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Who Owns Broccoli?

Intellectual Property Rights in a Liberal Context

Proceedings of a Colloquium at the Liberal Institute,
Friedrich-Naumann-Foundation for Freedom, 13th October 2011
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Knut Blind
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Who Owns Broccoli?

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Imagine somebody owns broccoli; not just broccoli but the essence of broccoli - its genetic code. Anybody who wanted to breed new varieties, or plant and sell broccoli would not only have to buy the seeds but would also have to pay the owner a royalty. Would it be good for gardening, leading to additional incentives to breed vegetables and to register new species? Or would it be bad for breeders trying to improve existing varieties and for customers who would have less choice and thus have to pay a higher price for seeds and produce? Have you ever asked yourself such questions? Not many people think about owning vegetables. However the protection of ideas, concepts and creative works as well as the illegal sharing of music files and bootlegs are on everyone's mind. Hardly a day goes by without patent wars in the news.

Even among classical liberals, the principle of intellectual property rights, patent and copyright law are controversial topics. On the one hand there are protagonists who advocate stern protection for immaterial goods and ideas. On the other hand some classical liberals oppose intellectual

monopolies. Some commentators point out similarities between the benefits of protecting private property rights for innovation and the efficiency of resource allocation. They fear a world without intellectual property as a socialist nightmare, where nobody is able to reap the fruits of their creativity. In an opposing view, other experts caution against the monopolization of ideas which place barriers in the way of creativity and reduce incentives to innovate. To this day there is continuing dispute concerning the historical role of intellectual property rights. Were they established to promote economic development or merely to censor creative thinkers and to support political cronies?

In modern life the economic and legal importance of intellectual property rights is remarkable. Whether through copying, sharing and application of content on the internet, the use of patents in science and industry or the application of ideas in computer and software design, fashion and even art, innovators are constantly confronted with the limits of intellectual property. Some have heavily invested in new ideas and want to make a reasonable profit, others want to use and combine successful ideas but are restrained by legal obstacles. Protagonists from both sides argue either (i) that investments will not be profitable without granting protection or (ii) that there are countless examples which demonstrate that making a profit from innovations has no need of intellectual property rights. Indeed some people wonder if for instance the computer industry really needs the protection of hardware designs or software code to profit from their often

already hugely popular products. On the other hand others fear that we will never see a cure for HIV without strict patent protection.

With this in mind, there is a clear rationale for political decisions regarding intellectual property. In our information-led age this topic is far too important to be left to political pundits and industry lobbyists. Therefore the Liberal Institute at the Friedrich-Naumann-Foundation for Freedom initiated a discussion giving a liberal perspective on intellectual property rights in a scientific colloquium. Our goal was an exchange of ideas on both the history of intellectual property rights and important empirical aspects of copyrights and patents in our daily lives. As well as identifying the similarities and differences of the positions among classical liberals, we hope to inspire public debate and influence the political decision making process. The results of our discussions are presented in this book.

Terence Kealey puts intellectual property rights in a historical context. He critically assesses the development of patent protection over generations and cites cases of both use and misuse of patent law. Opposition to state protection of intellectual property rights is not only a contemporary phenomenon but has a long tradition. Early critics of strong patent protection objected to state granted monopolies in an era of free trade. They were sceptical about the specialness of invention and considered inventive talent to be a common feature in the milieu of collective enterprise and one

that was not necessary to encourage. On the contrary they believed patents would encourage their holders to waste their lives in the fruitless search for returns on their patents. According to Kealey there is ample evidence to confirm this opinion. He goes on to make a theoretical case for rethinking intellectual property rights and patents. Unlike material property, ideas are not rivalrous and only partially excludable. Thus many people can simultaneously use the same idea without weakening its usefulness. Since a broad use of inventive ideas is clearly beneficial for society and the evidence for the effectiveness of patents in pushing innovation is weak, why should we create artificial restrictions? Perfect market models are no good guide to evaluate patent law because economic players don't act in a stylized environment of perfect information, atomistic competition and reckless profit maximization. Humans, moreover, are complex, and they are incentivized by more than just money. Indeed many scientists continue to make their work free and businesses continue to finance open source projects.

Stan J. Liebowitz asks if we should be concerned about the weakening of copyright and draws a different conclusion for copyrights than for patent protection. He highlights the importance of property rights in incentivizing people and enterprises to be productive, but also in promoting the freedom of producers to keep the benefit of their efforts. As a classical liberal he prefers a system that allows individuals the freedom to reap the rewards of their efforts to a system that ultimately leads to greater GDP but violates the free-

dom of producers and consumers. In the case of copyright he argues that giving authors the freedom to generate rewards from their efforts is more important than whether this leads to economic efficiency. According to Liebowitz, empirical evidence strongly suggests a weakening of intellectual property rights through piracy. Illegal file sharing is responsible for most of the decline in record sales. For him, making copies of someone else's work is not competition but rather free riding. It doesn't restrict competition because nobody is restricted in creating competing work or in entering the market. He argues that copyright is a means by which creators earn their incomes, incomes due to monopoly talent not the literal monopoly from copyright. Regarding patent protection he highlights an important difference to copyright. While copyright seeks only to prevent free riding, patents prevent inventive activities that clearly are not free riding. Patents prevent real competition and are more than just a reward for unusual talent. This weakens the case for patent law.

Product piracy and counterfeiting is the topic of Knut Blind's paper. Surveying German enterprises he tries to analyse how product piracy and counterfeiting affect small and medium enterprises and if they restrict profits and innovation. Summarizing the results of the study "The Economic Relevance of Intellectual Property and its Protection" and analysing additional data, he underlines the increasing importance of intellectual property in a global economy. Enterprises report a high incidence of intellectual property infringement with however large differences between industries and size

classes which are unequally affected by different types of imitations and identify different threats from domestic and foreign infringers. The heterogeneous distribution of damages among companies leads to different reactions by companies to the phenomenon of product piracy depending on intensity of damage and on company size. This is not only a challenge for companies but demands new approaches in policies for small and medium sized enterprises. Informal ways to keep competitors from re-engineering an invention seem to be more promising than focusing on patent protection. Improved training in intellectual property management skills in academic education is equally important.

Bernd Klein relates his personal odyssey through the abyss of intellectual property rights from the perspective of a software developer who happens to invent a mathematical algorithm and use a software programming language to implement it. Realizing his invention infringes a software patent he has never heard of gives him a tough lesson in the realities of intellectual property rights and ends his dream of intellectual property rights as a means to provide inventors, scientists, thinkers, designers, and others with essential incentives to produce and release new creative materials. He argues not only from his own experience but from a theoretical perspective that so called intellectual property does not enrich the society. There are a vast number of daily cases where patents and copyrights create dis-incentives to innovation and creativity. Creators often have to go to huge expense to prevent patent and copyright infringement even

if there is no evidence of business disadvantages on behalf of the holders of rights. He mentions a couple of cases, where seemingly petty infringements can lead to high costs for innocent internet users. This clearly shows that copyright significantly increases the cost of creation. According to Klein trying to avoid or limit these expenses often results in creations of poorer quality and sometimes prevents creative work. Freedom of speech is another reason to be suspicious of intellectual property rights. When copyrighted images are so deeply embedded in our cultural heritage, we should be allowed to employ such creations freely in the name of free speech. Given the current state of copyright law he dies not hold out much hope for positive changes. Regarding patents he argues that patents are often granted to obvious pseudo-inventions containing no novelty. Such patents don't promote invention but rather grant a monopoly to exploit common knowledge. Nevertheless he believes that more and more creators are forfeiting their potential individual claims to patent or copyright their contributions. Even certain companies are demonstrating that they can be more successful than businesses relying on patents or copyrights. Open source software is a popular example. Despite many attempts to stop free operating systems like Linux or Android, challenging the markets of old-established firms, their technical development and market penetration is thriving. Even if Klein's initial dream of intellectual property rights promoting inventiveness was dashed, he now dreams that lawmakers will realize that patent and copyright laws should be changed in order to prevent the restriction of our poten-

tial to develop, create, or invent. A shortening of the terms of duration, granting patent and copyrights less generously, more fairness regarding "fair use" and less litigation against adaptation would help to further his dream.

These four contributions clearly show the theoretical and practical complexities of intellectual property rights. Despite their differences, the authors agree in the necessity to reappraise patent and copyright law from a liberal point of view. The current state of law doesn't adequately meet the requirements of a manageable and incentive-compatible intellectual property rights regime. Whilst we do not present sweeping solutions to this problem, we are determined to steer the discussion in a more helpful direction.

Steffen Hentrich and Csilla Hatvany
Potsdam, December 2011

The History of Intellectual Property

Terence Kealey

Introduction to patents (and some early history)

The story of intellectual property starts with the introduction of the first systematic patent laws in Venice in 1474. Before 1474, according to Bruce Bugbee's authoritative 1967 book *The Genesis of American Patent and Copyright Law*, intellectual property was recognised only episodically. Thus it appears that the restauranteurs of Sybaris during the 5th century BC (or BCE) competed every year for a prize for the best novel recipe, and the winner was allowed a monopoly on the recipe for the following year. Bugbee describes other Greek and Roman examples of intellectual property, yet all are as economically marginal as the recipes of Sybaris, and only with the 1474 Venetian statute did intellectual property law first become systematised.

(The great Florentine architect Brunelleschi was awarded a patent in 1421 for a novel hoist, but that was a unique award by the Florentines and one they did not repeat during the 15th Century.)

The motive for the creation of the Venetian statute was the intensive glass manufacture of the lagoon, which inspired competitive invention, and which in turn led to demands from the glassmakers for the legal protection of their inventions. The 1471 statute was remarkably modern in its provisions, in that it (i) required the disclosure of the invention, (ii) prescribed a term limit on the duration of the patent, and (iii) prescribed penalties for infringers. The apparent modernity of the Venetian statute speaks of its influence on the English Statute of Monopolies of 1624, which is the Statute that forms the basis of contemporary patent law, internationally.

Curiously, the English 1624 Statute was not conceived primarily as an incentive for invention but, rather, as a restriction on the King, because it was passed by Parliament to restrict King James I who, like other monarchs before him, had granted monopolies on pre-existing trades (such as salt) to favoured clients. Outraged, the Parliamentarians in 1624 restricted all subsequent patents to novel inventions ("projects of new inventions.") The Statute of Monopolies, therefore – and slightly ironically in view of later controversies – was enacted primarily to limit the role of monopolies in the economy. Nonetheless the 1624 English Statute was inspired by the 1474 Venetian Statute because – as the glassmakers of Venice migrated all over Europe in search of markets – they spread their concepts of the legal protection of innovation with them.

Patents are so called because they were originally called

'letters patent', the word *patent* meaning 'open' as in 'patently obvious' from the Latin *patere* meaning 'to open.' When a patent was granted, it came in the form of a letter, with the wax seal being ornamental and not functional (i.e., the letter was not sealed but was open to be read freely.)

Modern copyright law is based on the English Statute of Anne of 1710, but I will leave it to Professor Stan Leibowitz to address that here. As for the other aspects of intellectual property (trade secrets, trademarks, the so-called 'law of ideas', creative commons, copyleft *et alia*) space here is limited and I refer to them only to explain that here I am focussing on patent law.

Patents are a form of property, and ever since Locke described the three fundamental rights of individuals under the law as being life, liberty and the protection of property, property rights have been properly venerated in the west. Nonetheless it is important to note that, important though property rights are, they are rarely unrestricted. Consider land. Freehold landowners are not sovereign, and all states – which of course *are* sovereign - reserve to themselves the ultimate ownership and use of land. Thus in many countries freeholders do not automatically own the mineral or overflying rights to their land, and in all countries governments can legally acquire land from freeholders without their consent if, in the judgement of the government, such an acquisition is in the public interest (in America this is called the law of eminent domain, in Britain compulsory purchase, etc.)

Equally, as a form of property, patent rights in invention are restricted: the US's Patent Acts (which date from 1790) to take a typical example, restrict the award of a patent only to an innovation that is (i) useful, (ii) novel, and (iii) non-obvious. Nonetheless, as a form of property, patents can be traded, and patent holders may sell all or some of their property, just as they may also grant licences to others to use part or all of their patents.

It is often said that patents provide an exclusive right to use or exercise an invention for a limited time in return for the disclosure of the invention. Actually, this is not true: patents provide an exclusive right *to stop others* from using or exercising an invention for a limited time in return for the disclosure of the invention. But in their turn others may be able to stop a patent holder from using or exercising their own invention. As we shall see, this apparently subtle or even pedantic point is important, and it goes to the heart of one of the contemporary controversies over patents.

The theoretical basis of the British (and international) patent system was summarised by TA Blanco White in his *Patents for Inventions*, quoted by the Banks Commission in its 1970 UK Committee of Enquiry's *Report on the British Patent System*:- "It is desirable that industrial techniques be improved. To encourage improvement and disclosure (in preference to secrecy) any person devising an improvement in a manufactured article, or in machinery, or in methods of making it, may upon disclosure of his improvement to the

Patents Office demand to be given monopoly in the use of it for 16 years."

(As White adumbrated, there are different classes of patent, and America – to take the prototypical international example of today – recognises three, namely [i] utility patents [for new processes, machines, artefacts and composition of matter], [ii] design patents [for designs for articles of manufacture] and [iii] plant patents [for novel plants as in horticulture or agriculture.] The periods of patent monopoly have varied over the centuries, and between different national jurisdictions and between different classes of patent, but currently in the US utility and plant patents extend for 20 years and design patents for 14.)

The later history of patents

As the Industrial Revolution accelerated in Britain and the Continent of Europe during the 19th Century, and as patents became an increasingly prominent part of business life, so a powerful movement of opposition built up against them. In Britain the opposition was led by prominent men such as Isambard Kingdom Brunel, while on the Continent of Europe other prominent men such as Bismarck were openly sceptical. The Victorian controversy over patents, which was chronicled by Adrian Johns in his 2009 book *Piracy: The Intellectual Property Wars from Guttenberg to Gates*, has been largely forgotten today, but it is worth recalling because

many of these earlier arguments are perennial and remain relevant today.

