodern societies). *Rational-legal authority* is a product of the modern state and its legal system and bureaucratic mode of organization. It relies on the recognition of powers in persons that are bureaucratically and legally attached to their position. Leadership by means of authority may obviously involve coercion, manipulation, force and seduction, but it is perhaps not reducible to such acts and may instead depend on certain dispositions in the leader's followers, like habit, faith, devotion and respect.

Persuasion, as defined here, is getting people to accept that it would be reasonable for them to perform certain actions. The person who engages in persuasion does not rely on any authority held by him by which such actions may be required, nor does he make promises or threats in order to coerce or seduce people to act. Being persuasive usually depends on one's *rhetorical powers*: one's powers to use language or another symbolic system to persuade others. Through rhetoric, one can appeal to reason (e.g. prove or reason why it would be in a person's interest to perform certain actions) or to emotions (e.g. use suggestive or seductive language or appeals to authority to induce actions). Rhetorical discourse may make use of various aids, such as facial expression, voice inflection, body language, or clothing. Persuasion may also depend on expertise or privileged information. An agent may have expanded persuasive powers because he is seen to have special expertise based on his education or experience, or he may be persuasive on a subject because he is believed to possess privileged information. Raven and Kruglanski (1970) called such powers based on expertise or privileged information *expert power* and *information power*.

#### **4. How Technology Creates and Sustains Power Relations**

Technology can help agents exercise power over others by either giving them new powers or by improving the efficiency, effectiveness, reliability and ease by which existing powers are exercised. Formulaically:

Technology  $T$  helps  $A$  exercise power with respect to  $B$  when  $A$  wants  $B$  to do  $y$  and  $T$  either gives  $A$  the ability to do  $x$  which causes  $B$  to do  $y$  or  $T$  makes  $A$ 's doing  $x$  more efficient, effective, reliable or easy.

When a country *A* wants a country *B* to change its foreign policy, its development of a nuclear weapon could be used to effectively threaten country *B* with it to change its foreign policy. This is an example of technology giving an agent new powers over others. An example of the improvement of existing powers would be an employer switching from traditional surveillance methods to electronic surveillance, against lower cost and with greater effectiveness.

It is not just artifacts like weapons and surveillance cameras that give agents more power over others. The layout of the built environment and the arrangement of furniture can also help agents exercise power more effectively. Foucault's classical example is the panopticon, the circular prison building that allows guards to observe all prisoners without being observed themselves. Similarly, a board room is normally arranged to place the CEO at the head of the table so he can more easily control the conversation. Artifacts do not just help agents gain control over others by giving them added physical powers. They also do so through symbolic powers that affirm the leadership of the agent. The king's crown and scepter, the CEO's lavishly decorated office and the scientist's white lab coat all help them convey high status and authority, thereby stimulating or facilitating acceptance of their leadership.

An analysis of the way in which technological artifacts help agents in their exercise of power requires an analysis of the relation between these artifacts and the controlling agent. In the classical scenario, agents *A* and *B* are at the same location and technical artifact *T* is available to *A* to help him do *x* so that *B* does *y*. For instance, *A* is a police officer who attempts to restrain *B*, a suspect, and *A*'s baton gives him more effective powers to perform actions that cause *B* to cease resistance. I shall call instances where technology is used to exercise power where *A*, *B* and *T* are all at the same scene instances of the exercise of *proximate power* using technology. *A* needs not be present at *B*'s location, however, to exercise power over *B*. *A* can also use technology *T* at *B*'s location that is controlled by *A* from a distance. For instance, *A* can use remote-controlled video cameras to observe *B*, causing *B* to modify his behaviour according to *A*'s wishes, or *A* can close remote-controlled access doors to deny *B* access to a building, or *A* can make a telephone call to *B* to persuade him to do things *A* wants. I will call such instances exercises of *distal power* using technology.

In a third type of scenario, *A* brings it about that a technical artifact *T* with specific properties is present at *B*'s location, but does not engage in further proximate or distal interaction with *T* or *B*. In this scenario, *T* functions independently from *A*, and is used by *A* as a delegate to exercise power on his behalf. For instance, code-controlled access doors can selectively let people enter who know the right access code, speed bumps can slow down traffic, and automobiles can be designed to persuade, coerce or force drivers to wear their seatbelt. After Bruno Latour (1992), I will call such instances exercises of *delegated power* using technology, and artifacts that exercise such power *technological delegates*. In technological delegation, technical artifacts exert power on a power holder's behalf.

Latour has emphasized that delegation can occur in relation to human beings as well as technical artifacts. There is symmetry between humans and artifacts, in that both can act on someone else's behalf. Thus, if an agent wants to enhance his exercise of power over others, he can either do so by using or deploying artifacts or by deploying humans who act on his behalf (a helper, employee or intermediary). In proximate actions, the

agent can bring along others to help him; in distal actions, he orders helpers to the scene and instructs them from a distance; in delegated actions, he orders helpers to the scene and instructs them in advance.

