THE RIGHTS OF ROBOTS

Technology, culture and law in the 21st century

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The development of robots and their emerging rights will have significant impact on judicial and criminal systems and on the philosophical and political worldviews of our social institutions. This article places the definition of rights and of what is 'alive' in a historical and cultural context, and reviews the developments in and prospects for artificial intelligence (AI). It argues that such advances will change our perceptions to such a degree that robots may have legal rights. It examines how such rights might emerge, and which legal issues may be involved.

In the last five years, the Hawaii Judiciary has developed, as part of its comprehensive planning programme, a futures research component. Initially, futures research was largely concerned with identifying emerging issues; that is, issues that are low in awareness to decision makers and high in potential impact.[1]

At present the courts' futures programme is engaged in a variety of activities. Researchers study the impact of possible legislation on the Judiciary, forecast future caseloads, publish a newsletter of emerging issues, trends, and research findings,[2] and provide research information to decision makers on the future of technology, economy, population, management and crime.

In the past few years of concentrating on short- and medium-term futures, we have remained fascinated by one particular long-term emerging issue—the rights of robots. The predictable response to the question, "Should robots have rights?" has been one of disbelief. Those in government often question the intent or credibility of such research. Many futurists, too, especially those concerned with environmental or humanistic futures, react unfavourably. They assume that we are unaware of the second and third order effects of robotics—the potential economic dislocations, the strengthening of the world capitalist

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system, and the development of belief systems that view the human brain merely as a special type of computer.

Why then, in the face of constant cynicism, should we pursue such a topic? We believe that the development of robots and their emerging rights is a compelling issue which will significantly and dramatically impact not only the judicial and criminal justice system, but also the philosophical and political ideas that govern our societal institutions.

In the coming decades, and perhaps even years, sophisticated thinking devices will be developed and installed in self-propelled casings which will be called robots. Presently, robots are typically viewed as machines—as inanimate objects and, therefore, devoid of rights. Since robots have restricted mobility, must be artificially programmed for 'thought', lack senses as well as the emotions associated with them, and most importantly cannot experience suffering or fear, it is argued that they lack the essential attributes to be considered alive. The robot of tomorrow, however, will undoubtedly have many of these characteristics and may perhaps become an intimate companion to its human counterpart.

We believe that robots will one day have rights. This will undoubtedly be a historically significant event. Such an extension of rights obviously presupposes a future that will be fundamentally different from the present. The expansion of rights to robots may promote a new appreciation of the interrelated rights and responsibilities of humans, machines and nature. With such an holistic extension of rights to all things in nature, from animals and trees to oceans, comes a renewed sense of responsibility, obligation and respect for all things. Certainly, these concepts are foreign to the worldview of most of us today. The burden of this article is, then, to convince the reader that there is strong possibility that within the next 25 to 50 years robots will have rights.

Cultural perspectives

The definition of rights has been historically problematic. In part, it is an unresolved problem because there are numerous disparate definitions of what constitutes rights. These fundamentally different views are largely politically, institutionally and culturally based. Those in or with power tend to define rights differently from those out of or without power. In addition, cultures with alternative cosmologies define notions of natural, human, and individual rights quite differently.

Historicaly, humanity has developed an ethnocentric and egocentric view of rights. Many notions of rights reflect the 16th century views of Newton's clockwork universe and Descarte's rationality as well as the emerging Protestant ethic. The impact of such views upon thinkers of the Enlightenment like John Locke, Jean Jacques Rousseau and Thomas Hobbes was profound. In *Leviathan*, Hobbes vividly illustrated the problem of existence. For Hobbes, life without legal rights (as provided by governing institutions) was one of "continual fear, of violent death; with the life of man solitary, poor, nasty, brutish and short".[3] With the development of Western capitalism and rationality, man suddenly assumed dominance over nature and replaced God as the centre of the universe. Thus, natural rights of man became institutionalized, bureaucratized and formalized and, like legal systems, developed along rational lines so as to provide the necessary stability and predictability for the growth of market capitalism.

In addition, this Western capitalistic notion of governance led to the loss of individual efficacy, and the elimination or subjugation of the rights of nature, women, non-whites, and religious groups. For capitalism to thrive, for surplus to be appropriated, a division of capital, labour and resources must exist; that is, there must be capitalists who exploit, and the underclass—the environment, the internal proletariat and the external colonies—who must be exploited. To provide an ideological justification for exploitation, it was necessary to perceive the exploited as the 'other', as less than human, as less than the agents of dominance. Thus, nature, those in the colonies, and the underclass in industrialized nations (women and the proletariat) had to be denied certain rights. The denial of rights for nature, in addition, found its ideological justification from Christianity and the classical Cartesian separation in Western thought between mind and body, self and environment, and self and nature. Similarly and unfortunately, from our perspective, the possibility of robotic rights in the future is tied to the (next long wave) expansion of the world capitalist system. Robots will be given rights only insofar as such an event will aid in the further strengthening of the capitalist system. Most likely they will gain rights during a system crisis, when the system is threatened by anarchy and legal unpredictability—a condition that paradoxically may result from developments in artificial intelligence and robotics.