The criticisms of patents were inevitably complex, but for simplicity they can be reduced to six main themes. First, patents were a form of monopoly, and in an era of free trade (the British Corn Laws were repealed in 1846) private state-granted monopolies seemed retrogressive. Second, critics were sceptical about the specialness of invention: simultaneous invention of the same innovation by more than one inventor seemed (and still seems) to be a feature of technological development (hence all the bitter battles over priority, which remain of feature of research to this day) and technological invention thus seemed to be a collective matter that emerged out of a milieu of collective enterprise, so critics felt that no incentive was necessary to encourage invention. Third, critics indeed suggested that inventiveness was an innate feature of human beings, and thus needed no incentivisation. Fourth, individual inventions clearly built on the legacy of centuries or even millennia of progress, so critics argued that a patent holder – by inventing only the last in a long line of inventions – was unfairly appropriating the inventions of the past. Fifth, critics argued that industrial organisation and the creation and management of companies were the real limiting factors in economic development, and that patents conferred on invention an inappropriate level of importance. And finally, sixth, critics of patents argued that almost all patents were economically useless but that their possession – and the expectation of their possession

– raised unrealisable hopes in the hearts of most inventors, who would thus waste their lives in the fruitless search for return for their patents.

These arguments were judged to be so powerful that Britain very nearly abolished patents and, as Johns described in *Piracy*, but for certain parliamentary vagaries such as the timing and results of particular elections, Britain actually would have abolished patents. In two countries on the Continent of Europe the critics of patents did win the argument, and Switzerland in 1850 reaffirmed its earlier decision not to introduce patent laws while – most dramatically of all – the Netherlands in 1868 actually repealed its existing patent laws.

Nonetheless, most countries did operate patent laws, and their delegates congregated at the Paris Convention of 1883 to start the process of international harmonisation. Further, those countries that operated copyright laws sent delegates to the Berne Convention of 1886. The secretariats of those conventions were eventually fused into today's World Intellectual Property Organisation (an agency of the United Nations) and finally, simply for fear of being excluded from the newly emerging international trading treaties, Switzerland (in 1907) and the Netherlands (in 1912) introduced patent laws.

(The latest development in the international harmonisation of intellectual property was the Agreement on Trade Related Aspects of Intellectual Property Rights [TRIPs] which was

negotiated at the end of the Uruguay Round of the General Agreement on Tariffs and Trade [GATT] in 1994.)

Interestingly – indeed, importantly – as the economic historian Eric Schiff showed in his 1971 book *Industrialisation Without National Patents*, Switzerland's and the Netherlands' long term rates of economic or productivity growth were unaffected by these developments (which can be independently confirmed by examining those countries' long-term rates of economic growth in Maddison's 2003 book *The World Economy*) which suggests that patents – either in their observation or in their absence - are irrelevant to aggregate economic growth.

Schiff also chronicled at the anecdotal level that the lack of patent protection did not inhibit the technical fertility of Switzerland or the Netherlands. To take just one 14 year period in Switzerland, in 1866 Henri Nestlé developed a formula milk for infants, in 1869 Julius Maggi invented powdered soup, in 1875 Daniel Peter invented milk chocolate, and in 1879 Rudolf Lindt developed chocolat fondant. Those names still live in the companies that flourished patent-free on the back of those technologies.

The absence of patents did, of course, facilitate the import of technology. The Dutch precursor of Unilever created margarine during the 1870s by exploiting, licence-free, a French patent, and during the 1890s Gerard Philips in Holland built his company by manufacturing light bulbs without paying Edison a licence fee (Philips's first big order being,

ironically, to light a candle-manufacturing factory). Those companies have since produced important innovations of their own, thus showing how their intensification of research has benefited society at large.

One paradoxical example of the value of that research intensification was provided by the Swiss drug company CIBA (now part of Novartis) which was founded in 1869 in Basle to exploit, licence-free, the discovery of mauve and other aniline dyes that William Perkin had made in London two years earlier. Yet, as Simon Garfield showed in his 2001 book *Mauve*, it was the patent-free exploitation of mauve by Continental chemists that saved Perkin's own business! Perkin could not find investors in Britain, who did not believe that mauve was a profitable colour, and only after the Europeans started copying Perkin's technology to produce mauve gowns for Parisians (who *loved* them) did the ladies of London demand their own, thus impelling British investors into funding Perkin's business. Thus we see how competition – that patents are designed to inhibit – stimulates innovation.

The problem with patents

The fundamental problem with patents is that knowledge is not, innately, a private good, yet patents seek to privatise the innately public. A private good is defined as being both 'rival' and 'excludable.' A piece of land, for example is rivalrous, and if more than one person seeks to farm a piece of land,

the rivalry between the two people will reduce its output. So if one farmer places his animals on it to graze, and another farmer places his own animals on the same piece of land, then each farmer will have a private incentive to ensure his animals eat the maximum amount of food before the other farmer's animals do, and in a so-called 'tragedy of the commons' the land will be over-exploited and ruined.

But knowledge is non-rivalrous: a million people can use the same idea (the laws of gravity for example) and the idea is not weakened in consequence.

Furthermore, land is excludable. A private good such as a farm can be fenced, to thus exclude all others. Private goods, therefore, can be monpolised by owners, and they will thus attract investment. But ideas are only partially excludable because secrecy is hard to maintain. Patents attempt to achieve excludability by restricting the commercialisation of ideas in exchange for their publication, but should we be trying to restrict the commercialisation of knowledge? Knowledge is non-rivalrous, and society is clearly advantaged if everybody has access to all knowledge, so why create artificial restrictions on its application?

Patents do not incentivise invention

The answer to the question of "why create artificial restrictions on the application of knowledge?" is, we are told,

the incentivisation of invention. We are told that inventors will be incentivised to invent only if they can monopolise their inventions. But is this true?

Imagine an old-time baker in a world of old-time bakers. Faced with competition, he needs a novel product by which to increase his profits. So he invents one – sliced bread perhaps. To invent sliced bread, the baker takes out a bank loan, he (let us assume for simplicity that the baker is male) invests in research, he develops a mechanical slicer, and soon he will be selling his sliced bread at a vast profit because he is its only producer.

What will his competitors do? Some, stunned by the fall in their revenues and by his profits, will take up their own research. They will take out bank loans and employ researchers. Soon, someone will invent *thin* sliced bread (for sandwiches). That someone will then steal much of the first baker's profits.

At this point the defenders of patents will cry - unfair! "Poor first baker" they will wail, "someone has stolen his intellectual property. People developed thin sliced only because of the first baker's idea". Which is true, but thereafter the patent-defenders go awry. You and I know what the first baker will do next. He'll revisit his bank, take out another loan, research even more intensively than before, and develop *thick* sliced for toasting. Soon he will be enjoying huge monopoly profits as people buy his bread to make toast.

The various bakers will therefore create the best possible world for customers, perennially improving their products by their competitive research.

But the patent-defenders argue the opposite. They invoke a bizarre economic concept called the 'perfect market'. In perfect markets there are an infinity of producers, an infinity of consumers, an infinity of products, and no-one makes a profit. Perfect markets clearly bear little relation to real ones, but nonetheless - because the first baker's returns from the initial invention of slicing are lower than they would otherwise have been because someone invented thin sliced - 'perfect market theory' predicts that the first baker will research less than he would otherwise have done. Moreover, perfect market theory also suggests that the first baker will downsize his research and development (R&D) even further because he can anticipate his diminution at someone's hands: even if the first baker invents thick sliced, he knows that someone will soon invent muffins or some other market-stealer; and everyone else will do the same. They too will anticipate that others will acquire their ideas, so they too will research less.

Therefore, say the perfect markets theorists, competition will cause entrepreneurs to *reduce* their research budgets. Only patents will protect research by guaranteeing inventors a proper return on their investment in research and development (R&D.) Monopolies, in short, are good for the economy!

Except, of course, that the empirical evidence shows the opposite, namely that competition is the great spur of research. In a 2001 survey of 154 Spanish research-led companies, for example, the economist Isabel Busom found that the majority confirmed that they "would accelerate their own R&D effort if they found that a rival firm was doing similar R&D". Similarly, in a survey of agricultural R&D across the developing world, Carl Pray and Keith Fuglie of the US Department of Agriculture found that, even amongst poor countries, it is market competition that spurs private research:-

> The most liberal market economies of the 1980s – Thailand, Malaysia and the Philippines – had the highest private research intensities. The countries with the most controlled economies – China, Indonesia, Pakistan and India – had the lowest. The countries in which private research grew most rapidly – China, India, Pakistan and Indonesia – had major liberalisation programs during the mid-1980s.
>
> US Department of Agriculture, *Agricultural Economic Report No 805*, 2001

An intriguing episode in US history, namely the War of 1812, confirms that competition incentivises research. In 1812 the Americans attacked Britain over its continental blockade against Napoleon. But in 1814/1815 the Americans and British re-negotiated peace. It was the economic historian Kenneth Sokoloff (1988) who studied the peace following

the War of 1812 to test the effects of trade on the USA: the War had disrupted trade between British Canada and the USA for up to three years, but thereafter trade restarted; what were the consequences on the northern US counties adjoining Canada?

Sokoloff found that the resumption of trade prompted research and patenting. With each new incursion of trade after 1814, local businessmen started to patent. The sudden rises in local patenting, moreover, were not caused by influxes of inventors from Boston, New York and other areas of existing innovation, they were caused by local businessmen turning to research to defend their existing businesses against new competitors, and to exploit new markets to which the new trade routes had provided them with access. Competition, Sokoloff confirmed, stimulates research. As the head of R&D at Unilever used to say, his department's budget's best friend was the R&D department at Procter and Gamble.

We thus see that innovation is driven by competition, and that companies invest in research when faced with competitors. One contemporary economist who understands this is William Baumol of Princeton who wrote as the very first sentence of his 2002 book *The Free-Market Innovation Machine*:- "Under capitalism, innovative activity – which in other types of economy is fortuitous and optional – becomes mandatory, a life-and-death matter for the firm". This is because, as Joseph Schumpeter wrote in his 1942 book *Capitalism,*

Socialism, and Democracy, economic theories based on perfect markets and the price mechanism are unreal – in real life companies compete for monopolies by innovation:-

> In capitalistic reality as distinguished from its textbook picture, it is not that kind of [price] competition that counts but the competition from the new commodity, the new technology […] which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of existing firms but at their foundations and their very lives.
>
> Page 84 of the 2nd, 1947, edition

We see here, therefore, the destruction of the idea that the perfect market model justifies patents. Markets are not 'perfect' (they are in fact oligopolistic, which is very different indeed) and entrepreneurs are not the profit maximisers of perfect market theory, they can be only profit-seekers, and the greater the competition the more they will invest in research to sustain their profits.

Humans, moreover, are complex, and they are incentivised by more than just money. Many scientists continue to make their work free, one example being Linux, the open-source software provided by Linus Torvalds and his merry band of fellow idealists. Another example is Wikipedia, provided by Jimmy Wales and his band of volunteers. Open source, of course, often outperforms the proprietary sector because of the contributions of the virtual community. Open source

thus challenges the assumption that innovators require IPR to be incentivised.

Patents do not disclose new information

The defenders of patents argue that patents promote disclosure. No they do not: industrial secrecy is a myth; in reality, company scientists trade information, which is thus disclosed speedily. In a survey of 100 US firms across a range of manufacturing industries, Mansfield and his colleagues found that:-

> Information concerning development decisions is generally in the hands of rivals within about 12 to 18 months on average, and information containing the detailed nature and operation of a new product or process generally leaks out within a year.
>
> Imitation Costs and Patents: An Empirical Study
> *Economic Journal* 91: 907-918, 1981

Surprisingly perhaps, competitor companies share information. In a survey of 11 American steel companies, Eric von Hippel (1998) of MIT's Sloan School of Management found that 10 of them regularly swapped proprietary information with their rivals. In an international survey of 102 firms Thomas Allen (1983) also of MIT's Sloan, found that no fewer than 23 per cent of their important innovations came from swapping information with rivals:- "Managers

approached apparently competing firms in other countries directly and were provided with surprisingly free access to their technology". In a 1997 cross-disciplinary study, Louis Galambos (Professor of History at Johns Hopkins University) and Jeffrey Sturchio (Vice President External Affairs, Merck Sharp & Dohme) have shown how pharmaceutical companies – though intense competitors – will also share knowledge.

Practical businesspeople have long known that rivals share information. It was the president of the Western Electronics Manufacturers' Association in the US who reported that competitors:- "share the problems and experiences they have had" (Saxenian, 1994). Some companies even boast of being good sharers:-

> Conventional business wisdom says: Never let the competition know what you're doing. But at Novell, we believe the secret of success is to share your secrets. So we established the Novell Labs Programme to openly share our networking software technology with other companies.
>
> Advertisement in *The Economist*
> 21 September 1991

Companies share knowledge for a number of reasons, but the most important is that those companies that share knowledge will outperform those companies that do not, because such sharing widens a company's knowledge base

and thus its opportunities. Plus the firms with which to share are those with the same specialist knowledge - rivals. Thus we see that modern scholarship confirms one concept of research held by Victorian critics of patents, namely that it is a collective enterprise by which discoveries emerge out of a milieu rather than being the achievements of uniquely self-sufficient geniuses.

Thus we see that we do not need patents to promote disclosure: there is no market failure in the exploitation of new knowledge; the12-18 months that Mansfield *et al* found is the time on average it takes for information to leak out, provides enough time to allow an innovator to consolidate his or her first-mover commercial lead, while being short enough to benefit society by empowering second-movers. In an ideal world, we would want inventors to be incentivised by a period of monopoly *and* we would want all information to be uniformly available, and the market appears spontaneously to square that circle.

Patents are rarely useful. Relatively few innovations are actually patented. In a systematic review of industry, Edwin Mansfield and his colleagues found that:-

> Patent protection did not seem essential for the development and introduction of at least three fourths of innovations.
>
> Imitation Costs and Patents: An Empirical Study
> *Economic Journal* 91: 907-918, 1981

Mansfield *et alia* found that patents increased the costs of imitation only to a minor degree. Empirical studies show repeatedly that *the* great defence of technological monopoly is 'first moving' – consistently providing the novel product that everyone wants to buy and for which consumers will pay premium prices; which therefore rewards the first mover with the profits by which to invest in the next innovation:-

> The picture is striking. For new processes, patents were generally rated [by 650 executives across a range of US industries] the least effective of the mechanisms of appropriation. […] Lead time, learning curves, and sales and service efforts were regarded as substantially more effective than patents in protecting products.
>
> RC Levin, AK Klevorick,
> RR Nelson & SG Winter, 1987,
> Appropriating the Returns from Industrial R&D
> *Brookings Papers on Economic Activity* 3: 783-820

Cohen *et al* (2000) confirmed by surveying R&D managers that most inventions are not patented and that other means of appropriation are more effective than patents in obtaining return on R&D.