Although the use of technology in the exercise of proximate or distal power is important, its use in the exercise of delegated power is more interesting and less well understood and will be the focus of the remainder of this section. In technological delegation, the design features of a technical artifact or its configuration in an environment are organized so that the artifact affects users or bystanders in such a way that they carry out desired behaviours or refrain from carrying out unwanted behaviours. The exercise of power through technological delegation can be defined as follows:

*A exercises power with respect to B using T as a technological delegate when A has configured T to do x, an intended causal outcome of which is that B does y which B would not have done without the occurrence of x.*

The power exerted by artifacts can either be *intrinsic* or *derived*. If the artifact is capable by itself of generating the desired behaviour, the power is intrinsic. For instance, a speed bump has an intrinsic power to speed down vehicles, because the force it exerts on vehicles either forces or coerces vehicle operators to slow down. Instead of employing speed bumps, law enforcement officials can also employ speed cameras, which are road-rule enforcement cameras that photograph speeding vehicles, including their license plates. Speed cameras do not have intrinsic power to slow down vehicles, but have derived power to do so. Their intrinsic power to photograph vehicles is used by law enforcement officials to penalize traffic offenders. This fact is known by vehicle operators, and gives speed cameras the derived power to speed down vehicles to avoid penalties. Artifacts with derived powers hence depend on their ability to *mobilize* powers of humans or other artifacts; they cannot exert power by themselves.

Let us now consider how technological delegation can be used to realize the five types of power relations discussed in section 3.

#### (1) *Delegated coercion.*

Technical artifacts cannot literally threaten people with punishment, but they can be designed to cause deprivation in people if they act or fail to act in a certain way. In this way, artifacts can coerce behaviour in users or other persons present. Not every correlation between behavioural choices in interacting with an artifact and negative consequences is the result of delegated coercion. People may use electronic equipment in an unsafe manner and get hurt, or they may walk too close to a water fountain and get wet. These are examples where people are not penalized because some remote agent has arranged the technology to punish them if they display certain behaviours, but merely because the technology happens to have certain capacities that cause harm in combination with certain actions undertaken towards it.

Delegated coercion or delegated pressure takes place when an artifact is intentionally arranged so that users or people in the artifact's environment must perform or refrain from performing certain actions in order to avoid a harm or disadvantage. We have

already looked at speed bumps and speed cameras as examples of coercive artifacts.<sup>2</sup> Another example, made famous by Latour, is a hotel key with a heavy weight, which pressures hotel guests to bring the key to the reception when they go out, rather than carry it with them. Similarly, coin-operated shopping carts penalize users by keeping their money when they do not return the cart after usage. Latour also describes how a seatbelt system in automobiles may pressure drivers to wear a seatbelt: they may emit annoying noises or signals that do not stop unless one wears one's seatbelt. Chairs at fast food restaurants are often intentionally designed to be uncomfortable after a while, so that people who stay too long are penalized with an uncomfortable feeling. Barbed wire coerces people to keep out of or remain inside an area because of the risk of physical harm if they act otherwise. In general, artifacts may coerce or pressure people through their known ability bring about bodily harm, discomfort, harm to property, if people do not perform the right actions towards them, or to require extra investments of effort or resources. Artifacts may either have the intrinsic power to bring about such negative consequences, or derived powers that depend on their ability to mobilize other actors that then issue a penalty.

## (2) *Delegated seduction.*

Delegated seduction takes place when an artifact is intentionally arranged so that it offers one or more scarce goods but requires users or people in its environment to perform or refrain from performing certain actions in order to acquire these goods. As explained in section 3, seduction, understood as an exercise of power, requires there to be an asymmetrical relation between the power holder and the power endurer due to a relative monopoly of the power holder over a scarce resource in exchange of which behaviours are required that are disproportionate to the received benefit. An artifact like a vending machine would not normally qualify as an instrument of delegated seduction, because vending machines normally sell resources that are not scarce and sell them against a normal market price. However, a vending machine in the middle of the desert that asks users \$100 for a bottle of water exercises asymmetrical power because it asks users to perform unreasonable actions due to its monopoly position.

Artifacts can obviously be designed to let users jump to all kinds of hoops in order to receive a benefit. Artifacts may then dispense the benefit themselves or contain a promise that human agents will provide them. An example of the former would be a website that offers free services to people in response to their filling out long forms with personal information. An example of the latter would be a keystroke monitor or time clock that is used by an employer not just to penalize employees who perform poorly but also to reward exceptional performance. Employees may then be seduced to put in exceptional performance in order to receive a bonus. Seduction in artifacts may also lie in their emotionally stimulating or addictive properties that can be used to influence behaviour. For instance, the stereo system in the supermarket that plays soft music is intended to stimulate customers to make purchases.