Other cultures, however, provide a different if not fresh perception of the meaning and purpose of rights that is in marked contrast to the historical and present Western position. For example, American Indian Jamake Highwater states in *The Primal Mind*, "... whites are extremely devoted to limiting the rights of individuals and preventing anarchy, which is greatly feared in individualized cultures ... by contrast the Indian, generally speaking, does not recognize the individual and therefore has not formulated strict regulations for its control."[4] The Indian recognizes the collective. This collective is more than the aggregate of individuals in his tribe. It is rocks, trees, sacred grounds, animals—the universe itself. Thus, for the Indian, there exists a harmony between nature and the individual; it is a relationship characterized by sharing, caring and gratitude, not dominance.

Social philosopher, activist and mystic P. R. Sarkar states in *Neo-Humanism: The Liberation of the Intellect*[5] that we must develop a new humanism that transcends the narrow outlook of the ego. We must transcend our attachments to our nation, our religion and our class. In addition, humans must include animals and plants and all of life in definitions of what constitutes 'real' and 'important'. We cannot neglect the life of animals and plants. This is not to say that there should not be hierarchy among species, especially as human life is rare and precious; but our economic development decisions and food policy decisions must take into consideration plants and animals as participants. The rights of technology is a legitimate concern from the Eastern perspective because all-that-is is alive. The universe is alive.

Sarkar also forecasts the day when technology will have "mind" in it. While this may seem foreign to the Western notion of mind, for Sarkar mind is in all things. Evolution is the reflection and development of this mind towards total awareness, Godhood and self-realization. Humans in general have the most developed mind, animals less, plants even less, and rocks the least. Once technology can develop and become more subtle, then it, like the brain, can become a better carrier of the mind. Mind is constantly looking for vehicles to

express itself. Nothing is soulless, although there are gradations of awareness.[6]

The Buddhist notion is similar to this. For the Buddhist, the self is always changing, by evolving and de-evolving. Defining humans as the sole inheritors of the planet at the expense of other sentient beings leads to hubris and evil. Although explicit rights for robots were not developed by the Buddha or any of his disciples, the Buddhist perspective certainly involves seeing All as persons, not as things.

From the American Indian, Yogic Sarkarian and Buddhist perspectives, we must live in harmony with nature and technology—things do not exist solely for our use as humans; life exists for itself, or as a reflection of the supreme conciousness. Animals and plants, then, as well as robots, should have rights not because they are like humans, but because of what they are.

Chinese cultural attitudes towards the notion of rights also offer a decidedly different approach from that of the West. From the Chinese perspective, the legal norms of rights, established by man, are held as secondary to natural rights. Clarence Morris in *The Justification of the Law* argues that for the Chinese, harmony is more important than dominance.[7] For example, ". . . few Chinese scholars prize law in general or the imperial codes in particular: most of them hold that proper conduct is consonant with the cosmic order and therefore is determined not by law but by natural propriety."[8]

Morris continues in the vein of natural law, noting that: "we live in an unsuperstitious world—in which enforceable legal obligations [are] human artifices, and the laws of nature, in themselves, [do] not indicate where earthly rights [lay]—man inevitably [has given] up the primitive practice of prosecuting brutes and things. So beasts and trees no longer [have] any legal duties. *Westerners who gave up the conceit that nature had legal duties also became convinced that nature has no legal rights.*"[9] (Our italics.)

Morris believes that nature should be a party to any case, not for man's purpose but for its own purpose. Nature should have rights. "Nature should no longer be dislocated on whim or without forethought about the harm that may ensue; he who proposes dislocation should justify it before he starts."[10] Certain authorities should then be designated as nature's guardians in the same way that children who cannot represent themselves have guardians. In addition, writes Morris:[11]

> When legal rights are, by statute, conferred on feral beasts, green forests, outcroppings of stone, and sweet air, and when these legal rights are taken seriously, men will respect these duties in much the same way as they respect their other legal obligations.

Nature and robots

This neohumanistic thinking can and, we believe, should apply to robots as well. Eventually humans may see robots not only as mechanical slaves, not only as our products, as ours to buy and sell, but also as entities in their own right. Of course, at present the notion of robots with rights is unthinkable, whether one argues from an 'everything is alive' Eastern perspective or from an 'only man is alive' Western perspective. Yet as Christopher Stone argues:[12]

> . . . throughout legal history, each successive extension of rights to some new entity has been, theretofore, a bit unthinkable. We are inclined to suppose the rightlessness of

rightless "things" to be a decree of Nature, not a legal convention acting in support of some status quo.

Stone reminds us of the obvious but easily forgotten. Human history is the history of exclusion and power. Humans have defined numerous groups as less than human—slaves, women, the "other races", children and foreigners. These are the wretched who have been defined as stateless, personless, suspect, and rightless. This is the present realm of robotic rights. The concept of extending rights to nature represents a dialectical return to a holistic sense of natural rights. Once a renewed respect of the rights of all things to exist is established, then an understanding of the legal dimensions of human-made creations, such as robots, can emerge.