Patents can be damaging. Consider the airplane. Orville and Wilbur Wright flew the first manned heavier-than-air powered aircraft, *Flyer 1*, in 1903; and they patented it, which was the biggest mistake of their lives.

The Wright brothers were bicycle manufacturers from Dayton, Ohio, who invented the airplane in their spare time. They were amateurs. The person who felt he should have invented the airplane was a grander figure, Samuel Langley, the Director of the Smithsonian Institution. Since 1885 he had been trying to fly his own planes, *Aerodromes One* to *Six*, yet each had crashed on take off into the Potomac River, over which Langley launched his *Aerodromes* to allow his pilots a chance of survival. A reporter described the crash of October 7th 1903 as *Aerodrome Six* "entering the Potomac like a handful of mortar". Yet on December 17th Orville and Wilbur Wright took off at Kitty Hawk, North Carolina.

The Wright brothers had financed their own R&D (a mere $1000) whereas the Federal Government had provided Langley with a grant of no less than $73,000. The Federal Government then funded only military and agricultural research, but Langley had exploited the Spanish American War of 1898 to persuade Congress to finance him - only to have created, in the disenchanted words of one Representative, "a mud duck". Both the Government and the Smithsonian were therefore chagrined by the Wrights' success.

But the chagrin was soon aggravated by the Wrights' patents because, after the brothers' success with *Flyer 1*, other American aviators including Glen Curtiss soon built their own planes. But each time Curtiss or any other aviator took to the American skies, the Wrights sued for patent

infringement. Official America took Curtiss's side, and in court the Smithsonian and the relevant federal government agencies claimed, falsely, that the Smithsonian's *Aerodrome* had flown first. The Smithsonian even got Curtiss to adapt Langley's surviving *Aerodrome*, to show it could have flown; and for years the Wrights were reduced to protesting that it was only on being adapted in the light of later experience that *Aerodrome* (nearly) flew. But official America so denigrated the Wright brothers that in 1928, when Orville Wright (the surviving brother – Wilbut had died earlier) sought a museum for *Flyer 1*, he found no US institution prepared to take it, nor one to which he was prepared to donate it. He sent it instead to the British Museum in London. Only after Orville died in 1948 did the Smithsonian ask London for America's plane back - the Smithsonian did not want to give a Wright brother the satisfaction of knowing that it acknowledged his priority.

Yet this unpleasant story was not just one of frustrated *amour propre*: the Federal Government had legitimate concerns. The aeroplane was of strategic value, and the Europeans (who readily paid the Wrights' licence fees) were pulling ahead in aeronautics, but the US was threatened with obsolescence because the Federal authorities would not pay those fees. Because the Federal Government had funded Langley's research, it did not want to recognise its waste of money, and the Smithsonian colluded with the charade because it needed to sustain the credibility of future government grants.

If the Federal Government was determined not to pay the licence fees, it would have been more honest to have modified the relevant patent laws. Indeed, in a key episode, the Federal government *did*, as a war measure in 1917, revoke the Wrights' patent rights, a revocation that it sustained until 1975. Between 1917 and 1975, therefore, the federal government forced all American aeroplane manufacturers to pool their patents collectively – and the consequence was the vast growth of the US aeroplane industry. Thus we see that the Wright brothers' patents destroyed aeronautical innovation in the US, and that only on their revocation in 1917 did America's planes take off.

This story, moreover, is not just an anecdote, because the Wrights were not alone in their patent defence-induced misery: Eli Whitney (cotton gin), John Kay (flying shuttle), Jonathan Hornblower (double-chambered steam engine), Charles Goodyear (rubber vulcanisation) and the Foudrinier brothers (mechanical papermaking) were but some of the many other inventors who ruined themselves in defending their patents. Whitney, as an industrial researcher, learned his lesson, and he launched a second, successful, innovative career as a manufacturer of firearms – without writing another patent. How wise Jonas Salk was when, understanding that academic scientists should seek esteem via reputation, not money, he dismissed the idea of patenting the polio vaccine as:- "like patenting the sun".

But the damage that patents impose is being increasingly

chronicled by scholars. In a startling piece of research, James Bessen and Michael Meurer of the law school of Boston University showed in their 2008 book *Patent Failure* that in 1999 (the last year they studied) the aggregate costs to the US of patent litigation was $12 billion but the aggregate profits to US companies of their patents was only $3 billion (these figures exclude chemical and pharmaceutical patents, see below.)

This is an extraordinary finding. It shows that, outside of chemical and pharmaceutical patents, patents were in aggregate costing America $9 billion in 1999 (and the figure has most certainly risen since.) Individual companies may have done well by their patents, but collectively American industry was suffering losses of $9 billion annually because of patents. Why?

There are two main reasons for this. First, overlap. Intellectual property is not the same as physical property. Consider a piece of land. It is discrete, and it is usually obvious who owns a piece of land and who may exploit it. But the different constituent parts of any new technology can be claimed by many people. Consider software. Any particular commercial advance will incorporate many individual technical advances, many of which will be patented. So, for example, David Martin, the CEO of a patent risk management firm, says that:- "if you're selling on-line, at the most recent count there are 4,319 patents you could be violating. If you also planned to advertise, receive payments for, or plan shipments of your

goods, you would need to be concerned with approximately 11,000" (Bessen & Meurer, 2008, 8-9). Clearly, any on-line seller today is potentially going to invite many lawsuits. He or she may possess a patent, but the other 4,318 patent holders will be able to stop him or her from exercising their patent because its exercise would violate their own interrelated patents. These different patents overlap in a way that pieces of land do not. So an on-line seller, even if he or she possesses some relevant patents, is nonetheless going to have to risk litigation because the costs of pre-screening all the potential patent infringements (at about $5,000 a patent) are prohibitive: it is best just to enter the market and be sued.

The other major problem is 'abstraction'. A piece of land is defined, and its owner is not going to be able suddenly to claim ownership of any one else's land. But technology is fluid. Consider as an example a handset. Imagine that a tiny little company patents a simple walkie-talkie system by which two people can communicate over short distances (loggers in a wood for example). Now imagine that a big company invents a dramatically superior technology, the mobile phone perhaps, by which millions can communicate simultaneously and globally. But this new technology will still need handsets, and though the new company might have invented its handsets afresh, the earlier company might be able to claim that its earlier patent on handsets had been violated by the new company, because inevitably there will have been some overlap (the shape for example) between

the earlier and later handsets. And the earlier company might in consequence claim billions in damages for violating a patent that actually played no direct role in the later invention. This because the earlier company could claim that its earlier patent was not just for a particular handset but could be 'abstracted' to cover all handsets, however independently invented.

In their 2008 book Bessen and Meurer show how, in the past, judges and courts were aware of the problem of 'abstraction', and how they were reluctant to reward patent holders for subsequent inventions that bore only a distant relationship to an earlier patent. But in 1982, in the US, a specialised patent court was created, the Court of Appeals for the Federal Circuit. Such specialised courts are unusual and dangerous, because they are themselves not subject to ready appeal, so they can generate precedents in an uncriticised way. This Federal Circuit Court, in a classic case of Public Choice Theory, has been very pro-patent-holder indeed, and it has seized upon abstraction to hugely increase the power of patent-holders and therefore to increase hugely the amount of patent litigation in the US and thus to also increase its own role, hugely seeking "to expand patent coverage to 'everything under the sun' – a phrase that is popular with the Federal Circuit" (Bessen and Meurer, 2008, 230). Following the creation of the Federal Circuit, the costs of patent litigation in the US have soared.

Chemicals and pharmaceuticals are two areas where the costs of litigation in the US ($4 billion in 1999) are still dwarfed by the profits companies make from them ($15 billion in 1999.) Why? One reason is clarity. A chemicals patent is almost like a deed on a piece of land: there is generally only one formula for each new chemical, and so there is only limited scope for conflict. Chemicals patents, therefore, appear to do only limited damage.

However, the only area where patents are actually justified is pharmaceuticals. Why? As I showed above in the example of the bakers, competition under the free market optimises R&D, so we need no government-gifted monopolies in innovation. But there can be no free market in pharmaceuticals because governments, rightly, impose vast regulatory costs on drugs. In 2000 it cost around $500 million to develop a new drug, and 70 per cent of those costs are dedicated to safety testing (DiMasi *et al*, 2003). Under those circumstances, it is only fair to researchers that they should enjoy a period of monopoly by which to recoup their initial investment because the costs of copying will be so much smaller than the costs of innovation. Indeed, once drugs' patents expire, prices drop to 37 per cent of their original level within two years (Grabowski and Vernon, 2000). Consequently, Bessen and Meurer (2008, 145) find that big pharmaceutical companies' profits from patents are around 79 per cent of their costs of R&D, which is very substantial indeed (chemicals patents were almost as profitable – unlike, as described above, the situation in all other industries where the costs of patent

litigation outweighed the profits from patents).

Oddly, though, it is hard to show that countries that strengthen their pharmaceutical patent laws generate more R&D in consequence (or vice versa; see Lerner 2002). There are probably two reasons for this. First, even within the pharmaceuticals industry, much of the profit from R&D comes from unpatented products (generic drugs for example are surprisingly profitable) and second the pharmaceutical industry spends more money on marketing than R&D, thus suggesting that even in the pharmaceuticals industry profits are generated less by 'objective' criteria than by 'subjective' ones.

In other areas of industry, strengthening patents seems not to stimulate R&D or innovation (Jaffe, 2000) which is not necessarily surprising, and nor does patent protection seem to promote endogenous private research within the developing world. Consider agriculture, which remains a major industry within the developing world. As we saw above, the economists Carl Pray and Keith Fuglie of the US Department of Agriculture found that private agricultural R&D will flourish within the developing world when the market is free. Changes in IPR, however, make little systematic impact:-

> There were substantial changes in IPR policy during this period [of the study] but they were not consistently associated related to changes in research intensity. For example, Malaysia and Thailand made improvements to their patent laws but

> had declining research intensity. India and Pakistan, which had very limited IPR changes, had the most rapid growth in research intensity.
>
> US Department of Agriculture,
> *Agricultural Economic Report No 805*, 2001

It is often said that patents protect small or lone inventors. Small or lone inventors are undoubtedly helped in their leverage of venture capital money by the possession of patents, but this raises the question: how important is small invention?

It is certainly true that during the 19th century, particularly in America, that small (i.e., people working in small companies) or lone inventors made a disproportionate contribution to innovation, and that their patents helped protect them (Khan, 2005). But today individual inventors account for only 12 per cent of patents and these tend to be in economically marginal areas (or in very mature areas, where significant single advances are rarely made; Bessen and Meurer, 2008, 169). This is because big companies have now routinised research:-

> Innovation itself is being reduced to routine. Technological progress is increasingly becoming the work of trained specialists who turn out what is required to make it work in predictable ways.
>
> J Schumpeter,
> *Capitalism, Socialism and Democracy* 1942, p 132

The economist of technology, Jacob Schmookler, agrees:-

> Invention was once … a nonroutine economic activity, though an economic activity nonetheless. Increasingly, it has become a full-time, continuing activity of business enterprise, with a routine of its own.
>
> J Schmookler,
> *Invention and Economic Growth* 1966, p 208

Moreover, the patents obtained by small firms are generally less valuable than those obtained by large ones (Bessen and Meurer, 2008, 174). Partly this is because small firms hold smaller patent portfolios. Most patents are not valuable because most ideas are not valuable: a survey in 2003 by Thomas Astebro of the University of Toronto of 1091 Canadian inventions revealed that only 75 reached the market, of which 45 lost money. Invention and patent-seeking is, therefore, a tournament, and the winners are those who can spread their bets most widely; small firms are thus disadavantaged.

Although it is supposed that lone inventors need patents to protect their ideas from being stolen by Big Industry, in practice lone inventors can generally approach companies safely:-

> Very few of those [big firm managers] could recall inventions submitted from individuals or very small firms that had been accepted, although one or two

> isolated cases were mentioned, but all said they were prepared to welcome promising cases. Most of the inventions submitted are relatively simple-minded, although some show genuine technical expertise or ingenuity, and the main reason for not taking them up are that the idea is old or that it is simply not a commercial proposition.
>
> Christopher Taylor and Aubrey Silberston
> *The Economic Impact of the Patent System* 1973, p322,
> Cambridge University Press

In reality, therefore, few lone inventors have much to offer big companies which, possessing teams of scientists and having routinised cutting-edge research, can generally beat the tiddlers. And, when lone inventors do pull ahead, they find protection in i) legally-binding confidentiality agreements which are easy to write and which have become standard practice, and ii) by the fear of:-

> the adverse publicity that tends to attach to a large company involved in a court action, especially where the opponent is an individual or a very small firm.
>
> C Taylor & A Silberston
> *The Economic Impact of the Patent System*
> 1973, p102

Such litigation is, of course, expensive but so too are patents, whose cost can be prohibitive to lone inventors. Frank Whittle for example, the lone inventor of the jet engine, could not

afford to maintain his patents and they lapsed (though their irrelevance was highlighted by the successful creation of the patentless Power Jet Company in 1936). Indeed, patents are so expensive as to preferentially empower rich companies over lone inventors. A 1996 OECD report showed that 60 per cent of all US patents are filed by fewer than 700 firms.

University researchers will benefit from patent rights, and the 1980 Bayh-Dole Act, which granted to US university researchers the IPR that they had themselves generated, has spun out a significant number of firms, but the profits those firms generate does not match the taxpayers' investment in university R&D (Kealey, 2008, 253).

Defenders of patents note that patents do allow science to be traded in the form of licences (so patents need not generate monopolies) and in 2000 the National Science Foundation reported that between 1980 and 1998 no fewer than 9,000 major US, European and Japanese firms entered into strategic technology alliances, sometimes leading to unusual newspaper headlines such as that of the 13th August 1997 in *The Times* of London which described the deal between Apple and Microsoft as the "Rivalry that Ended in Friendship". Meanwhile IBM invests so much in R&D that it has for the last 12 years been awarded more US patents (3,000 annually) than any other institution. And from its total of 40,000 patents IBM earns over $1 billion annually in license fees, thus accounting for over 2 per cent of all American licence fees.