---

<sup>2</sup> Actually, speed bumps may both coerce and force behaviour; drivers usually slow down in advance for them to avoid a major impact, but speed bumps may also force vehicles to slow down through such an impact.

### (3) *Delegated force.*

Delegated force takes place when an artifact is intentionally arranged to force or constrain movement in users or other agents. Forcing or constraining behaviour is something that artifacts are good at: their physical mass or their ability to exert pressure or force can be effectively used to either force or constrain behaviour in human agents. They are particularly good at constraining behaviour. Wearables like handcuffs, straitjackets, shackles, and chastity belts physically prevent people from performing certain behaviours. More subtly, a piece of clothing like a tube skirt constrains a woman's movements so as to make it more elegant. Other items are not directly present on the body but are located in the environment and constrain movement within it. Walls, fences, trenches and similar structures prevent people from entering particular places. Chairs with hard backs force people to sit up straight. Turnstiles prevent people from entering an area quickly.

Artifacts are not just designed to constrain movement. They may also be designed to constrain communicative or perceptual behaviour. A car with two separate compartments prevents driver and passengers from talking to or interacting with each other. A room with no windows prevents people from seeing what is outside. In addition, delegated force may be selective: a low bridge may prevent high trucks or buses from passing under it, while allowing lower vehicles. A password-controlled website prevents only those from accessing it that do not have the password.

In section 3, it was argued that the exercise of force includes cases where people must perform certain behaviours in order to satisfy their vital interests. Artifacts or built structures may be intentionally arranged to require certain behaviour from people in order to access vital goods or services (water, food, energy, transportation, public services). If goods or services are not vital, then we would not say that people are forced to certain behaviours. Rather, we would say that they are pressured or seduced to such behaviours. Such pressure or seduction may then require them to submit to force in order to get goods or services. Whether goods and services are indeed vital is of course a matter of degree. Arguably, a conveyor belt at a Tayloristic production line that paces work in a certain way can be claimed to force people to perform certain sequences of actions at a certain speed. If they do not perform these actions in that manner, they will lose their jobs, and their vital interests are harmed. But in an economy without a scarcity of jobs, we may perhaps say that people are not forced to do this work, since they are free to find employment elsewhere.

Donald Norman has claimed that many artifacts have what he calls *forcing functions*, physical constraints that require users to perform certain acts not directly related to the purpose to which they want to use the artifact (Norman 1988, 132-38, 204-6). An example is the forcing function imposed by the special interlock, required for a short period in history to be installed in each new car in the USA. Because of this interlock, the car would not start if the driver's and passengers' seatbelts were not fastened. So drivers had to fasten both seatbelts to be able to use the car. Forcing functions are generally intentionally designed, and are usually, though not invariably, included in the interest of safety. Usually, the use of the artifacts in question is not vital, so we would not say that people are forced to perform these actions, but rather that they are pressured or seduced to perform them.

#### (4) *Delegated manipulation.*

In delegated manipulation, artifacts are designed or arranged to influence the behaviour of people in specific ways without an understanding in these people that their behaviour is being influenced in this way. As follows from the definition of manipulation in section 3, manipulation does not have to involve deliberate deception nor does it necessarily go against people's interests. As we saw in the discussion of delegated coercion, chairs in fast-food restaurants may be deliberately designed to cause discomfort in order to keep people from lingering in the restaurant. Similarly, chairs and tables may be arranged so as to stimulate or prohibit interaction with other people in a room, or they may be arranged so as to suggest status differences between individuals (e.g. one person sits at an elevated position relative to the other persons). Lighting, colour, textures, lines, shapes, images, sounds, music or fragrances may be used in the built environment or in artifacts to get people into particular moods, to induce them to leave, enter or remain in certain areas, to follow a certain trajectory or path, or to use a built structure or artifact in a particular way.

Artifacts may also be designed to influence people's behaviour through *deception*. They may, of course, have texts or symbols inscribed in them that issue false or misleading advice. More deviously perhaps, they may suggest affordances or functionalities that are not really there, or conceal functionalities that are present. For instance, a fencing at the end of a metro platform is sometimes designed as if it is a barrier, while in fact it can easily be trespassed. Spyware is software that is designed to monitor users without their knowledge or that takes partial control of a computer's operation without their informed consent, to the benefit of a third party. Spyware thus deceives users into thinking that it does one thing, while it (also) does another.

#### (5) *Delegated leadership.*

Delegated leadership in artifacts is either delegated authority or delegated persuasion. For an artifact to compel people to action through delegated authority, it must be recognized by people as embodying a leader's authority and expressing his directives, wishes or commands. Artifacts that embody authority tend to use symbolic means rather than physical force to induce action. A line in the sand, a prohibition sign or a series of poles may symbolize that a territory may not be entered by people. People may then decide not to enter it because they recognize the authority of the agent who has caused the marks to be there. A traffic light tells road users when to stop and when to go, and road users normally obey it because they recognize the authority of the state in regulating traffic.