As we enter a post-industrial technology-driven society, we need to reassess our interconnected relationship with nature and machines as well as the notions of rights associated with this new relationship.

Computer and robotic technologies are not only modernizing traditional industries, they are also creating numerous new opportunities and problems in space, genetic engineering, and war and defence systems. The adoption of these new technologies in education, health care and in our institutions as well as in our models of thought is inevitable and may, through proper forecasting and control, be positive. Any continued attempt to ignore the needs of technology or to deter its use would be foolish and impossible. Yet, in many ways that is precisely what we continue to do. Presently, the foundation of the American Constitution and the Bill of Rights "obviously reflects the technological and political issues of 18th century English society . . . what we continue to do is restructure and reinterpret it to fit an ever more rapidly evolving technological society".[13] Perhaps what we really need to do is to rewrite, or video, the Constitution in the light of future trends and issues.

The Constitution could be rewritten to include the rights of trees and streams, robots and humans. We are not arguing that robots should have the same rights as humans, but rather, that they are seen as an integral part of the known universe. In addition, although we are not advocating the worship of technology, with "the genie of technology having been let out of the bottle and [as it] cannot be force[d] back in,"[14] social planning for robots must be attempted.

Robot technology

The rapid impact of computers upon the world since the development of the first computer, UNIVAC, in 1946, has been profound. As little as 10 years ago, the thought of having a personal computer at one's office desk, home, or school seemed far-fetched indeed. Now personal computers are accepted complacently as part of our modern world. Computer brains run cars, stereos, televisions, refrigerators, telephone systems, factories, offices, aircraft, and defence systems, to name but a few examples. The next progression of the computer as a mobile unit or robot may, like the personal computer, become a common and essential companion at home and in the workplace.

At the vanguard of computer technology is the development of AI and the creation of living computer circuitry called biochips. The development of AI requires the computer to make a jump in inference, a quantum leap over mis-

cellaneous data, something a programmed machine has been unable to do. The computer must skip variables rather than measure each one. It is not quite a mirror of the human *gestalt* "aha" illumination of a decision, but it is similar.

One of the essential difficulties in developing such a thinking computer is the problem of converting the holistic process of thought into the linear description of written language. Common sense reasoning does not conform to the logic of computer languages such as FORTRAN. "For instance there is no program around today that will tell the difference between a dish and a cup."[15] What is needed is the development of a new language for programming which combines the multiple symbolic and visual meanings of Chinese cuneiform with the scientific preciseness of Western script.

The development of living biochips will further blur the definition of a living machine. By synthesizing living bacteria, scientists have found a way to program the bacteria's genetic development to mimic the on and off switching of electronic circuitry. Many scientists presently feel silicon miniaturization has reached its limit because of the internal heat that the chips generate. The biochip is then expected to expand greatly the capabilities of computerization by reaching the ultimate in miniaturization. Biochips will also have the unique ability to correct design flaws. Moreover, James McAlear of Gentronix Labs notes that: "because proteins have the ability to assemble themselves the [organic] computer would more or less put itself together."[16]

In the creation of a living computer system, we are, according to Kevin Ulmer of The Genex Corporation, "making a computer from the very stuff of life".[17] Eventually it is expected that these systems will be so miniaturized that they may be planted in humans so as to regulate chemical and systemic imbalances. As these chips are used to operate mechanical arms, or negate brain or nerve damage, the issue of man-robots, cyborgs, will arise. The development of such organic computers is expected in the early 1990s. This new technological development will force a redefinition of our conception of life. During this explosive era of high-tech innovation, contact between machines with AI and humans will rapidly increase. Computer-intelligent devices, especially expert systems, are now making decisions in medicine, oil exploration, space travel, air traffic control, train conduction and graphic design, to mention a few areas of impact.

The greatest attribute of an expert system is its infinite ability to store the most minute information and its tremendous speed at recalling and cross-referencing information to make instantaneous conclusions. The greatest drawback will be in convincing people to trust the computers' decisions. This mistrust, however, will be significantly reduced as robots in human form (voice, smell, sight, shape)—androids—are developed.

In deciding if computers can make expert decisions, we must first delineate the attributes of an expert. Randall Davis of MIT provides the following definition:[18]

> (1) they can solve problems; (2) they can explain results; (3) they can learn by experience; (4) they can restructure their knowledge; (5) the are able to break rules when necessary; (6) they can determine relevance; and (7) their performance degrades gracefully as they reach the limits of their knowledge.

Presently computers are capable of achieving the first three stages but do not have the human capacity to reprogram themselves or break rules.

Are robots alive?