But are such licence deals really optimal? Japanese patents are weaker than US or European patents, and they provide inventors with less protection with the result that, under the protection of confidentiality, Japanese inventors enter more readily into technology-sharing agreements with companies, thus speeding the dissemination of inventions within Japan and enhancing its productivity - which has in turn helped boost Japan's vast private investment in research.

Addressing some of the problems of patents

In their book *Against Intellectual Monopoly* (which is freely available on the web, of course) two American economists Michele Boldrin (Washington University at St Louis) and David Levine (UCLA) propose the total abolition of patents (except in the case of pharamaceuticals). That might be too radical a solution to the problem of patents, but in their 2008 book *Patent Failure* Bessen and Meurer revive the old idea of compulsory licensing. It is usual in the world of copyright for national governments to allow compulsory licencing, whereby someone has the right to, say, play a piece of copyright music on demand, subject to the payment of a fee, the size of which may be determined by convention or by arbitration. The international patent treaties provide governments with the same powers over patents, and Bessen and Meurer argue convincingly that such powers, if exercised, could prevent much wasteful litigation.

Certainly, compulsory licensing has emerged strongly within pharmaceuticals. The 1986-93 Uruguay Round of the World Trade Organisation (WTO) established such strong intellectual property rights (which preferentially advantage western countries, for obvious reasons) that, as the Economics Nobel Laureate Joseph Stiglitz protested in his 2002 book *Globalization*, "the result was that some of the poorest countries in the world were actually made worse off". In particular, the Uruguay Round prohibited the Third World from manufacturing cheap copies of drugs, and the subsequent rise in deaths ("Millions of people are dying and will die because trade is privileged over human beings" said James Orbinski of Médecins Sans Frontières) proved such a scandal that, in its Doha Development Agenda of 2001, the WTO instructed the TRIPs council to allow the manufacture certain drugs, cheaply, under compulsory licences.

Within the developed west, patent pools would provide a separate solution to the problem of endless litigation, and there are good arguments for anti-trust laws (if they inhibit the creation of pools) to be sufficiently relaxed to encourage them.

Conclusion

People take out patents to inhibit the competition, and as Karl Marx said, capitalists seek to close markets, not open them. As Adam Smith said:- "Men of the same trade

seldom meet together … but the conversation turns into a conspiracy against the public". These two thinkers would have understood the contemporary scepticism about patents, as would campaigners for social justice: patents are a weapon the rich can aim at the poor because, inevitably, the rich do more science than the poor.

Too many market thinkers, in their respect for property rights, are reluctant to acknowledge the difference between rights in tangible objects and those in knowledge. So, for example, when Paul Wolfowitz was at the Defence Department, his web site boasted that when he had been Ambassador to Indonesia between 1986 and 1989 he had been "a tough negotiator on behalf of American intellectual property owners". But even Wolfowitz knows what impact such American intellectual property ownership had on Indonesian economic development, and his World Bank site stated simply that during his time in Indonesia:- " … he was known for reaching out to all elements of society and for his advocacy of reform and political openness".

Individual patent holders can indeed do very well by their patents, so they will create a powerful pro-patent lobby in ways that Mancur Olson (1965) would have understood. It behoves the rest of us to resist the encroachments of these technological plutocrats.

References

Allen, Thomas *et al* (1983) Transferring Technology to the Small Manufacturing Firm, *Research Policy* 12: 199-211.

Astrebo, Thomas (2003) The Return to Independent Invention: Evidence of Unrealistic Optimism, Risk Seeking or Skewness Loving?, *Economic Journal* 113, 226-239.

Baumol, William (2002) *The Free-Market Innovation Machine,* Princeton University Press.

Bugbee, Bruce (1967) *The Genesis of American Patent and Copyright Law,* Public Affairs Press.

Busom, Isabel (2000) An Empirical Evaluation of the Effects of R&D Subsidies, *Economics of Innovation and New Technology* 9: 111-148.

Cohen W, Nelson R, Walsh JP (2000) Protecting Their Intellectual Assets: Appropriablity Conditions and Why US Manufacturing Firms Patent (or Not), NBER Working Paper No. 7552.

DiMasi JA, Hansen RW, Grabowski HG (2003) The Price of Innovation: New Estimates of Drug Development Costs, *Journal of Health Economics* 22, 151-185.

Garfield, Simon (2001) *Mauve,* WW Norton & Co.

Grabowski H and Vernon J 2000 Effective Patent Life in Pharmaceuticals, *International Journal of Technology Management* 19, 98-120.

von Hippel, Eric, (1998) The Economics of Product Development by Users, *Management Science* 44: 629-644; von Hippel, Eric (1988) *The Sources of Innovation,* Oxford University Press.

Jaffe AB (2000) The US Patent System in Transition: Policy Innovation and the Innovation Process, *Research Policy* 29, 531-557.

Johns, Adrian (2009) *Piracy: The Intellectual Property Wars from Guttenberg to Gates*, University of Chicago Press.

Kealey, Terence (2008) *Sex, Science and Profits,* William Heinemann Ltd.

Khan, B. Zorina, (2005) *The Democratisation of Invention During Early Industrialisation: Evidence from the United States 1790-1920*, Cambridge University Press.

Lerner, J (2002) 150 Years of Patent Protection, *American Economic Association Papers and Proceedings* 92, 221-225.

Maddison, Angus (2003) *The World Economy*, OECD.

Olson, Mancur (1965) *The Logic of Collective Action: Public Goods and the Theory of Groups,* Harvard University Press.

Schiff, Eric (1971) *Industrialisation Without National Patents*, Princeton University Press.

Sokoloff, Kenneth (1988) Inventive Activity in Early Industrial America *Journal of Economic History* 48: 813-50

Schumpeter, Joseph (1941) *Capitalism, Socialism, and Democracy,* Allen & Unwin London.

UK Committee of Inquiry, M A L Banks (1970) *The British Patent System* [1970-71 Cmd 4407].

Galambos, Louis & Sturchio, Jeffrey (1997) The Transformation of the Pharmaceutical Industry in the 20th Century in: J Krige & D Pestre (eds) *Science in the 20th Century,* Harwood Academic Publishers, Paris, France.

Saxenian Annalee (1994) *Regional Advantage,* Harvard University Press p 33.

Should We Be Concerned About the Weakening of Copyright?

Stan J. Liebowitz

I wish to propose two main claims in this talk. First, that copyright and patents should be treated quite separately and second, and somewhat more contentiously, that copyright does not provide a monopoly for authors.

Before getting started, let me mention that 'facts' are not always what they seem. I speak from experience as someone who has refuted the claims made to economists about the purportedly slow speed of the QWERTY keyboard. Although Steve Margolis and I demonstrated twenty years ago that the keyboard example, as presented to economists by Paul David, is wrong in almost every respect, and even though David has not presented any form of rebuttal, the QWERTY keyboard continues to be used by academics as an example of a case where the wrong product prevailed in the market. Therefore, just because an example is put forward in the literature we need to be careful in accepting the evidence at face value.

I mention this because the other speakers have mentioned several examples where patents are purported to have slowed down progress. The most famous case is the Watt steam engine where the claim is commonly made that the patent kept progress at bay until the patent expired. There is now evidence, fairly compelling in my opinion, that the Watt patent did no such thing.

It is also important to remember that the owner of a patent has a financial incentive to work with someone who can improve the technology since an improvement will increase the value of the patent, thus providing extra money for the patent owner as well as a payment to the creator of the improvement. The rule would be to expect such agreements when there is an improvement, since it is in the self-interest of both parties to reach such an agreement. If there were any instances where a patent owner prevented follow-on improvements, we would expect these to be unusual cases due to individuals not following their own economic interests or having strong differences in opinion about the value of the follow-on item.

A Little Background

Property rights are essential for a functioning economy as they prevent free-riding by those not involved in producing a product. In other words, others can't legally take the fruits of, say, farmers' efforts when farmers have property rights

over the crops that they have grown. Without property rights, anyone could go to a farmer's field when the crops are close to maturity and take some portion, or even all, of the crop themselves. Under such circumstances, farmers would have little or no reason to grow crops since they would perform all the work but not get much if any of the rewards.

Property rights, in other words, incentivise individuals and corporations in the economy to be productive (i.e., they lead to efficiency). Note that whereas property rights give farmers the freedom to benefit from their efforts, they also take away the "freedom" of other individuals to go into fields and steal crops.

Property rights can be justified either on the ground that they promote freedom of producers to keep the benefit of their efforts, or they can be justified on grounds of economic efficiency. Although economists often argue on the grounds of economic efficiency, and I have usually done so in the past, I should note that if forced to choose between a system that allows individuals the freedom to reap the rewards of their efforts and a system that ultimately leads to greater GDP but violates the freedom of producers and consumers, I would tend to agree with Milton Friedman and pick free markets even if they are not the most efficient form of production. Normally, we do not need to make this particularly difficult choice because free markets typically lead to economic efficiency. However, in the case of copyright I will argue that giving authors the freedom to generate rewards

from their efforts is more important than whether this leads to economic efficiency.

An Example of Weakened Property Rights: Piracy

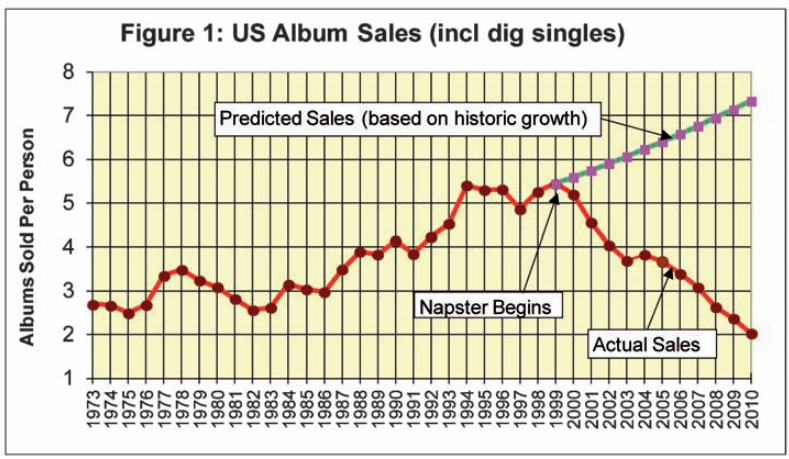
Traditional piracy was bad for commerce when it meant that the merchandise on ships was not secure. If piracy had been bad enough, commerce along threatened shipping lanes would have come to an end.

Copyright piracy has had the same type of effect on the music industry as traditional piracy did on trade. See Table 1 for a graphic representation of the losses in the ten largest sound recording markets.

Table 1: Trade Revenue Change, 1999-2009 (inc ringtn)			
	1999 Revenues (inflation adjusted 2009 Local Currency)	Nominal 2009 Revenues	% Change
USA	10,826.22	4,562.30	**-57.86%**
Japan	499,209.03	370,979.74	**-25.69%**
UK	1,464.48	928.80	**-36.58%**
Germany	2,036.83	1,046.40	**-48.63%**
France	1,379.22	622.76	**-54.85%**
Canada	1,165.96	430.21	**-63.10%**
Australia	908.72	470.23	**-48.25%**
Italy	604.22	162.05	**-73.18%**
Spain	599.83	151.06	**-74.82%**
Netherlands	345.42	156.11	**-54.81%**
Switzerland	376.45	186.07	**-50.57%**

Napster, the first viral piracy site, was born in 1999 and achieved a large market share in 2000. In the decade following Napster's birth, revenues in each of the ten leading markets have fallen by very large margins. Declines of this size are remarkable, particularly when the popularity of the product being sold in these markets does not appear to have been diminished, as witnessed by the remarkable financial success of iPods that was responsible for bringing Apple back from obscurity.

Further evidence of the piracy-induced decline, in historical terms, is show in Figure 1, which presents per capita unit sales of albums in the U.S. from 1973 to 2010. Per capita sales increased substantially from 1973 to 1999. As the chart makes clear, the birth of Napster coincides exactly with the beginning of the decline in record sales in the U.S.



By itself, the confluence of Napster's rise and the decline in sound recordings would appear to offer a prima facie case that piracy has led to the declines found in Table 1. Add to this the finding (Liebowitz, 2006) that no other alternative explanation for the decline has been found to be consistent with evidence used to test these hypotheses, and you get a strong case.

Finally, economists have conducted various studies to examine the impact of file-sharing on record sales, involving different countries and different time periods. Although the impact of file-sharing is often presented as a contentious and still-unanswered question, the evidence is quite compelling and quite strong.

Table 2 presents the results from academic studies of file-sharing. The second column indicates that most of the studies find that piracy is responsible for the entire decline in record sales and the rest find that a large percentage of the decline was caused by file-sharing. While there are two studies, not in the table, that conclude that file-sharing has no impact on sales they represent a small minority of the studies and are each open to very strong criticisms about their econometric methodology. One of the two studies, published in a leading journal, is also likely to be an instance of academic malfeasance on the part of the authors.

Table 2: Share of decline due to file-sharing			
Published/Unpublished Studies	Share of Decline due to File-sharing	Time Frame	Geography
Hong (2007)	>100%	2002	U.S.
Hong (forthcoming)	20%-40%	2002	U.S.
Liebowitz (2006)	100%	2005	U.S.
Liebowitz (2008)	>100%	1998-2003	U.S.
Michel (2006)	45%	2003	U.S.
Peitz and Waelbroeck (2004)	>100%	1998-2002	World
Rob and Waldfogel (2006)	35% or >100%	2003/4	U.S.
Waldfogel (2010)	65%	2008/9	U.S.
Zentner (2006)	>100%	2001	7 European
Zentner (2005)	100%	2002	World
Blackburn (2004)	>100%	2003	U.S.
Zentner (2009)	75%	1997-2008	World

Should we be concerned about this weakening of copyright?

I believe that we should. Critics say that copyright provides a monopoly and that any weakening of the monopoly is good since monopolies themselves are bad. But this claim mischaracterizes the nature of copyright.