It was stated at the beginning of this section that leaders often use artifacts to mark their status as leader (e.g. a king's crown). Conversely, artifacts associated with a leader's followers may be designed to express their subservience or inferiority. In pre-industrial societies, servants or slaves would have modest living and working quarters and wear plain clothes that would express their subordinate status. The modest artifacts of followers serve as reminders to them that they are in an inferior position and contrast with the elaborate and opulent artifacts of those in leadership positions, which convey leadership status. In this way, they induce behaviours that conform to the wishes of the leader.

Delegated persuasion similarly tends to rely on symbolic expression rather than physical action. In delegated persuasion, it is usually not the physical operations of artifacts but the signs inscribed in artifacts which are responsible for persuasion. Many artifacts are specifically designed to persuade: flyers, leaflets, notices, books, instruction movies, manuals, computer programmes and other written or narrated materials designed to convince people of certain ideas and corresponding actions. Artifacts may also have instructions directly inscribed on them concerning their proper operation. In addition to containing messages themselves, artifacts may also be used to increase the emotional persuasiveness of messages (e.g. blinking lights, soundtracks).

## 5. Technology and Empowerment

The aim of this essay, as stated in section 1, was to provide an analytical framework for studying the role of technology in the distribution and exercise of power. I argued that such a framework should involve both an analysis of the role of technology in the construction of power relations in society and an analysis of its role in the differential empowerment and disempowerment of individuals and groups. The former analysis was performed in sections 3 and 4, and the latter will be performed in this and the next section. The difference between the two analyses is that the first studies how agents can gain power over other agents whereas the second studies how agents acquire self-determination and social power. These two processes are intersecting: the acquisition of power over other agents is usually empowering for the controlling agent, in the sense of empowerment defined earlier. As will follow, however, not all empowerment involves the establishment of power relations.

Earlier, I defined empowerment as the attainment by agents of self-determination. This, I claimed, implies that agents acquire (social) power and free themselves from the exercise of power by others. Empowerment can be better understood by reference to John Rawls' notion of *primary goods* as introduced in his famous theory of justice (Rawls 1971). Rawls claims that there are certain goods in life that everyone wants because they are fundamental means to success in life, regardless of one's aims. He calls such means primary goods. Primary goods determine a person's expectations in fulfilling his or her life plan, or goals in life. Put differently, primary goods establish the outcome power of agents with respect to their goals in life. They come in two kinds: natural and social. Primary natural goods include health and vigor, intelligence and imagination. They are largely fixed, Rawls assumes, and are therefore not social goods that can be redistributed. Primary social goods include rights and liberties, powers and opportunities, income and wealth, and the social basis for self-respect. How much of these an agent gets is determined by the basic structure of society as well as the agent's own efforts, not to forget sheer luck. Empowerment, I want to suggest, can be understood as (1) having the power to use one's primary goods to one's own ends (freedom from restraint by others and from other restraints) and (2) the successful acquisition of a relevant share of primary social goods to more effectively further one's ends.

Technology has become a primary means to empowerment in modern society. Nowadays, the powers granted to agents by technology will certainly be among the key 'powers' mentioned in Rawls' list of primary social goods. Without access to certain

technologies, such as telephones, automobiles, running water, electricity, or computers, it is very hard for individuals to be successful in life. One's chances of acquiring more social goods (such as wealth and income) and to meaningfully use social goods one already has (such as rights and opportunities) often depend on one's access to technologies that have become basic in society. Similarly, the social and political empowerment of groups is often strongly dependent on their access to modern information, communication and transportation technologies. Technology has also become a primary means for economic competition between firms, and even between political organizations.

Technology has not only become a primary means of empowerment in society, it has also become a means to *differential* empowerment. Differences in empowerment can be lessened by technology, but often they are only enlarged. The rich have always been rich, and the poor always been poor, but their access to technology has made the rich that much more powerful in controlling their own destinies. The devastation in New Orleans caused by hurricane Katrina in 2005 laid bare the incredible differences in empowerment between the rich and the poor in this city. Unlike the rich, the poor often lacked basic means of escape or survival. Their lack of access to basic technologies, like automobiles and telephones, was in large part responsible for this situation. As another example, the emergence of information technology has yielded a situation in which those already well endowed with primary goods (wealth, intelligence) have access to the technology and make effective use of it, while those who do not are left further behind. The result has been called a digital divide, or a gap between the information-rich and the information-poor. Jeroen van den Hoven (1995) has even argued that in the information age, access to information has become so important for success in life that it has become one of the primary social goods.