Robots presently are construed to be inanimate. An argument can be made, however, that with advances in AI robots will be considered alive. Sam N. Lehman-Wilzig has presented evidence that AI machines already created or theoretically possible will be by most definitions alive. We quote extensively from his landmark article:[19]

By any definition the present powers of AI machines are both impressive and worrisome. Cyberneticists have already created or proven that AI constructs can do the following:[20]

(1) "Imitate the behaviour of any other machine".[21]
(2) Exhibit curiosity (ie, are always moving to investigate their environment); display self-recognition (ie, react to the sight of themselves); and manifest mutual recognition of members of their own machine species.[22]
(3) Learn from their own mistakes.[23]
(4) Be as "creative" and "purposive" as are humans, even to the extent of "look[ing] for purposes which they can fulfill".[24]
(5) Reproduce themselves, in five fundamentally different modes, of which the fifth—the "probabilistic mode of self-reproduction"—closely parallels biological evolution through mutations (which in the case of [machines] means random changes of elements), so that "highly efficient, complex, powerful automata can evolve from inefficient, simple, weak automata".[25]
(6) "Can have an unbounded life span through self-repairing mechanisms".[26]

In short, "a generation of robots is rapidly evolving, a breed that can see, read, talk, learn, and even feel [emotions]".[27] But the essential question remains—can these machines be considered to be "alive"? Kemeny presents six criteria which distinguish living from inanimate matter: metabolism, locomotion, reproducibility, individuality, intelligence, and a "natural" (non-artificial) composition.[28] In all six, he concludes, AI servo-mechanisms clearly pass the test.[29] Even a critic of AI such as Weizenbaum admits that computers are sufficiently "complex and autonomous" to be called an "organism" with "self-consciousness" and an ability to be "socialized". He sees "no way to put a bound on the degree of intelligence such an organism could, at least in principle, attain", although from his critical vantage point, not in the "visible future".[30]

Viewed from this perspective, robots are indeed alive. However, we should note the worldview behind this perspective; it is based on the assumption that we can compare a human brain to a computer brain, that creativity is something that is not divinely inspired, but simply the "juxtaposing of previously existing information"[31]—thus humans and computers can be equally creative. Humanness, then, is defined by aliveness, the ability to make decisions, to reflect, learn and discriminate—reflective awareness, to ask the questions: "Do I exist?" or: "Who am I?"

AI enthusiasts seriously argue that not only do robots have the theoretical possibility of life, but that they will inevitably be perceived as alive. It is only our 'humancentricism', our insistence that life must be judged strictly on human terms as evidenced, for instance, by the structural bias in our language, that prevents us from understanding the similarity of robots—now and in the future—to humans. Of course, there are numerous arguments against this perspective. From the Western religious view, man's soul is given directly by God; robots are soulless, thus dead, and thereby rightless. From a humanistic perspective, only by the clever use of language—comparing our brains to robots' memories, and other reductionist arguments—can it be argued that robots are alive. Aliveness is flesh and bones, aliveness is blood. Thus, robots remain dead, complex machines that can be made to act and look like humans, but will always remain

as robots, not humans. As in the case of B. F. Skinner's pigeons who were trained to hit a ping-pong ball back and forth, we should not be fooled into believing that they are really playing ping-pong.

However compelling these arguments against robots as humans, they may lose some of their instinctive truth once computers and robots increasingly become a part of our life, as we slowly renegotiate the boundaries between us and them. We have seen this with household pets, who are certainly perceived as having human traits and who have certain rights. Of course, the notion that dogs and cats have rights is contentious, since it can be argued that statutes on cruelty to animals only confer a right on the human public, represented by the state, to have a culprit punished. Conversely, it can be argued that humans are simply acting as agents of interest and that animals themselves are the real parties of interest.

In addition, arguing from the perspective of robots' rights, AI and robotics are relatively new innovations. If we assume that growth in computer memory and reasoning continues, we can safely forecast that computers and robots by the year 2100 will only differ in physical form from humans. Already, computers that perform psychotherapy cannot be distinguished from doctors who do the same, although clearly computers are not thinking. For example, in the 1960s MIT professor Joseph Weisenbaum invented a computer program ELIZA to parody a therapist in a doctor–patient format picking up key phrases, making grammatical substitutions and providing encouraging, non-committal responses. "Weizenbaum was soon shocked to see people become emotionally involved with the computer, believing that ELIZA understood them . . . the computer program had properties and powers that he had not anticipated."[32] Nor had he anticipated the need of humans to attribute human characteristics to gods, animals and inanimate objects.

Programs such as ELIZA, however, are only a beginning. Far more complex programs will be developed until distinctions between human thought and computer-generated thought become impossible. Our perceptions of thought and life will continue to change as a response to changing technology and changing beliefs of what is natural. These perceptions may change to such a degree that, one day, robots may have legal, constitutional rights.

Defining rights

But what does it mean to have legal rights? At present, but not necessarily in the future, an entity cannot have a right "unless and until some public authoritative body is prepared to give some amount of review to actions that are colorably inconsistent with that 'right'.[33] According to Christopher Stone, however, for a thing to be a holder of legal rights, the following criteria must be satisfied:

- The thing can institute legal actions at its behest.
- In determining the granting of legal relief, the Court must take injury to it into account.
- The relief must run to the benefit of it.

If these conditions are satisfied, then the thing counts jurally; it has legally recognized worth and dignity for its own sake.[34] For example, writes Stone, the action of an owner suing and collecting damages if his slave is beaten is quite different from the slave instituting legal actions himself, for his own recovery,

because of his pain and suffering.[35] Of course, a suit could be brought by a guardian in the subject's name in the case of a child or a robot, for the child's or robot's sake, for damages to it.