Copyright is a very narrow property right. It merely protects a particular 'expression' in the form of writing, music, or other creative endeavors. Copyright does not prevent other creators from creating independent new works, even if they turn out to be identical. Copyright therefore, does not provide a monopoly on creation, but instead merely provides

a monopoly on the reproduction of these expressions. In other words, copyright prevents free-riding, the copying of these works by individuals or organizations who have nothing to do with the production of these works and who therefore have no claim to these works.

This in itself does not restrict competition. Anyone else can try to create a work to compete with any other work. Because there is free entry into the competitive activity of creating works, there is no restriction on the ability of competitors to cut into the sales of any market leading creative work. Anyone can try to create a work to compete with Harry Potter. This is actual competition at work.

Making copies of someone else's work is not competition; it is instead an instance of free-riding. We should not consider the ability to free-ride as a "freedom" to be enjoyed, any more than the freedom to steal.

That the monopoly granted by copyright is not an economic monopoly is perhaps best understood with reference to another monopoly which is also not an economic monopoly, and that is the monopoly that each of us has on ourselves.

We all have a literal "monopoly" on ourselves. Each one of us is the only one who has our particular talents and history. The laws prevent people from being able to legally claim that they are someone else. Your monopoly on yourself, however, generally provides no economic value.

Not only do we have monopolies on our own selves, but property rights provide monopolies on all items we own. Each occupied house is slightly different than any other house as is each used automobile and all other physical goods. Although you have a monopoly on your particular car, this doesn't prevent others from having very good substitutes. Here we have a literal monopoly with no real economic consequences.

These monopolies are not economic monopolies, in general, because there are usually considerable close substitutes. Under some circumstances, however, these monopolies may have economic value.

For example, some people have unusual, hard to imitate talents. These hard to imitate talents give them monopoly power in the market. Great athletes, doctors, architects, even professors, earn unusually high income and economic "rents" from these talents which are, by definition, unusual, and therefore not easily copied or eliminated by competition. Free societies tend to celebrate these talents and not restrict the earnings that these individuals generate. Most people do not have such talents.

Copyright is merely the means by which writers, musicians and other creators with unusual talent earn their high incomes. But, again, those high incomes are due to monopoly *talent*, not the literal monopoly brought about by copyright. Just as most people do not enjoy these unusual talents,

most copyrighted works have no monopoly power.

Treating creators differently than everyone else

Because society does not frown on monopoly "rents" earned by athletes, singers, dancers, comedians, doctors, or anyone else, the question must be raised about why we would want to restrict the earnings of copyright owners, which is what weakening copyright does.

The answer normally given would be that we restrict the earnings of copyright owners because we believe that there are gains elsewhere in the economy and that it is economically efficient to limit the earnings of copyright owners. But there are instances of potential efficiency gains elsewhere in the economy and we do not necessarily try to maximize efficiency in these other instances, particularly when it results in the limitation of someone's income.

For example, if great pianists or athletes were to have their payments or salaries reduced, it would lower the costs for the team or the orchestra and this could lead to lower ticket prices, greater consumption and increased "efficiency" if the earnings that were removed were "economic rents" meaning that they do not influence the behavior of the individual receiving them. Economic efficiency might also be achieved if a talented golfer decided to miss a few tournaments in order to relax but was instead forced by the government to play them.

If the gain to viewers was greater than the harm to the golfer, this would be considered an "economically efficient" policy although it certainly is not one consistent with economic freedom. Finally, if my neighbor values my car more than I do, it would be economically efficient to let him take my car without any compensation to me (although in hypothetical circumstances, he would be willing to purchase the car from me).

All these examples of increased efficiency represents types of activity normally disapproved of by society, even though they might increase efficiency. Thus it is quite clear that society does not always approve, or even seriously advocate, certain efficiency increasing activities.

So again, I ask the question: why are we willing to restrict the earnings of creators when we do not restrict the earnings of members of any other group?

I believe that the reason that creators are treated differently is because copyright-based markets are newer. Land and other real property have a long history. It has been well established that property rights over these items are long-lasting and that a properly functioning economy could not exist without property rights (preventing free-riding). We expect the government to provide those rights; we do not consider it a favor of the government to allow landowners to own their land. Such property rights have become part and parcel of freedom loving societies.

Making multiple copies of books or songs wasn't possible until after the printing press and other technologies came into existence. Because of these technologies, a "new" property right was required to provide some protection for the creator. But unlike 'real property', this right was treated as a gift from the government, not a requirement for a functioning economy. This effectively "second class status" of intellectual property relative to other forms of property is neither fully comprehended nor appreciated. This is a topic begging for additional discussion.

How do patents differ from copyright?

Patent protection is much broader than copyright. Unlike copyright, where two people working on the same general idea can each receive protection but only for identical copies, patents allow the patent owner to block usage of similar inventions even when these inventions are created independently of the patented invention. In other words, copyright prevents almost no activity except for free riding but patents prevent inventive activities that are not free riding.

Patents prevent instances of real competition. This is the most important difference between patents and copyright and weakens the case for patent law. Proposals to reform patent enforcement on order to allow a new invention which can be shown to have been created independently (admittedly a difficult task to show) are worth serious examination.

Patents also protect innovations that are not merely related to the inventors' personality in the way that copyrighted works are. In other words, no one else would have written Shakespeare's plays in lieu of Shakespeare nor would anyone else but the author have written any randomly chosen book title. Creative works protected by copyright are the result of particular individual efforts and which could not be duplicated by anyone else. Innovations, on the other hand, have less to do with personal characteristics. If Edison had not invented his recording machine, someone else would have (in fact, it was Berliner's innovation that prevailed, not Edison's). Patents, therefore, are more than just a reward for unusual talent.

Other problems with patent law concern the "broadness" of the protection and "non-obviousness" of the patented invention. It is difficult to know how broad a grant to provide to patents. In principle, we would want to prevent free riding and nothing more. In reality, in trying to prevent free riding we need to make the patent broad enough to prevent fairly obvious similar methods of achieving the same result. It is difficult to know where to draw the line and this leads to potential problems.

"Non-obviousness" is also a difficult to measure. It would be economically nonsensical to provide patents on ideas that do not require unusual creativity, since this would be providing a monopoly reward where little or no effort was expended. It would also provide a reward to someone with no

unique talent to justify such a reward. Some of the patents awarded in recent years, especially certain business process patents, seem to cross this line of non-obviousness. Regardless, knowing where to draw the line is a problem.
The case for patents is therefore weaker than is the case for copyright. Nevertheless, the case against patents is often overstated. The alternative to patents is secrecy. If the government does not provide protection, innovators will sometimes try to keep their innovations to themselves. This is costly and wasteful in several ways.

The resources used by an inventor to keep details secret are wasteful to society. Keeping information secret on how the innovation was accomplished has the potential to reduce follow on innovations. Failure to provide information about the workings of an innovation can lead to other costs. A good example is the recent revelation that the Chinese Bullet Train accident may have had something to do with the Chinese being unable to properly understand the workings of a Siemens' component used in the railroad control system because Siemens did not make the detailed workings of the product available to the Chinese even though Siemens did make such detailed information available to other customers with a better track record of abiding by intellectual property laws.

Nevertheless, society still would want to restrict destructive free-riding on the back of innovations by others and still want to allow innovators to profit from their inventions. Thus,

in spite of the problems associated with patents, there is still a case to be made in favor of them.

Conclusions

Copyrights and patents are different in fundamental ways. Most importantly, copyright does little more than prevent free riding and thus provides no monopoly, whereas patents do prevent legitimate competition and do provide a real monopoly. The fact that copyright is merely a mechanism allowing superior talent (the talent being the true basis of any 'monopoly') to generate the rewards normally associated with superior talent, has not been properly understood.

Once it is understood that copyright does not provide a monopoly it is unclear why copyright should be restricted. Society does not limit the income or rewards for such talent elsewhere in the economy, even when doing so would increase economic efficiency. It is generally understood that freedom should allow individuals to earn returns commensurate with their abilities and efforts. Thus the case for copyright, and for a stronger copyright law than currently exists, is compelling. The same cannot be said for patents.

Product Piracy and Counterfeiting - Empirical Evidence from Germany

Knut Blind

Introduction

Precious coins in ancient Rome, Chinese porcelain in medieval times, mp3 files with the latest U2 album or high tech car parts in the 21h century: copying competitors' goods and selling them on one's own account is by no means an exclusively modern phenomenon. However, public attention (and subsequently attention among policy makers) has risen tremendously in recent years. Globalisation, especially the world-wide distribution of goods in international markets and highly dispersed value creation chains, is primarily to be held responsible for the growing appearance of counterfeiting and product piracy. Part of the phenomenon is also connected with the rise of emerging economies like India and China, which are often blamed as the primary producers of goods infringing the intellectual property rights (IPR) of other (Western) companies. The OECD already estimated

in 1998 a volume of up to 350 billion US$ of counterfeited goods. In terms of the number of firms being affected by counterfeiting, data for German companies suggests that around two thirds of German manufacturing companies have had experience with illicit activities connected to their intellectual property (VDMA 2007).

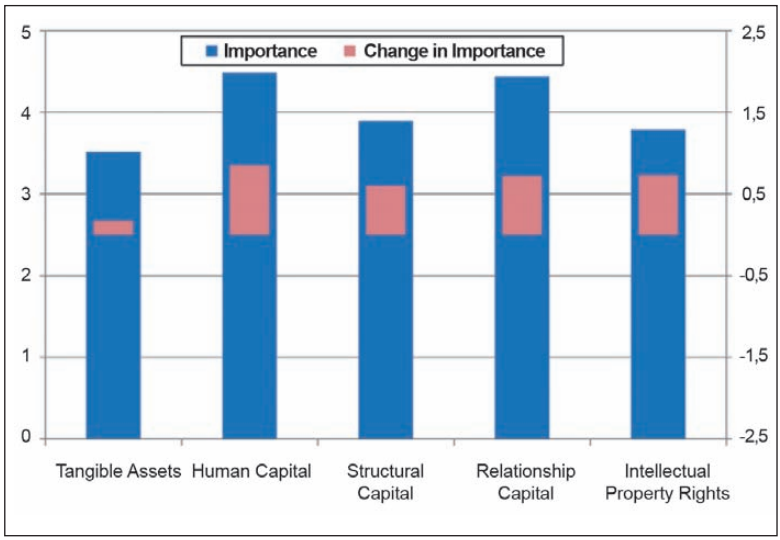
All empirical studies in this field of research have one severe problem in common: the very nature of counterfeiting activities makes it hard to access reliable data. To overcome this problem, the OECD (1998) chose the approach of analyzing seizure rates at customs, thus catching only international flows of pirated goods. The problem with this approach lies in the fact that certain substantial assumptions have to be made e.g. concerning the percentage of pirated goods being detected. An alternative methodological possibility is the use of survey data collected among companies. Comparing the two approaches stresses once more the measurement problems in this area. While customs seizure data suggests that most cases are connected with trademark infringement – which can be identified more easily by the authorities – company responses in surveys also show the relevance of illegal imitation of patents or technological components in general, which are at best difficult to spot by customs officers. Finally, we still have a problem of definition (see Berger, Blind and Cuntz 2012). Strictly speaking, the term intellectual property infringement (product piracy, counterfeiting of trademarks) only applies if valid property rights exist in a relevant country. Survey results reveal that in about 40% of

counterfeiting cases the relevant product was not protected by valid formal intellectual property rights (Blind et al. 2009). This article primarily summarizes the results - with a focus on product piracy - of the study "The Economic Relevance of Intellectual Property and its Protection - a study focusing on the German 'Mittelstand'" commissioned by the German Federal Ministry of Economics and Technology and carried out by Fraunhofer Institute for System and Innovation Research with support from the Department for Innovation Economics at Technische Universität Berlin as well as the Austrian Institute for SME Research (Blind et al. 2009) complemented by additional data.

Empirical Results

A direct assessment of the importance of tangible assets compared to intangible property (human capital, structural capital, relationship capital, intellectual property) delivers an unambiguous picture: all intangible assets were rated more important for the success of the company. This does not imply that companies do not need production centres or factory and office equipment, but rather that tangibles are apparently falling behind in relative importance. This is evident from developments over the last five years which demonstrate substantially higher growth in the importance of intangible goods as compared to tangible assets (Figure 1).

Figure 1: Importance of tangible and intangible values and the respective change (Source: Blind et al. 2009)



Assessment of the importance on a scale from 1 ("low) to 5 ("high") / Change in Importance from -2 (strongly decreased) to +2 (strongly increased)

Quantifying these findings into monetary values proves difficult because of the valuation problem of intangible assets. An indicator for the quantitatively relevant dimension of intangible goods was developed using a cost-based approach to intangible goods. Applying broad measures, total expenditures for intangible goods in Germany add up to about Euro 154 billion in 2004. This amounts to around 7% of German GDP.

As already highlighted, monetary losses caused by intellectual property infringements are hard to objectify (OECD 1998). One reason lies in the fact that not all incidences of infringements and violations are detected by injured parties. Secondly, even if the activities of product pirates have been identified, the real damage both for the concerned company and the economy as a whole cannot be easily assessed. For the affected companies the damage generated by product pirates is not only the reduction of turnover from own original products, but also possible harm to companies' images and finally possible enforcement and other legal costs as a consequence or reaction to conflicts with pirate product. In the long run, the incentive to develop and introduce product innovations into the market might be reduced due to the restricted option to appropriate returns on these mostly large and long term innovative activities. From the perspective of the whole economy or even society, the assessment of the impact of product piracy becomes even more complicated, because counter effects have to be considered.

First, certain consumers may gain, if they are able to afford illegally copied products, but not the more expensive products. Besides allocation efficiency due to the expansion of consumption, the redistribution from producer to consumer rents could be secondary objective for policy makers. Finally, the activities of product pirates are obviously developing additional competitive pressure on established companies, i.e. the incumbents, which may well be welfare enhancing in the long run.

In short, an assessment of costs and even more, possible benefits is a challenge for empirical research. Consequently, we have applied a complementary approach to identify the quantitative (monetary) as well as qualitative damage caused by product piracy. In the following, we do not consider the possible benefits of product pirates' activities.