Differential empowerment through technology is often a matter of differential access to technology, as a result of which some are better equipped in life than others. Some own automobiles, others do not. Some can afford a state-of-the-art computer with broadband Internet, others have to make do with a five-year-old PC with a dial-in connection. Such differential access often has economic reasons, but access barriers to technology may also be social, political, cultural or legal. A second way in which technology is implicated in differential empowerment was discussed in the previous section. Technology may be used to establish or maintain asymmetrical power relations. In such power relations, the power holder is empowered while the power endurer is disempowered. The result of this process is differential empowerment.

Third, technical artifacts may also differently empower agents by making a different fit with their interests and attributes. Technology users are differently situated, meaning that they differ in attributes like physical features, knowledge, skills, resources, and social status. In addition, technology users may have different goals. The same technological artifact may therefore empower one user more than it does another. First of all, artifacts will necessarily serve certain goals or interests better than others. For instance, a pocket calculator may be well suited for business use but less useful for scientific calculations. Second, artifacts may be more or less compatible with the attributes of users. Tools like scissors make assumptions about the size of people's hands. Buildings are designed to be accessible to able-bodied persons, but may not be designed to be wheelchair-accessible. An ATM may not be designed to be easily usable by blind people or people who speak

foreign languages. A road may be designed for automobiles but not for bicycles. Technological artifacts may also differentially assign penalties for their usage to certain users, such as extra consumption of resources or extra physical strain.

Technological artifacts make assumptions about the attributes and needs of their users, and when these assumptions are not met, users are not fully empowered by these artifacts. Users may even be disempowered by such artifacts, because empowerment is often a relative notion, defined relative to the empowerment of others. This is especially true in economic competition. Winner (1980) discusses the case of the mechanical tomato harvester, built in California in the seventies, which allowed tomatoes to be harvested faster and cheaper. This tomato harvester was most useful in larger farms that use a highly concentrated form of tomato growing. So even if small farms could get some efficiency gains from the harvester, they would still lose from the larger farms which made far greater efficiency gains and therefore could offer their tomatoes at a much lower price.

A fourth way in which technology may also differently empower agents is by changing the social and economic value of their abilities and resources, that is, their primary and secondary goods. New technologies can have drastic consequences for the labor market, making some skills less and others more valuable. In the factory and in the office, artifacts can lead to deskilling (Noble 1986) which makes skilled workers less valuable and limits their bargaining power in relation to management. This can lead to a greater asymmetry in the power relation between employers and workers. New artifacts can also affect the value of different types of privately or collectively owned property that becomes outdated or obsolete.

A fifth and final way in which technology may differently empower agents is by creating unilateral (and therefore asymmetrical) *dependencies* between agents. An agent *A* may be said to unilaterally depend on another agent *B* if *B* provides *A* with goods or services that *A* cannot do without (i.e. primary social goods, or the means necessary for *A* to secure or maintain his primary goods), and there is no good alternative way for *A* to acquire these goods or services. New technologies may create dependencies by reallocating control over resources or the distribution of goods and services in such a way that dependencies arise. For example, the water well in a village may be replaced by running water, thereby giving the villagers the benefit of running water but also making them dependent on the waterworks company. Dependencies are not necessarily accompanied by asymmetrical power relations. This would require the will and the means in the provider to exploit the dependency. But dependencies may easily be used to establish or maintain power relations, and thereby disempower agents.

## 6. Technology and Resistance

In sections 4 and 5, I discussed how technical artifacts can maintain asymmetrical power relations between agents and how they can empower agents differently. In this section, I will discuss how agents can resist disempowerment through technology. Notice, first, that not all resistance to technology is caused by disempowerment or fears thereof. People may resist technology for many other reasons, for example because of perceived conflicts with their values, such as moral or religious values, aesthetic sensibilities, or

concern for future generations. My focus in this section, however, will be on resistance to technology resulting from (perceived) disempowerment. Such disempowerment occurs whenever technology diminishes the share of primary goods available to an agent, including cases in which technology is used to establish a power relation in which the agent loses power.

In resistance to technology due to perceived disempowerment, the direct object of resistance is not the technology in question but the perceived negative effects of the technology. Eliminating or modifying the technology may be one way of reducing or eliminating these negative effects, but as decades of research in constructivist technology studies have taught us, effects of technology are not produced by technological artifacts in and of themselves but by a whole sociotechnical arrangement or network of which the artifacts are part. Effects may therefore also be eliminated by changing aspects of the network other than the physical artifacts themselves.

Bryan Pfaffenberger (1988, 1992) has proposed that the political consequences of the introduction of a new technological artifact or system in a social setting are the outcome of a *technological drama*, which is a battle between different actors to determine the meaning and implications of the technology. This battle is analysed metaphorically by Pfaffenberger as a ‘discourse,’ in which actors produce ‘statements’ and ‘counterstatements’ to persuade each other about a particular way of ‘reading’ the technology, that is, of a particular way of interpreting and using the technology. Such ‘discourses’ are used to determine what count as legitimate configurations and uses of the technology. A technological drama involves at least two major parties. They include a *design constituency*, a group of actors who are involved in creating, appropriating, or modifying a technological artifact or system with the intent to achieve certain politically sensitive goals, and an *impact constituency*, a group of actors who experience political losses when the new artifact or system is introduced.