This is equally true for nature. We cannot always rely on individuals to protect nature, as they may not have standing and as it may not be cost-effective for an individual owner, for example, to sue for damages for downstream pollution. However, a stream may be protected by giving it legal rights. If nature had rights, courts would then weight the concerns of the polluter not only against those of the individual plaintiff, but also against the rights of the stream. With nature rightless, courts presently can rule that it is in the greatest public interest to allow business to continue pollution as industry serves a larger public interest. "The stream", writes Stone, "is lost sight of in a quantitative compromise between two conflicting interests."[36]

Similarly, we can anticipate cases and controversies where the needs of robot developers, manufacturers and users will be weighed against those who are against robots (because they have been injured by a robot, or because of their religious perspectives or labour interests). Judges will have to weigh the issues and decide between parties. But, unless robots themselves have rights, they will not be a party to the decision. They will not have standing, and will not be legally real.

Certainly as robot technology develops, as robots are utilized to increase humanity's collective wealth—albeit within a capitalistic framework, robots will only increase the gap between rich and poor, between employed and unemployed—their future will be inextricably tied to our future, as is the case with the environment today.

Emergence of rights

As important as defining legal rights is developing a theory on how rights emerge. They, of course, do not suddenly appear in courts. Neal Milner has developed a useful theory on the emergence of rights from a synthesis of literature on children's rights, women's rights, rights of the physically and mentally handicapped, rights to health, and legal mobilization and socialization.[37]

His first stage in this theory is imagery. At this stage, imagery stressing the rationality of the potential rights holder is necessary. From this perspective, the robot must be defined as a rational actor, an actor with intent. This, however, is only true from the Western perspective. From the Eastern perspective, previously outlined, rationality does not define life.

The next stage of rights emergence requires a justifying ideology. Ideologies justifying changes in imagery develop. These, according to Milner, include ideologies held by agents of social control and those to which potential rights holders or their representatives subscribe. These ideologies would be developed by scientists, science fiction writers, philosophers and perhaps even futurists. They would have to argue that robots are a legitimate category of life.

The last stage is one of changing authority patterns. At this stage, the authority patterns of the institutions governing the emerging rights holders begin to change. It is not clear what institution directly controls robots—whether it is the intellectual academic university sector, business and manufacturers, or the government and military sector. As rights for robots emerge, however, we can

forecast conflicts between the various institutions that control them and within those institutions themselves. Milner next sees the development of "social networks that reinforce the new ideology and that form ties among potential clients, attorneys and intermediaries".[38] We will see the emergence of support groups for robots, with leading scientists joining political organizations. The next stage involves access to legal representation. This is followed by "routinization", wherein legal representation is made routinely available. Finally, government uses its processes to represent the emerging rights holders.

This is just a general model. The initial step will be the most difficult. Arguing that robots have rationality, especially from the Western perspective which reserves rationalities for self-directed, individual, autonomous adult persons, will be difficult. Given the dominance of the West, it may be that robots will not gain rights until they are seen or imaged in this way.

Economic issues

Eventually, AI technology may reach a genesis stage which will bring robots to a new level of awareness that can be considered alive, wherein they will be perceived as rational actors. At this stage, we can expect robot creators, human companions and robots themselves to demand some form of recognized rights as well as responsibilities. What types of rights will be demanded? The basic human rights of life, friendship and caring? The right to reproduce? The right to self-programming (self-expression)? The right to be wrong? The right to intermarry with humans? The right to an income? The right to time off from the job? The right to a trial by its peers (computers)? The right to be recognized as victims of crimes? The right to protection from unwarranted search and seizure of its memory bank? The right to protection from cruel and unusual punishments such as the termination of its power supply?

In a brief play script Don Mitchell vividly illustrates the future image of the blue-collar industrial robot on the assembly line as one of danger, monotony and despair. The exploitation of robots is seen as a reflection of the human exploitation incurred during early 20th century industrialization. Unlike their human counterparts, however, these robots have no way to voice their suffering. This situation raises these types of questions: "How do you measure value? By the price tag? By the need? By the blood and sweat that goes into making something? Robots do not produce labor value, though. . . . There is no mechanical Karl Marx to save them."[39]

Obviously, in the discussion of robot rights, questions like the above are difficult to answer. Yet robots continue to replace their human counterparts on the assembly line and at the factory at a rapidly increasing pace. They are replacing humans because of their high productivity and low cost. Although they are faster than humans, robots do not tire; more reliable robots do not have family, drink or drugs problems; and robots are cheaper to maintain, as they do not strike for wages and fringe benefits.

Soon the initial question that will be raised is: How are robotic-generated goods and services to be distributed in the community? The distribution of this wealth requires a new conception of ownership, production, and consumption. In a potential world without work some form of redistribution of wealth will be necessary. "In Sweden employers pay the same taxes for robots that they do for human employees. In Japan some companies pay union dues for robots."[40]

Supporters of robotic rights might say that computers are paying these taxes and dues from their labour and should derive rights for such labour.