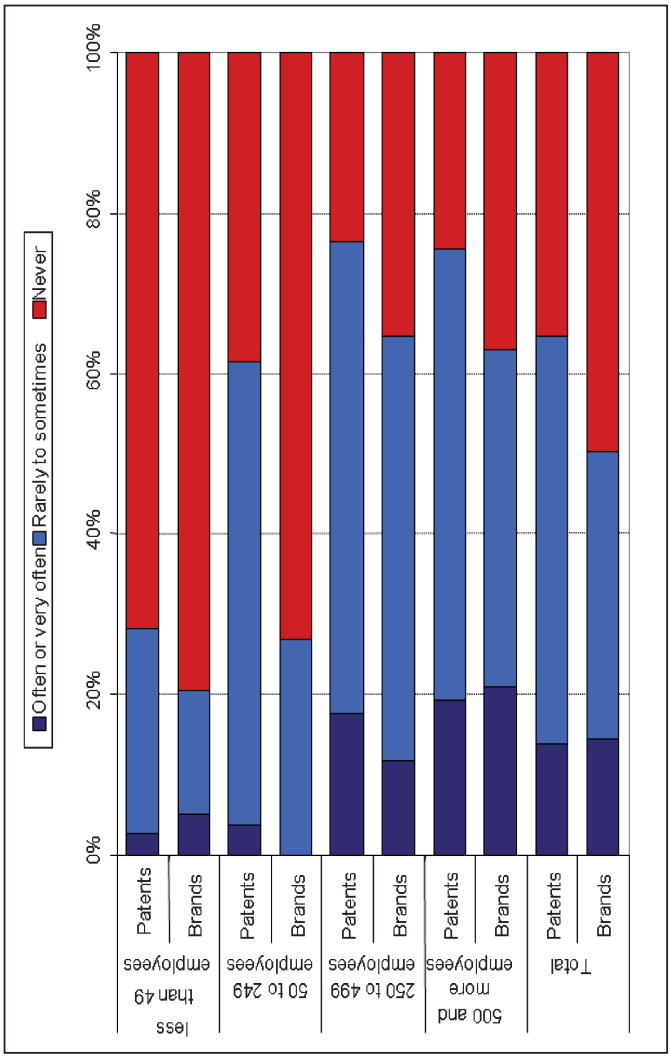
In order to give a rough overview of the magnitude of the damage, we surveyed the literature of already existing studies. According to the focus and the methodology of the studies, damages between several millions up to more than 200 billon US dollars could be identified. In addition to the attempts to quantify the damages, the likelihood of becoming victim to product pirates is another key indicator aimed to be identified. In the German manufacturing industry, two thirds of companies report that they have become victims of product pirates.

Table 1: Overview of estimations on the magnitude and caused damages of product piracy and counterfeiting (Blind et al. 2009)

Study	Year	Estimations
OECD	1998	Damages of around USD 350 bn, 5-7% of world trade volume
OECD	2007	Damages (without digital piracy) around USD 200 bn
Business Software Alliance	2007	Global damages for enterprise caused by software piracy around € 28 bn
Center for Economic and Business Research	2002	Reduction of EU GDP of € 8 bn; estimated loss of 17.000 jobs (study only addresses four industries like Consumer Goods or the pharmaceutical industry)
VDMA	2007	67% of all interviewed members of the VDMA are affected by counterfeiting; 18% had losses in turnover bigger than 10% (226 responses), estimated loss of € 7 bn in mechanical engineering
DIHK/APM	2007	40% of enterprises active in China were affected by product piracy; loss of around € 29 bn (70.000 jobs) for the German economy is estimated

Concerning the question of damages caused by IPR infringement on the company and economy-wide level, our study showed that more than two thirds of the surveyed companies indicated that they were affected by illegal imitation of protected know-how. This share is around 64% for patent infringement and about 50% for unauthorized trademark use. This figure rises with company size, caused by increased activity in foreign markets and a correspondingly higher exposure to potential imitators in countries with weak IP regimes. Regarding the reported damage from product piracy, 12.1% indicated sales losses of more than 10%; the majority of companies reported losses of less than 5%.

Figure 1: Frequency of Patent or Trademark Infringement (by firm size) (Blind et al. 2009)



Given the methodological focus of our study on patent-active enterprises and deliberate oversampling of large enterprises and high tech industry, we collected in parallel representative data of infringement of intellectual property rights in the context of the German version of the Community Innovation Survey or Mannheimer Innovationspanel 2008. The precise question posed to companies had the following wording: "Has intellectual property of your company been violated by other companies during 2005 to 2007?". Table 2 reports the results, which reveal that most cases of intellectual property infringement can be observed in high tech industries, e.g. chemical, mechanical, electro-technical and automotive industries. In addition, large enterprises are up to three times more affected than small and medium sized companies. The reasons are the international scope of activities, the attractiveness of prominent brands and possible economies of scale for counterfeiters. Berger, Blind and Cuntz (2012) identify in an in depth regression analysis that conducting research and development abroad especially increases the likelihood of becoming victim of product piracy, whereas general higher research and development activities help to reduce this risk.

Table 2: Percentage of firms affected by IP infringement (only innovating firms) Source: MIP 2008 survey ZEW and FhG ISI

	< 500	>= 500	Total
Mining	0,0%	0,0%	0,0%
Nutrition	8,5%	25,8%	9,5%
Textile	11,4%	50,0%	12,1%
Timber/paper	8,8%	23,2%	9,1%
Chemical	24,7%	34,2%	25,5%
Plastics	21,3%	33,0%	21,8%
Glass	15,1%	52,5%	17,1%
Metal Processing	10,5%	33,2%	11,3%
Mechanical Engin.	17,4%	56,4%	19,0%
Electrical Engin.	18,6%	44,1%	20,1%
Medical Technology	15,8%	47,6%	16,7%
Automotive	18,4%	47,5%	23,1%
Furniture	13,2%	3,4%	13,0%

Besides the general likelihood of becoming a victim of product pirates, there are significant differences between illegal copying activities targeting technical inventions, products and business models, product names and design, which are displayed in Table 3. In general, large enterprises in most industries are more affected by copying of technology than brand imitations, whereas small and medium sized companies have to deal with both issues to a lesser extent, but are equally affected by patent and trademark infringement. Furthermore, in addition to the already mentioned high-tech industries, trademark counterfeiting, but also patent infringements are very relevant in the textile and glass industries.

Table 3: Percentage of firms affected by different IP infringements (only innovating firms) Source: MIP 2008 survey ZEW and FhG ISI

	Innovators (<500 employees)				Innovators (>=500 employees)			
	Technical Inventions	Products/ Business Models	Product Names	Design	Technical Inventions	Products/ Business Models	Product Names	Design
Mining	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Nutrition	1,7%	6,8%	5,2%	5,3%	0,0%	14,6%	11,3%	20,5%
Textile	12,8%	4,0%	1,3%	6,7%	25,0%	4,2%	45,8%	20,8%
Timber/Paper	1,6%	8,0%	2,3%	3,1%	23,2%	0,0%	9,8%	9,8%
Chemical	8,2%	6,8%	17,5%	5,4%	32,9%	11,8%	15,1%	3,9%
Plastics	6,4%	11,7%	17,1%	8,7%	19,1%	14,9%	8,5%	13,8%
Glass	11,5%	10,9%	2,7%	9,3%	35,6%	16,9%	22,0%	0,0%
Metal	6,7%	7,3%	5,1%	4,3%	25,4%	13,0%	16,1%	16,1%
Mechanical Engin.	11,9%	4,7%	8,1%	4,9%	56,4%	25,8%	30,2%	26,2%
Electrical Engineering	10,3%	6,3%	7,8%	9,1%	37,4%	6,1%	25,7%	28,5%
Medical Technology	10,5%	4,6%	9,3%	4,7%	52,4%	27,0%	19,0%	25,4%
Automotive	10,3%	3,1%	8,5%	10,2%	47,5%	14,8%	18,5%	19,1%
Furniture	5,0%	5,3%	7,6%	9,8%	3,4%	3,4%	3,4%	3,4%

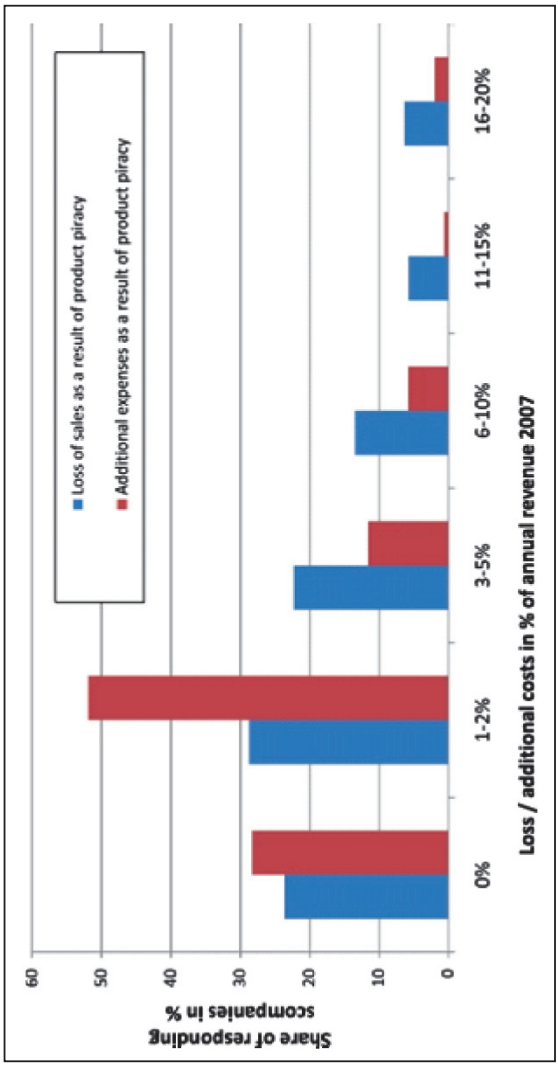
In general, it is supposed that the culture related to and the tradition of rigorously penalizing/detecting the violation of intellectual property rights within Germany should lead to rather small numbers of patent infringements and trademark counterfeiting at home. In contrast, anecdotal evidence and some sound empirical studies give reason to expect much more illegal copying activities by competitors located abroad. Table 4 displays the percentage of firms either affected by illegal imitation of technical inventions or product names differentiated by whether the headquarter of the imitator is located at home or abroad. Whereas the geographical location of brand names imitation tends to be outside Germany, i.e. (two and more times?) product names are illegally copied by companies from abroad, the situation related to technical inventions is quite different. In some high tech industries such as the chemical and automotive industries, patent infringers are in general domestic competitors, whereas in mechanical and medical engineering technologies, domestic patents are more likely to be infringed by foreign competitors. These differences can certainly not be explained by a different level of enforcement of intellectual property rights or differences in the intellectual property regimes, but are more the consequence of rather fierce competition between domestic companies in some high tech markets. The more fierce the competition, the higher the likelihood that domestic companies accuse their competitors of intended or unanticipated illegal behaviour related to intellectual property rights.

Table 4: Percentage of firms affected by different IP infringements differentiated by location (only innovating firms) Source: MIP 2008 survey ZEW and FhG ISI

Innovators with at least 500 employees				
	Technical Inventions		Product Names	
Location of Imitation	Domestic	Abroad	Domestic	Abroad
Mining	0,0%	0,0%	0,00%	0,00%
Nutrition	0,0%	0,0%	5,96%	0,00%
Textile	4,2%	4,2%	4,17%	16,67%
Timber/Paper	4,5%	7,1%	0,89%	7,14%
Chemical	13,8%	3,9%	1,97%	1,97%
Plastics	11,7%	0,0%	3,19%	4,26%
Glass	22,0%	11,9%	3,39%	11,86%
Metal Processing	14,0%	4,1%	3,63%	0,52%
Mechanical Engineering	20,4%	25,1%	6,55%	12,73%
Electrical Engineering	14,5%	11,2%	6,15%	11,73%
Medical Technology	11,1%	27,0%	3,17%	9,52%
Automotive	19,8%	17,9%	1,85%	9,26%
Furniture	0,0%	0,0%	0,00%	0,00%

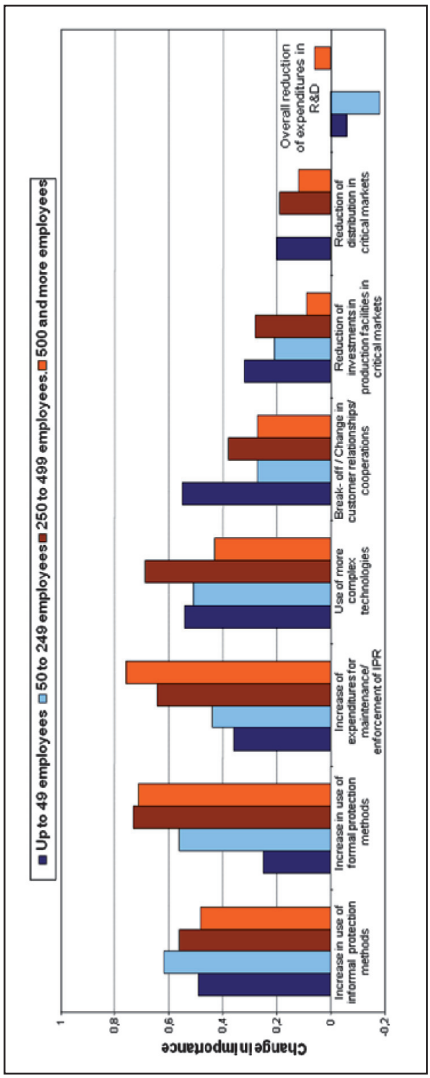
While stating the incidence of being a victim of product pirates is already difficult, but possible in the case of detected incidences, quantifying the related losses in revenue and possible additional expenses is rather a big challenge for companies. Nevertheless, the structure of the answers and the overall quantification of damages collected in our survey is quite similar to the results reported by the German manufacturing association VDMA. Firstly, losses in turnover resulting from product piracy among surveyed enterprises are in most cases 5% or less of annual turnover. Furthermore, less than 20% of enterprises report losses of more than 10%. In addition, monetary expenditures, e.g. for legal enforcement costs, range for the majority of companies between one and two percent of their turnover. Higher costs are rarely reported by companies. Overall, the financial impacts amount to about six percent of companies' annual turnover. Although these figures are only rough assessments,, they correspond very well to the range of findings by the OECD analyzing the share of illegally copied products of the world trade volumes.