A technological drama usually has the following structure. First, the design constituency engages in a process of *technological regularization*, in which it tries to further particular interests through the introduction of the new artifact or system and accompanying actions to fabricate a *social context* for this technology. This social context consists of social structure, ritual behaviours, procedures, and prevailing concepts and ideas that jointly determine how the technology is *interpreted and used*. Design constituencies will try to shape this social context by various means, such as manuals and public statements about the technology, policies for its proper use, training sessions, and interventions on the job. Impact constituencies respond to regularization by acts of *technological adjustment*. Technological adjustments are strategies in which impact constituencies engage to compensate for their loss of self-esteem, social prestige or social power caused by the introduction of the technology. Technological adjustments include attempts to modify aspects of the social context fabricated by the design constituency, or even of the technology itself. Acts of technological adjustment may result in new, intensified rounds of technological regularization and adjustment. Technological dramas end when the different involved actors settle into routines and accept the technology together with its fabricated social context and assigned interpretations. They may also end with a (partial) rejection of the technology.

In a technological drama, Pfaffenberger claims, impact constituencies can respond with three kinds of countermoves to technological regularization. *Countersignification*

is the substitution by impact constituencies of a more favourable frame of meaning for a technology, in which their self-esteem does not suffer as much, and which may be used to undermine perceptions of legitimacy and legitimize resistance to the technology. It is an attempt to conceptualize and put into words the negative experiences provoked by the technology, experiences that are not adequately accounted for in the frame of meaning put forward by the design constituency. To arrive at such alternative conceptualizations, impact constituencies may make use of contradictions, ambiguities, and inconsistencies in the frame of meaning presented by the design constituency. Countersignification can be used to counter delegated leadership, seduction and manipulation in technology and to justify the two other technological adjustment strategies.

*Counterappropriation*, the second strategy, is defined by Pfaffenberger as the effort by an impact constituency to get access to an artifact or system from which it has been excluded. In the most extreme case, counterdelegation involves the destruction of an artifact's capabilities. In Brey (1999), I argued that this is a special instance of a more general strategy of *counterstructuration*. Counterstructuration is an attempt by an impact constituency to counter the adverse impacts of a technological artifact or system by modifying the *social context* in which it is used. This may involve attempts to change rules, policies, regulations and standard practices surrounding the use of the artifact or system. These are attempts at changing the system of power and authority surrounding the technology that determines which uses are legitimate or acceptable, and hence who can do what with the technology. Counterstructuration can even include attempts to have the technology be removed. Counterappropriation is a special instance of counterstructuration in which legitimate access to the technology is opened up to the impact constituency. I have since come to believe that counterstructuration should be defined to include not just the modification of social structure, but also the modification of physical infrastructure in which the technological artifact in question is embedded.

*Counterdelegation*, finally, is a strategy aimed at subverting coercive functions imposed by an artifact or system. It involves the technical modification of artifacts or system functions so as to limit or remove their most disturbing features, or it may include attempts to 'deceive' the system, in case of information systems and measuring and detection equipment. Counterdelegation is sometimes attained through the use of 'countertechnologies' like radar detection technologies, scramblers, and privacy enhancing technologies. Counterstructuration and counterdelegation can both be effective ways to avoid a loss of primary goods or to counter delegated coercion, force, manipulation and seduction.

Counterdelegation can be understood as a process in which intrinsic powers of a technology are eliminated, modified or avoided, whereas counterstructuration and countersignification do the same for its derived powers (cf. section 4). In all three cases, the power and authority embodied in or mediated by the technology are subverted. Such strategies of resistance may also cause design constituencies to reengineer the technology themselves, or to replace it with a different design. Design constituencies may be forced, coerced or otherwise convinced to engage themselves in acts of counterdelegation by creating a new or modified design in which the negative impact on the impact constituency is blunted or eliminated. To conclude, then, resistance to the political consequences of technology can be effectuated through three

broad strategies: counterdelegation (modifying or deceiving the technology), counterstructuration (modifying the social context of the technology) and countersignification (modifying the frame of meaning of a technology). Which strategy will work best depends on the type of disempowerment or technologically delegated power relation that takes place..

## 7. Conclusion: Democratizing Technology

What Pfaffenberger's analysis makes clear is that the political implications of technological artifacts do not result from their physical design but from a combination of their design features (*delegation*), the meanings and interpretations attached to the technology (*signification*) and the social and material structures and correlated practices in which the technology is embedded (*structuration*). Any attempt to reform technology should take these different factors into account. With this in mind, let us turn now to the practical question stated in section 1: what steps can be taken to move closer to an ideal model of the role of technology in the distribution and exercise of power in society? It was claimed in section 1 that in such an ideal model, technology is arranged in such a way as to promote a democratic, free and just society.