Following questions of distribution of wealth come questions of ownership. In the near future it is expected that computers will begin to design their own software programs. Considering the fact that "the Copyright Act limits copyright protection to the author's lifetime, which is clearly inappropriate for a computer, it would then seem that a change in the law may be needed to provide proper protection for programs with non-human authors."[41]

Legal rights and responsibilities will then be needed to protect humans and robots alike. This need should give rise to a new legal specialization in robotic law, in the same way as environmental law. With this new specialization we may find lawyers defending the civil rights of self-aware robots which could take the following form: "to protect the super-robot from total and irreversible loss of power (LIFE); to free the robot from slave labor (LIBERTY); and allow it to choose how it spends its time (THE PURSUIT OF HAPPINESS)".[42]

New cases

We will then see an avalanche of cases. We will have robots that have killed humans, robots that have been killed by humans, robots that have stolen state secrets, robots that have been stolen; robots that have taken hostages, robots that have been held hostage, robots that carry illegal drugs across borders, and robots that illegally cross national borders. Cases will occur in general when robots damage something or someone or a robot itself is damaged or terminated. In addition, robots will soon enter our homes as machines to save labour, and as machines to provide child care and protection. Eventually these entities will become companions to be loved, defended and protected.

Robots that are damaged or damage or break other human laws will raise various complex issues. At present, robot damage will be simply a tort case, just as if one's car was damaged. But an attorney will one day surely argue that the robot has priceless worth. It is not a car. It talks, it is loved and it loves. The robot, then, like a human, has been injured, its program and wires damaged. In this scenario, we will need to have special tort laws for robots.

The legal system is today unprepared for the development of robotic crimes. Recently, the *Morbidity and Mortality Weekly Report* cited the first death caused by a robot. "This accident occurred when a machinist at a Michigan company entered a robot's work envelope. Apparently not programmed to take human frailty into account the robot used its arm to pin the man to a safety pole killing him with the force."[43] This case is considered an industrial accident and could possibly have been avoided if the robot had an improved sense of sight and more careful programming. In the future, robotic legislation may require laws similar to Isaac Asimov's *First Law of Robotics* that prevent the injury of humans by robots. These laws could be coded into robots' memories such that robots will have to terminate themselves if a conflict arises.[44] However, we can easily imagine scenarios where a robot will have to choose between one and many humans, or situations in which its own termination may cause injuries to humans. These issues and conflicts will challenge programmers, the legal systems, and robots themselves.

Once the computers within robots begin to program themselves according to external stimuli, robots may begin to commit crimes, independent of earlier

human programming. If a robot can commit a crime, then a number of problematic questions will arise. "Can a robot intend to commit a crime? How is a robot to be punished? Is it sufficient to reprogram it? To take it apart? To penalize its owner? Its designer? Its manufacturer? Its programmer?"[45]

Such questions also raise problems concerning criminal trials that involve robots. Many court procedures will need to be adapted to accommodate the needs of such cases. This situation will be exacerbated by the development of robots who serve as witnesses for robots or provide expert testimony: "a trial by a jury of peers seems inappropriate and certainly the 6th and 14th amendments' guarantees to such a trial do not apply to robots."[46] Or do they?

To understand the legal principles that can be applied to robots, we must first have an understanding of the emerging electronic judiciary.

The electronic judiciary

The future of the judiciary and the legal system itself is relevant in developing scenarios.[47] Courts in the next 50 years may be run by robot-computers. Judges are faced with a rapidly expanding caseload where they must analyse legal documents, settle plea bargains, determine sentences, keep abreast of social, economic and political issues as well as act as court administrators. Furthermore, as the courts continue to act as political and social decision makers, judges must cope with complex scientific and technological issues. Of this situation, critics note, "judges have little or no training or background to understand and resolve problems of nuclear physics, toxicology, hydrology, biotechnology or a myriad of other specialties".[48] Computer technology should then be incorporated into the judicial process to aid in decision making.

The first step will be judges using computers to aid them in searching out the most appropriate precedent to fit the present case. The development of a legal reasoning robot could serve as a valuable adjunct to a judge's ability to render fair decisions. "As computers grow more elaborate and versatile [they] can better cope with the complexities of law, judgments and precedence."[49] A legal reasoning robot could "serve as a repository of knowledge outlining the general parameters of the law . . . assisting in the reasoning process necessary to reach a conclusion".[50] As a logic-oriented companion and a massive knowledge bank with the ability instantly to recall legal facts, precedent and procedure, a legal robot would greatly assist the judicial system by speeding up court procedure, minimizing appeals based on court error, and preventing legal manoeuvring, thereby resulting in fewer cases brought to court.

Eventually, as enough statistics are compiled, judges may not be necessary except at the appellate level. Judges could then be free to pursue vigorously the legal and philosophical dimensions of societal problems. Of course, initially during the pre-trial phase, humans would be necessary. Attorneys would enter the facts into computers (manually, or through voice telecommunications) and a motions judge could monitor discovery and fact finding. Computers would then decide the case outcome.[51] In addition, as most cases are negotiated (only about 5% ever end up in trial)[52] we will see the continued development and sophistication of negotiation and mediation programs. Disputants would enter ther side of the problem, and the computer-robot would interact with each side and aid in reaching a settlement. Computers might inspire trust as they can provide relevant previous cases instantaneously and anonymously to both disputants.