Figure 2: Loss in revenue and additional expenses as a result of product piracy (Blind et al. 2009)



Since the phenomenon of product piracy has not only been relevant for the last few years, companies have started to defend themselves against product pirates. Complementary to formal intellectual property rights, companies of all sizes increased their efforts in using informal protection methods, including using secrecy or trying to achieve a technological advantage in relation to their competitors and the product pirates. In contrast to smaller companies, larger companies are comparatively increasing their activities in applying intellectual property rights and putting more effort into their effective enforcement. Finally, reconsidering co-operations, re-allocation of product sites and reducing sales activities in specific markets are further reactions after becoming victim of product pirates. However, the expected reduction of research, development and innovation activities cannot be observed among the surveyed companies.

Figure 3: Enterprises' reactions to product piracy (Blind et al. 2009)



Summary and Implications

The results of the presented study underline the increasing importance of intellectual property. This can be illustrated in numerous ways and becomes apparent independent of particular approaches for measuring or differences in the exact definition. Against this background and as a consequence, enterprises report a high incidence of intellectual property infringement with large differences between industries and size classes. Furthermore, industries are affected very unequally by different types of imitations (technical inventions, brand names) and by domestic or foreign infringers. Consequently, we find a rather heterogeneous distribution of damages among companies. Finally, companies react differently to the phenomenon of product piracy depending on intensity of damage and on company size.

The complex issue of product piracy is not only a challenge for companies' strategies and management, but also poses multidimensional challenges for intellectual property trade and small and medium sized enterprise focused policies. Among the survey companies there was a broad agreement that the concept of an integrated intellectual property management is not sufficiently addressed in many public support programmes and that still an overly strong focus on patents dominates. However, a "holistic" approach would be important because it can be counter-productive for a company to file a patent, especially in markets or for companies with low expectations of successful patent enforcement. Alter-

natives such as informal ways to keep competitors from re-engineering an invention should be taken into account e.g. an accelerated time to market, an explicit trade secret policy or complex technological product features.

For the highly complex area of intellectual property, expertise and long-time experience covering technical, legal and business aspects is necessary. The demand for these kinds of expertise in the labour market clearly exceeds the supply side. Thus academic education, especially at technical universities, should focus more strongly on intellectual property management to close this gap.

Regarding infringement of IPR in foreign countries, one of the main demands of the surveyed companies was the continuation and a possible increase of political pressure on countries with a high level of piracy. In closing, the necessity of stronger evaluation of all support programs in the innovation protection area is advised. Only by routinely assessing the achievement of objectives can the efficiency of utilized instruments be increased. An evaluation must not be one-dimensional – like the number of patents filed – but has to deliver multiple conclusions about enhancements in the entire innovation and intellectual property management.

References

APM, 2008. Studie des DIHK und des APM zu Produkt- und Markenpiraterie in Deutschland, 832 Berlin.

Berger, F.; Blind, K.; Cuntz, A., 2012. Risk Factors and Mechanisms of Technology and Insignia Copy-ing - A First Empirical Approach, forthcoming in: Research Policy.

Blind, Knut; Cuntz, Alexander; Köhler, Florian, Radauer, Alfred: Die volkswirtschaftliche Bedeutung geistigen Eigentums und dessen Schutzes mit Fokus auf den Mittelstand, .: Forschungsbericht Nr. 579 Bundesministerium für Wirtschaft und Technologie, Berlin 2009 (http://www.patentserver.de/Dateien/Patentserver/PDF/volkswirtschaftliche-bedeutung-geistigen-eigentums-endbericht,property=pdf,bereich=patentserver,sprache=de,rwb=true.pdf)

BSA, 2008. 5th Annual BSA and IDC Global Piracy Study. Washington, DC.

Center of European Business Research, 2002: Counting Counterfeits: Defining a Method to Collect, Analyse and Compare Data on Counterfeiting and Piracy in the Single Market, London.

OECD, 1998. The Economic Impact of Counterfeiting. Organisation for Economic Cooperation and Development, 886 Paris.

OECD, 2007. The Economic Impact of Counterfeiting and Piracy. Organisation for Economic Co-operation and Development, 888 Paris.

VDMA, 2007. Produkt- und Markenpiraterie in der Investitionsgüterindustrie, Frankfurt am Main.

Economic Activity in Spite of Intellectual Property

Bernd Klein

Like most other people and probably most of you, my dear audience, I had a dream that patents were needed in our society to encourage inventions. I had a dream that copyrighting would provide inventors, scientists, thinkers, designers, and others with essential incentives to produce and release new creative materials. I had a dream that both patents and copyrighting would serve critical roles in advancing our culture and our economy. However, I have learned that dreams can turn into nightmares.

Let me tell you a short story: a true story. Imagine a software developer, engrossed in a thrilling project, one of the most interesting he has ever worked on before. It is an interesting task, but has some challenging problems. This task occupies his thoughts, day and night. First he explores many mathematical models, which have to be adapted and expanded to fit the task. Finally, he comes up with a perfect algorithm and uses a software programming language to implement it. But then, after months of hard work, and just a

few days before the scheduled presentation in the company, he suffers a serious setback when he discovers problems of numerical instability, apparently inherent in the underlying mathematics. It looks as if all his work has been in vain. So, he goes back to the drawing board, and, night after sleepless night, he wracks his brain desperately for a stroke of genius, when … Eureka! … the liberating idea comes to him in a flash, at about 4 o'clock in the morning, (that's when great ideas usually come to him). Some would call it an invention, something which should be patented, but for him it is just an idea and, above all, it is simply a case of applying pure mathematics, which can't and shouldn't be patented. The demonstration of his algorithm is a great success, and it proves to be better than all other known implementations. But now we come to the climax of our story. Imagine our developer, sitting back in his swivel chair in his office, still glowing from his success. His office door opens, and a grim-looking colleague bursts in, throws a batch of copied papers onto his desk, and asks "Did you know that YOUR algorithm has already been patented by our competitor?" Our software developer is chilled to the bone. No, he didn't know! In fact, he hadn't even known that software could be patented! Worse yet, the tone of his colleague's voice is unmistakably reproachful. He is being accused of stealing the algorithm and trying to palm it off as his own!

This all happened more than ten years ago and, yes, as you might have guessed, I was this developer and this was my first encounter with a patent issue and with patent law in

general. Had my algorithm really infringed upon patent law? I would like to postpone answering this burning question for now.

This reality bite forced me to wake up from my dream, and from then on I was introduced to the lurking dangers of so-called intellectual property. Since then, I've lost my innocence concerning copyright and patent laws. I am no longer a gullible common man, dreaming of becoming an inventor, and, as a result, becoming incredibly rich. Now I know that "intellectual property" does not enrich us --- it dispossesses us! Without my encounter, I'd most probably still feel naively secure in my bubble of illusions. As secure as a tourist ambling cheerfully down a path through a minefield, oblivious to the fact, that every step could be the last one. One false move can make you – an honest, law-abiding citizen – into an infringer or – as it is more popularly expressed – a thief.

Since this eye-opening encounter, I have had to approach my daily work with a completely different frame of mind. Now, my work is governed, no, actually I should say, throttled, by concerns of intellectual property. Before this encounter, I had lived with the false assumption that it would be up to me to infringe on the law or not. Now I know that all I have to do is write programs, create content for websites and that sooner or later, somebody will sue me for "stealing" his or her intellectual property. Today the challenges of protecting myself from unfair "intellectual property" claims thwart me from carrying out my work.

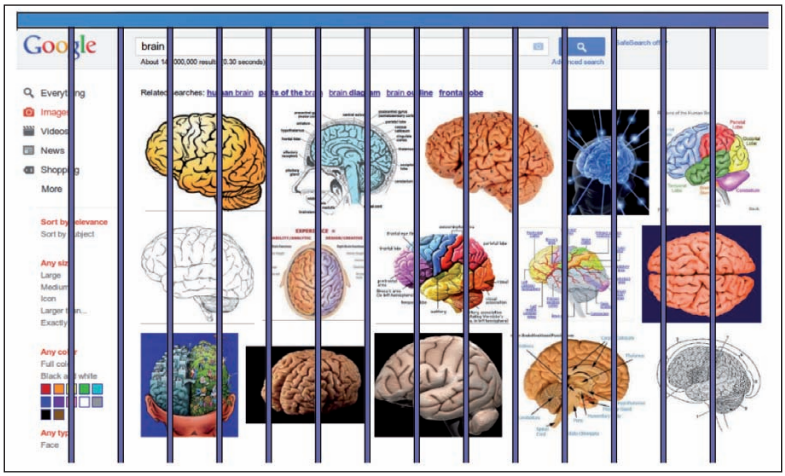


Figure 1: Brains behind bars, Google Images

Allow me to give you some specific examples. I'll start with one from my website on intellectual property[1]. When I was constructing the intro page, I needed an eye-catcher. I wanted to visually communicate the idea that the misuse of intellectual property rights bridles the exercise of free thinking, and, in the long run, keeps creative and productive thinkers "behind bars." So, I thought, what would be better than to incorporate the image of a brain to represent the concept of thoughts. Google has brains and images of brains but I didn't dare to use one of them for fear of a copyright infringement (Figure 1). I nearly gave up the idea, but then the entry page wouldn't have been so interesting. It wouldn't have an eye-

1 http://www.geistiges-eigentum.eu

turner. It could even have meant giving up the whole idea of this website, because I had just started, which is always a critical phase. So I had to rack my brain again. – You know what the original idea behind copyright was? To provide an incentive to create. But here I wasn't motivated. I was frightened –so much so that I even considered not creating.

Of course, I could have started asking for the copyright owners' permission to use the various brain images. But I knew all too well from the past: It takes a while to find the contact information on the websites, if you can find it! It takes even longer to contact the copyright owners by writing emails explaining what you want to do. Then, and this is really bad, you have to wait for quite a while to get an answer, if you get an answer at all. Some do reply, and then I often learn that they are not the owners of the copyrights, which means they used the images without permission. Others send me questionnaires to fill out, which is time-consuming work.
My solution was to avoid using "a whole brain." I decided to use only a part of it. To be on the safe side, I changed the image drastically, so that the owner wouldn't recognize that he was missing some of his brain. Then, I put my "stolen goods" behind bars:

According to German copyright law, permission from the copyright holder is not required if someone has drawn freely on a work to create a new and independent work. Section 24 (1) of the German copyright law says that – "An independent work, which has been created in free adaptation

of the work of another, may be published and processed without consent of the original author."[2] I can't be sure if this paragraph would be applicable to my surgical extraction of brain tissue and its incarceration. What is called "free adaptation"[3] in German law is similar but not equal to the U.S. law's concept of "fair use."

Another subsection of my website deals with the duration of copyrights and how some greedy copyright-holders try to extend the duration of copyright into infinity. For this I needed a picture that depicted infinity. I wanted to use M. C. Escher's lithograph entitled "Ascending and Descending" -- that's the famous endless staircase with people running up and down in a circle.

Figure 2

2 §24 (1) Freie Bearbeitung: Ein selbständiges Werk, das in freier Benutzung des Werkes eines anderen geschaffen worden ist, darf ohne Zustimmung des Urhebers des benutzten Werkes veröffentlicht und verwertet werden.

3 German: freie Bearbeitung

I tried to find out what would be involved in using an Escher image. It was easier to do than in other cases. I "just" had to fill in a Copyright Request Form, which was actually quite lengthy. Unfortunately, this form provided no information about what I might have to pay for using the picture. My website on copyright issues is a non-profit website that generates no income whatsoever. So, I decided not to increase the costs for the website by having to pay for any rights of use and to create "art" of my own. So, here is what I came up with: A horizontal eight as a sign for infinity with a copyright symbol and a "-1" inside (Figure 2). An allusion to a proposal from the Motion Picture Association of America, whose former president, Jack Valenti, demanded the extension of the copyright term to last forever less one day.[4] Naturally, creating custom-made art takes a lot of time -- time which might have been invested in a more useful manner.

Figure 3a

Figure 3b

4 Congressional Record – House, H9952, Oct. 7, 1998

Let's start the next example with a question. What do you see in this picture? No, you're wrong; these are not stairs leading to the top of an ancient Mayan temple. Nor is this a scene from an apocalyptic film, and it's not a volcano shortly before, during, or after an eruption. These are stairs leading up to a newly built bridge in my home town (Figure 3a [modified] and 3 [original]).

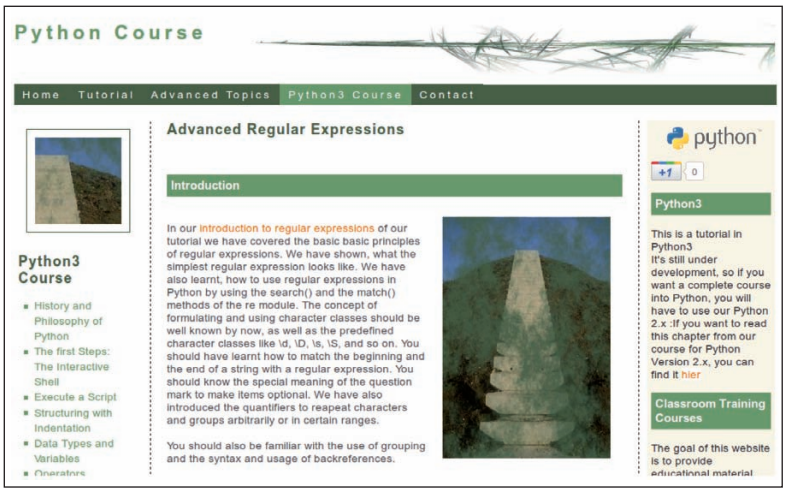


Figure 4:
Screenshot of the website where Figure 3a is used

I needed the picture for one of my favorite websites. It's a tutorial on the programming language Python.[5] And this is how I used the photo on the website. (Figure 4) If you think

5 http://www.python-course.eu

that the previous picture is still too similar to the original, what do you think about the next example?