The currently favoured way of reforming technology is to democratize it.

*Democratization approaches* to technology hold that the process of developing and introducing technology should be democratized, meaning that these processes should be arranged so as to guarantee broad public participation, in which all stakeholders have their voice heard on these processes (Sclove 1992, 1995; Zimmerman 1995; Feenberg 1995, 1999, 2002; Kleinman 2000; Latour 2004; Latour and Weibel 2005; Bijker 1995; Winner 1986, 1995). The values of democracy, freedom and justice figure prominently in these approaches. In many of them, democracy is lauded as a value that is not just a means to other ends, but an end in itself, and the expansion of democratic politics into the sphere of technology is simply a consummation of this ideal. Freedom is also a cherished value in some approaches, and in Richard Sclove's work, the very purpose of democratization is individual freedom and autonomy. Justice, finally, is clearly a concern in many approaches, as they emphasize how all stakeholders should have a say in technology development so that their interests are accounted for.

A democratization approach is highly defensible in light of the political virtues expounded earlier. Such an approach will, first of all, clearly work to make technology, and thereby society, more democratic.<sup>3</sup> It is also likely to promote freedom, as it involves all stakeholders in a technology, who all have an interest in their own freedom. Similarly, it is likely to promote justice, since it gives an opportunity to the least advantaged to promote their own interests. In general, democratically developed

---

<sup>3</sup> Just like a tyrant could be voted into office in a democratic election, a democratization of the process of developing and implementing technology need not yield technologies that themselves support democratic practices. However, just like democratic elections tend to yield democratic governments, democratic technology development will likely yield democratic technologies.

technologies appear unlikely to be instrumental to oppression and disempowerment, and therefore more likely to support democracy, freedom and justice.

A problem for democratization approaches is that they seem difficult to realize in practice in the current capitalist system of production. In this system, most technologies are developed by commercial enterprises that have no real interest in democratizing the development of technology except to the extent that it could improve their market share. Feenberg (2002) complains that current technology is designed to realize two major aims, which are power and profit. To the extent that this is true, reform of technology is precisely difficult because it will divert from these two aims and thereby harm the interests of the corporations that produce or commission the technology. Governments, although democratically elected, have been wary to impose major democratic reforms, if only for fears of hurting the economy or of losing the support of big business.

Yet, although a capitalist system of production and consumption imposes limits on the possibility of democratizing technology, there are reasons to believe that a limited democratization is possible even within the confines of capitalism. First, advanced technological societies all have a system of representative democracy, in which elected representatives represent the interests of the electorate in technology policy. Technology policy can, and frequently is, designed to impose democratic controls on technology development and implementation, and often includes regulations that protect freedom rights, uphold the interests of the least advantaged, and require democratic participation in important projects. The measures taken by representatives to this effect are not always satisfactory from the point of view of advocates of democratized technology. Perhaps, however, they are only unsatisfactory because of a lack of understanding by voters and their representatives of the political importance of technology, and more education could change their attitude.

Second, Pfaffenberger's theory of technological dramas shows, as do many other studies in STS, that the meaning and implications of an artifact are not fixed when it leaves the factory, but are further determined by users and other stakeholders. As some studies in STS have put it, design is also performed by users and other stakeholders, not just by engineers (Oudshoorn and Pinch 2003). Democratizing the design of technological artifacts therefore does not necessarily require that stakeholders are involved in design before manufacture takes place (participatory design), although this is perhaps the preferred scenario. Post-production design also takes place when stakeholders reconfigure artifacts, their social context, and their preferred interpretations. This process is recognized in the work of Andrew Feenberg, who proposes a form of democratization of technology which he calls democratic rationalization. Feenberg recognizes that there are many ways other than participatory design to democratize technology. He recognizes a technological micropolitics (akin to Beck's subpolitics), in which stakeholders group together to define their common interests and engage in new communicative practices outside the system of parliamentary democracy to challenge dominant technologies (Feenberg 1999, 120-129).

Participatory design, in which experts and laypersons design technologies together, is only one possible outcome of these new practices. More frequently, these practices take the form of protests designed to shape public opinion, change laws and regulations, and pressure corporations into design changes or even the removal of technologies. Another useful practice is that of creative appropriation, which is the initiation of new

functionalities for already existing technologies. Creative appropriation could be an especially valuable strategy for information technology, the functions of which can quite easily be altered through reconfiguration and reprogramming. The functionality of the Internet as a medium of information, communication, products and services, is in large part the outcome of the programming activity and uploading of content of many individuals.