They can inform the disputants how the case might be settled (in terms of probabilities) if they went to trial or if they settled; that is, they could provide a range of alternative choices and solutions. In addition, AI programs, as we are seeing in computerized psychotherapy, allow individuals to relax and open up more easily. Besides being impressed by the intelligence of robot-judges we might gain trust in the machines because of the apparent magic they invoke and the authority they command. This magic and authority may lead to an increased belief in the fairness of the judiciary.

Fairness is not a given; it is a political issue. Law is laden with assumptions and biases. Decision making is an act of power. Initially the use of computers will shift power in the court system from judges to programmers. Judges, of course, if they allow AI to enter their courtroom, will do their best to keep control of the law and programmers. Given the anticipated development of robotics, however, we may eventually see computers changing their programming and developing novel solutions to cases. If computers can develop creative abilities, then judges and other experts will have to find new roles and purposes for themselves. Finally, although it is presently ludicrous, a day may come when robot attorneys negotiate or argue in front of a robot judge with a robot plaintiff and defendant.

Legal principles

To understand in more concrete terms the legal future of robots, we must understand what legal principles will be applied to conflicts that involve robots. Lehman-Wilzig's article on the legal definition of AI is useful. He presents various legal principles which may be relevant to robot cases, including product liability, dangerous animals, slavery, diminished capacity, children, and agency.[53]

Product liability would be applied as long as robots are believed to be complex machines. Not only will the manufacturer be liable, say in the case of a robot guard shooting an intruder, but so will "importers, wholesalers, and retailers (and their individual employees if personally negligent); repairers, installers, inspector, and certifiers".[54] Thus, those that produce, regulate, transport, and use the robot will be liable to some degree. Certainly, as caseloads for robot liability cases mount, insurance companies will be cautious about insuring robots. Moreover, we can imagine the day when manufacturers will argue that the robot is alive and that the company is not liable. Although the company may have manufactured the robot, they will argue that either the robot has reprogrammed itself or the new owner has reprogrammed it. The argument then will be that it is the robot which should suffer damages and if it has no money, other parties who are partially liable under the joint severability law should pay the entire bill—the deep pockets principle. When the first atttorney will call a robot as witness is difficult to forecast but not impossible to imagine.

Product liability will be especially problematic for AI because of the present distinction between hardware and software. For the robot that kills, is it the manufacturer of the arms who is liable, or the software designer, the owner, or is there no liability—human beware, computer around? Will we see no-fault computer insurance law?

The danger that robots may cause would logically increase as they become autolocomotive, that is, once they can move. At this stage law relating to dangerous animals may be applicable to robots. Like animals, they move and like

animals they give a sense of intelligence, although whether they actually are intelligent is a political–philosophical question. Lehman-Wilzing writes:[55]

> While the difference in tort responsibility between product liability and dangerous animals is relatively small, the transition does involve a quantum jump from a metaphysical standpoint. As long as AI robots are considered mere *machines* no controversial evaluative connotations are placed on their essence—they are inorganic matter pure and simple. However, applying the legal principle of dangerous animals (among others) opens a jurisprudential and definitional Pandora's Box, for *ipso facto* the "machine" will have been transformed into a legal entity with properties of consciousness, if not some semblance of free will. Once begun, the legal development towards the "higher" categories will be as inexorable as the physical expansion of robotic powers. In short, the move from the previous legal category to the present one is the most critical step; afterwards, further jurisprudential evolution becomes inevitable.

It is important to remember here that as important as legal rights, those rights that can be resolved or judged by a public authority, there are human rights. These often cannot be resolved by any judicial authority. The right to employment, the right to minimum basic necessities, and other United Nations Charter human rights although stated morally and unequivocally cannot be guaranteed, given that rights are politically won and lost. Rights are thus gained through ideological—philosophical as well as militant—battles.

Given the structure of dominance in the world today, between nations, peoples, races, and sexes, the most likely body of legal theory that will be applied to robots will be that which sees robots as slaves. They will be ours to use and abuse. Of course, as Stone has pointed out, this means that they will have no legal status. Neither the slave nor the robot can institute proceedings themselves, for their own recovery, wherein damages are recovered for their pain and suffering. Will errant robots have to be responsible for their actions, or will owners who argue that the slaves understood the intent of their actions make the slaves responsible? If the manufacturer or owner is liable in civil cases and guilty of wrongdoing in criminal cases, then they will certainly argue that the robot understands intent, understands its programming. If this line of argument succeeds, the robot can then pursue its own case. As mentioned above, it will probably be the programmer or group of programmers who will be responsible.

The problem of punishment is also problematic. Robots have neither money nor property. One way would be to give the robot to the injured party for their economic use. Another would be to eliminate or reprogram the robot. This may be analogous to the present debate on the right of the foetus—is it alive, do we have the right to terminate it? Also, who has the right to terminate a robot who has taken a human life, or a robot who is no longer economically useful? In the 21st century we may see right to life groups for robots.

Lehman-Wilzeg argues that another category for robots would be that of diminished capacity, "used for those individuals who are legally independent but have a diminished capacity for initiating actions or understanding the consequences of such actions at the time they are being committed".[56] What is important here is intent. However, robots will not be the stupidest of species—more likely they will be the most intelligent. At question will be their morality and ethical decision making.

Far more useful as a category is that of children, or the whiz-kid, high in brain power and low in wisdom. More useful, yet also ultimately problematic is that of the law of agency. As Lehman-Wilzeg writes:[57]

To begin with, the common law in some respects relates to the agent as a mere instrument. It is immaterial whether the agent himself has any legal capacity, for since he is a sort of tool for his principal he could be a slave, infant, or even insane.[58] . . . "it is possible for one not *sui juris* to exercise an agency power."[59] Indeed, the terms automation and human machine have been used in rulings to describe the agent.[60] Nor must there be any formal acceptance of responsibility on the part of the agent[.] . . . The only element required for authority to do acts or conduct transactions[61] . . . is the communication by one person to another that the other is to act on his account and subject to his orders. Acceptance by the other is unnecessary. Thus, . . .[g]enerally speaking, anyone can be an agent who is in fact capable of performing the functions involved. Here, then, is a legal category already tailor-made for such a historical novelty as the humanoid.

While it is true that the law of agency may be tailor-made, given that law itself is changing, given that in the next 10 years there may emerge a science court to deal with questions of science and technology (questions that lawyers and judges devoid of scientific and technological training can rarely adequately understand), and given rapid changes in robotics and computers, is it at all possible to forecast the legal principles in which AI robots can be understood? Thus, although the legal categories presented—from product liability to agency—are useful heuristics, the fantastic noton of robotic rights behoves us to remember that development in robots may result in (or may need) entirely new legal principles and futures.

Another perspective and useful heuristic in understanding the rights of robots involves developing two continuums at right angles to each other. At one end of the x-axis would be life as presently defined—flesh and bones, reflective consciousness and soul. At the other end would be robots in much the way that many see them today—as mechanical–electronic gadgets that run programs designed by humans. Along this continuum we can imagine humans with a majority of robotic parts (artificial limbs, heart, eyes) and robots with human-like responses and reactions (creativity, ability to learn). We would also have robots that look like humans and humans that increasingly look like robots.

On the y-axis we can also develop a rights dimension. At one end of this continuum would be a condition of total "human rights" and at the other end, a state of rightlessness. Along this continuum, we can visualize robots representing themselves and robots represented by guardians. Finally we can develop a moving–stationary dimension as well as various economic dimensions (household robots to military robots). By juxtaposing these dimensions (flesh–mechanical; rights–rightless; moving–stationary) and visualizing them across time, we can develop various alternative scenarios of the future of robots.

Along these time lines and dimensions, we can imagine the day when a bold lawyer rewrites history and argues that the robot should be treated legally as a person. On this day an entirely new future will emerge.

Conclusion

Technological change is growing at an exponential rate. Genetic engineering, lasers, space settlement, telecommunications, computers and robotics are bringing economic, social and political changes like no other period of human history. Unfortunately it is difficult for individuals and institutions to keep pace with such change. In order to minimize the stress caused by the expanding role of robotics it is vital that the judiciary, legislature, and executive make proactive

decisions and plan for the eventual development of robotic rights before the issue reaches a crisis point.

We feel the issue of robotic rights and responsibilities to be an eventuality. Considering the question of rights in this new dimension offers a unique opportunity to reconceptualize our very notion of rights and what they will mean in a global society. This issue generates the larger question of man's relationship with his world; it signals a quantum change in our perspective of ourselves, and a new understanding and appreciation for the concerns of all things in our world. This is the underlying theme of this article.

John Haught, professor of theology at Georgetown, has identified a higher spiritual dimension to the growing planetary interconnectedness that the computer age is establishing. He likens:[62]

> . . . the spread of satellites and computer networks over the Earth as comparable to the complexification of the private nervous system as the condition for the birth of thought. Now the complexification is taking on a planetary dimension. So the whole planet is being prepared by technology for the eventual birth of a far higher form of consciousness . . . we are participating in a magnificent process of bringing about a physiological base for a higher and dramatically novel form of consciousness.

It is with such a global transformation in mind that we should consider the rights of robots as well as rights for all things.

Someday robots will be in our houses as playmates for children, servants for adults. They may become sex surrogates. They will be in the courts as judges. They will be in hospitals as caretakers. They will perform dangerous military and space tasks for us. They will clean pollution, save us from numerous hazards. The child who loses her robot because of malfunction will, when she grows up, always remember her robot. She may, at the insistence of her parents, relegate robots to the world of fairies, goblins and ghosts, the unreal and the impossible. Or she may decide that her robot, like her family, friends and pets, is part of her, is part of life itself. We must remember that the impossible is not always the fantastic and the fantastic not always the impossible.

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