What my discussion in the last two sections has shown is that the democratization of technology is not just the democratization of physical designs, it is also the democratization of the social context of the technology and of the language that we use to talk about it. When democratization is understood in this broad sense, it actually becomes a more manageable task, because social structure and language are owned by no one and can be influenced by everyone. The democratization of technology is, then, the best hope we have for the reform of technology towards a more democratic, free and just society.

## References

- Bachrach, P., and M. Baratz. 1970. *Power and poverty. Theory and practice*. New York: Oxford University Press.
- Ball, Terence. 1993. Power. In *A companion to contemporary political philosophy*, edited by R. Goodin and P. Pettit. Oxford: Blackwell.
- Beck, Ulrich. 1999. Subpolitics: Ecology and the disintegration of institutional power. In *World risk society*, edited by U. Beck. Cambridge: Polity.
- Bernhagen, Patrick. 2002. *Power: making sense of an elusive concept*. Dublin: Trinity College.
- Bijker, Wiebe E. 1995. *Bikes, bakelite, and bulbs. Steps toward a theory of socio-technical change*. Cambridge: MIT Press.
- Brey, P. 1999. Worker autonomy and the drama of digital networks in organizations. *Journal of Business Ethics* 22: 15-25.
- Dowding, Keith. 1996. *Power*. Minneapolis: University of Minnesota Press.
- Feenberg, Andrew. 1995. *Alternative modernity: the technical turn in philosophy and social theory*. Berkeley: University of California Press.
- . 1999. *Questioning technology*. New York: Routledge.
- . 2002. *Transforming technology*. Oxford: Oxford University Press.
- French, J., and B. Raven. 1960. The bases of social power. In *Group dynamics*, edited by D. Cartwright and A. Zander. New York: Harper and Row.
- Fay, Brian. 1987. *Critical social science*. Ithaca, NY: Cornell University Press.
- Hoven, Jeroen van den. 1995. Equal access and social justice: information as a primary good. In *Proceedings of ETHICOMP95, an international conference on the ethical issues of using information technology, vol. 1*, edited by S. Rogerson and T. W. Bynum. Leicester: School of Computing Sciences, De Montfort University.
- Kleinman, Daniel Lee, ed. 2000. *Science, technology, and democracy*. Albany, NY: State University of New York Press.
- Latour, Bruno. 1992. Where are the missing masses? The sociology of a few mundane artifacts. In *Shaping technology/building society: studies in sociotechnical change*, edited by W. Bijker and J. Law. Cambridge, MA: MIT Press.

- Latour, Bruno. 2004. *Politics of nature: how to bring the sciences into democracy*. Cambridge, MA: Harvard University Press.
- Latour, Bruno, and Peter Weibel, eds. 2005. *Making things public: atmospheres of democracy*. Cambridge, MA: MIT Press.
- Lukes, Steven. 1974. *Power: a radical view, 1<sup>st</sup> ed.* Basingstoke: Macmillan.
- . 1986. Introduction. In *Power*, edited by S. Lukes. New York: New York University Press.
- . 2005. *Power: a radical view, 2<sup>nd</sup> ed.* Basingstoke: Macmillan.
- Noble, David F. 1986. *Forces of production. A social history of automation*. Oxford: Oxford University Press.
- Norman, Donald A. 1988. *The psychology of everyday things*. New York: Basic Books
- . 1993. *Things that make us smart: defending human attributes in the age of the machine*. Reading, MA: Addison-Wesley.
- Oudshoorn, Nelly, and Trevor Pinch, eds. 2003. *How users matter. The co-construction of users and technology*. Cambridge, MA: MIT Press.
- Pfaffenberger, B. 1988. The social meaning of the personal computer, or, why the personal computer revolution was no revolution. *Anthropological Quarterly* 61: 39-47.
- . 1992. Technological dramas. *Science, technology, and human values* 17: 282-312.
- Raven, B., and A. Kruglanski. 1970. Conflict and power. In *The structure of conflict*, edited by P. Swingle. New York: Academic Press.
- Rawls, John. 1971. *A theory of justice*. Cambridge, MA: Harvard University Press.
- Sclove, R. 1992. The nuts and bolts of democracy: democratic theory and technological design. In *Democracy in a technological society*, edited by L. Winner. Dordrecht: Kluwer.
- . 1995. *Democracy and technology*. New York: Guilford Press.
- Weber, Max. 1946. *From Max Weber: essays in sociology*. London: Routledge.
- Winner, L. 1980. Do artifacts have politics? *Daedalus* 109: 121-36.
- . 1986. *The whale and the reactor*. Chicago and London: University of Chicago Press.
- . 1995. Political ergonomics. In *Discovering design: explorations in design studies*, edited by R. Buchanan, and V. Margolin. Chicago: University of Chicago Press.
- Zimmermann, A. 1995. Toward a more democratic ethic of technological governance. *Science, technology and human values* 20: 86-107.