Figure 5a

Figure 5b

Most of you will probably think this is probably a photo of a fossilized jellyfish (Figure 5a). But I can assure you, this jellyfish has never seen water. I molded the photo of a doorway and staircase (Figure 5b) which can be found in the ruins of an ancient castle. Would the copyright owners of the previous examples mind? The last one is – to my mind - an unquestionable case of free adaptation[6] as it is understood according to German law. What about the Mayan stairs? Can the original primitive photograph, taken with a mobile phone camera, even be regarded as art? Something which is worth being copyrighted? I can assure you that in these

6 freie Bearbeitung

cases I can feel safe. I took both pictures. But what would be the case if someone else had taken the photo? Would this individual have the right to sue me? Would I stand a chance of winning the case? Years ago this wouldn't have been an issue, but nowadays the courts are more likely to regard garbage as art, and, free adaptations, regardless of all the efforts, are seen as simple derivatives.

In each of the previous cases, I changed the original work in a substantial way. The original work was turned into something original, a new and independent work. This is the technique I apply when I use pictures on my websites. It's known as "appropriation art." As I pointed out, I don't have to be afraid of copyright litigations in the case of my previous examples. But in many cases, the underlying picture has not been one of my own works. I could have shown you interesting examples of those, too, but I didn't' dare to. I was afraid of making the original copyright owners aware of the fact that their works had been used.

I am sure that what I am doing is in accordance with the German copyright law (§24). However, there is a catch. I, and others like me, are always taking the risk that a judge might consider the "altered" result as a simple derivative work. Judges, who are neither artists nor artisans, have to decide if the transformations of a picture have been made by an artist and not by an artisan. The division line between free adaptations, as used in the appropriation art, and derivative works can be extremely difficult to determine. Even the as-

sumption that there is a borderline is wrong. Instead of a line, there is a broad continuum, where it is hard to classify a work in one or the other group. It is as difficult as deciding what is art and what is not art. Deciding between art and not art is an error-prone and extremely subjective process. For example, The Museum of Modern Art in New York definitely made a mistake when they sent a rejection letter to Andy Warhol. This was no exception. All of the first Impressionists, like Monet, Degas, and Renoir, were laughed at when their movement began. Today sales of their artwork command millions of dollars. Therefore, if connoisseurs of art are often seriously mistaken, what can we expect of judges?

Stephan Kinsella addresses this problem in his book "Against Intellectual Property" when he writes: "One function of property rights, after all, is to prevent conflict and to put third parties on notice as to the property's boundaries. The borders of property must necessarily be objective and intersubjectively ascertainable; they must be visible. Only if borders are visible can they be respected and property rights serve their function of permitting conflict-avoidance. Only if these borders are both visible and objectively just (justifiable in discourse) can they be expected to be adopted and followed."[7]

7 Kinsella, Stephan, N. (2001). Against Intellectual Property. In *Journal of Libertarian Studies, 15*(2), p. 37.

But I started my discussion of using pictures with the Escher image. I started to show what's involved in using pictures under copyright. Let's assume that we take the long and winding road – regardless of the costs and the work involved – and obtain the licenses to use about a hundred copyrighted pictures and add them to our website. Each license has its own particular constraints. For example, we might have to agree that we use a certain image only in a non-commercial environment or in a certain context. Let's now assume that our website adheres to all these constraints. What happens if we start changing our website, as we must do, usually on a regular basis, to improve, update, or just generally maintain websites. Well, then we have to check the constraints of each of our images again. As a consequence, this means that we have to check the license agreements of a hundred images, which might entail hundreds of pages of texts. If we don't, we are likely to breach our contracts with copyright owners.

We have seen in all the previous examples that copyright considerably increases the cost of creation and that trying to avoid or limit these expenses results in creations of poorer quality. In the worst case, a creation will even be prevented by the copyright barriers.

Let me give you another specific example from my work. As a lecturer I want to continually capture the attention of my audience. Of course, the most important factors are what I have to say and how I say it. However, to keep a lecture inter-

esting, you have to appeal to all the senses. In other words, a captivating course employs numerous illustrations and pictures. Yet, I am not allowed to use Mickey Mouse, Homer Simpson, or other famous cartoon characters, because they are protected by copyright. Of course, in principle it might be possible to get the right to employ such pictures, but this would be both too costly and too time-consuming.

Let me give you an idea of what the costs could amount to if we used a picture of Homer Simpson. Imagine the following scene in a documentary on backstage workers at an opera company. You hear the riveting music of a Richard Wagner opera, but all you see is a group of stage-hands, oblivious to the music, playing a round of checkers backstage. In the background there's a TV on, and you see an excerpt from an episode of the Simpsons, only 4 seconds long, without sound. Jon Else, the director, wanted to get the license to use this short scene in his documentary. Most probably, he expected to be allowed to use this brief clip for free. After obtaining consent from the Matt Groening's company, which produces the Simpsons, Jon Else had to contact Fox as well. They wanted $10,000 for the four second clip. At a later date, Fox wanted to charge even a greater fee, after they had learned that the documentary "Sing Faster" would appear as a video as well.8 In former times such a scene

8 Hennefeld, Margaret (2006). Fair Use in Independent Documentary Filmmaking. CUREJ - Undergraduate Research electronic Journal. University of Pennsylvania

would have been designated as a de minimis usage, meaning that the permission of the copyright owner is not even required!

Let's forget about the license fees we might have to pay to the copyright owners. Instead, let's focus on the bureaucracy involved in obtaining the license in relation to the time it takes to create the presentation without worrying about licenses. Let's assume that it takes us 15 to 30 minutes to create one presentation page. Acquiring the licenses or rights to use a picture will take at least three times as long: Browsing the web to search for the license owner and find their contact address, write emails, make phone calls, wait for answers, send reminders and so on. Even if we haven't paid anything for license fees, at least not yet, we have already spent three times as much time as we did on writing the original script. However, the additional pictures surely do not make the presentation four times more valuable. Although the benefit gained is difficult to estimate, it's likely to be more marginal than substantial. Don't forget, we still haven't paid anything for the license fees. Even if all the owners say that they will generously waiver any license fees – which is highly unlikely, – we are still forced to put in too much effort for the benefit of the presentation.

It's widely accepted that if we employ a copyrighted piece or object directly, that is, in a way that competes with the creator's business, that we should pay license fees. This applies, for example, to cases where we earn a profit that

is directly tied to using this piece of art, for example, by using a copyrighted photograph on prints, T-shirts, and so on. However, most of us would agree that we shouldn't have to pay if we use a picture indirectly, that means, if we use this copyrighted image in a way that is not intended to generate income or profit but, rather, for our own creative efforts and products. Or, to put it still in other words, if the copyrighted object is just employed to embellish our work and people would buy our work even in the absence of this image, then we should not have to be subject to obtaining licensing rights. First of all, we are not competing with the creator. This means, that the creator has no business disadvantage! Secondly, we are even marketing the creator's product. It's free advertisement for them. People who see the image of Homer Simpson might be more likely to later buy a DVD in a shop or watch the film in a cinema. This is a "you scratch my back and I'll scratch yours"-situation. In our case: the pictures brighten up lectures, and our presentations help to promote the original artist. So, the improvement in my teaching efforts is balanced with the promotion of the work. But, regrettably, we are not allowed to employ copyrighted images in this way; neither according to German, nor international copyright laws.

Even though all these pragmatic and economic points are sufficient reasons for allowing the usage of copyrighted images without constraints and without having to pay fees in the previously described situations, there is another even more compelling reason: freedom of speech. Mickey

Mouse, Homer Simpson and the like belong to our cultural heritage. We should be allowed to employ such images freely in the name of free speech!

However, that is wishful thinking in a world were the laws governing intellectual property are continually changed to increase the profits for a few right-holders. We are not allowed to use copyrighted pictures in the manner I described to you, and it is getting continually tougher to use them at all. A potential alternative seems to be employing images from the public domain or those with creative commons licenses. Yet, these cannot ever match the importance of copyrighted images, because, for example, we certainly won't find our famous cartoon characters or other copyrighted pictures there. And, to make matters worse, there really aren't many pictures of this kind available. Anyway, let's assume that we are lucky and find an image which is appropriate for our intended purpose and that it is clearly indicated that the picture belongs to the Public Domain. But what if this isn't true? What if it is a mistake and the picture is in fact copyrighted? If we use this picture, someday the real copyright owner will find our website with his or her image, and they can sue us, if they want. It doesn't matter that we acted in good faith but were misinformed. This is not an intellectual game. It happens quite often. Sometimes pictures are intentionally marked as being "free," but in fact they aren't! Sometimes even the real copyright owner is involved in "falsely" promoting images by offering them as being free to use!

People are encouraged to use the allegedly copyright-free images and then they're sued for infringing the copyright. It's a great business model for unsuccessful artists and the lawyers who handle their cases.

Copyright problems are lurking inside of the textual content of my websites as well. Most articles cite work published by others and quote other authors. But the question is: How much of someone else's work can I use without getting permission? The United States Copyright Office answers this question in their FAQ:

> "Under the fair use doctrine of the U.S. copyright statute, it is permissible to use limited portions of a work including quotes, for purposes such as commentary, criticism, news reporting, and scholarly reports. There are no legal rules permitting the use of a specific number of words, a certain number of musical notes, or percentage of a work. Whether a particular use qualifies as fair use depends on all the circumstances."[9] That's the crux of the matter: This is a law without transparent rules. There are no borders, not even invisible ones, and so it remains vague what is allowed and what isn't. So one judge might say that you are liable for copyright infringement because you took – let's say – a dozen words while another might think that using a few hundred

9 http://www.copyright.gov/help/faq/faq-fairuse.html#howmuch

> words from the same text is still "fair use." This is simply an unfair law! It's arbitrary! Imagine the same thing was true for your material property. Let's say you are having a barbecue in what may or may not be your garden. You may or may not be sued and condemned for trespassing, depending on the mood of your neighbors and the judges.

Joseph Heller, author of "Catch-22", would have taken great delight in interpreting §48 of the German copyright law. Newspapers, magazines, and other print media are allowed to print complete speeches on issues of the day, but websites are not allowed to do this. That's a typical catch-22 situation. Newspapers and magazines are allowed but don't have the space to do it, whereas websites have the necessary space but are not allowed to do it. So, you won't usually find printed speeches anywhere, although this would really be an improvement for any democracy.

In a similar vein, I would like to mention that newspapers in Germany are allowed to print complete news from other newspapers without permission, as long as these reports contain no opinions and are based solely on facts. Websites are not allowed to quote like this from newspapers, but newspapers are allowed to freely borrow from websites.

I was aware of this double standard when I considered using the text of a newspaper article from the Halifax Courier in the UK with the sensational title "Snakes alive! Python pie

is on menu at Halifax restaurant." I wanted to use it in my online course on the programming language Python to demonstrate how to work with a text in Python. I sent a letter to the editor, asking permission to use this article with a link and a copyright notice. Their response was: "Thank you for your enquiry about using an article from the Halifax Courier on your website. We do not allow others to reproduce our articles on their website but the Editor will agree to your putting a link on your website to the article on ours." I didn't understand this non-compromising rejection. They would have gotten a lot in return. Other website owners often offer me a lot of money if I agree to include a link to their site on my high-ranking website. Such a link would have increased Halifax Courier's Google ranking, which would have increased their traffic and, in the long run, the profits they could generate from their website. I was equally puzzled and annoyed. I thanked them for their "generosity," but reminded them that they were in no position to allow or not allow me to link to their website. So instead of an entertaining text about snakes for dinner, I ended up with a Latin poem by Catullus.

It's not clear how long the use of quotations and links will remain free of costs. There are many who want them to be subject to a user's fee. The discussion was kicked off by the print media criticizing Google's news service, which is based on short quotations followed by a link to the original article. Their constant complaints have already caught the attention of high-ranking politicians, who now want to change the law according to the demands of the print me-

dia. This would mean that entering any link and inserting any quotation into a website would be subject to a charge! This would be a devastating situation. Without website owners being able to post links and citations freely, the internet as we know it would be history! Such legislation would end the freedom enjoyed by all users to exploit the personal and commercial advantages of using internet as well.

Let's turn from copyright to patents. Perhaps you are wondering how the story I began to tell you about finally ended. Did my algorithm violate an existing patent? Well, at first I thought that my algorithm had already been patented. Not having the faintest idea of patent law at that time, I was convinced that it wouldn't affect me, because I had developed my algorithm completely independently. But then I learned that this didn't matter. I was unbelievably angry about this apparent injustice. Could it really be called fair when two people or two companies who are working independently at the same time, on the same problem, find the same solution but that the one who is lucky to get it patented first owns it and the other one is called a thief in New-speak? And, that the "losers" can be prevented from using their own work or will have to pay licenses to the patent owner? After I had examined the patent specifications more closely, I concluded that this patent did not pertain to my algorithm. The patent owners had made a mistake. They hadn't phrased the patent broadly enough. In simple terms, the patent phrased the procedure of applying well-known mathematical techniques A, B, and C according to the sequence: "First A, then B,

and finally C." Fortunately, my algorithm hadn't incorporated technique C, but another one, similar but not identical to technique C – I'll call it C'. Best of all, it was my colleague and not the competitor who had found out about the patent. So, we were not sued and we didn't have to rely on our luck in the legal lottery of patent law.

I would like to think that this "happy end" was the end of my story. But it's not! This patent should have never been granted, because it was essentially a software patent and, more important, there was nothing new in this so-called invention. The patented combination of mathematical procedures had been state-of-the-art for many years and had appeared in many mathematical publications. To put A, B, and C in a row is the natural way of solving the problem, but how A, B, or C should be implemented, this is the rub! Although the patent doesn't say anything about this, it took me a long time to determine this. I later learned that lots of software patents are based on situations very similar to the one I had been confronted with. It seems that many – yes, I think far too many -- patents are assigned to "inventions" that are really not "inventions" at all, at least not according to most definitions!

The patent number 5,412,807 for a text searching system with the title "System and method for text searching using an n-ary search tree" by Microsoft is another good example of this approach. Finding the novelty and the non-obvious in this invention is like finding a tree threatened by extinction in a jungle – or even like finding this tree in a desert. Even in

the specification of this patent you frequently find sentences containing passages like "...created in a well known fashion by forming a tree..." or "…there are numerous techniques well known to those of skill in the art ..."or "This may be accomplished using a number of different techniques well known to those of skill in the art."

Where is the novelty in this patent? I searched in vain for the words "novel" and "novelty" in the patent's text – of course without using their patented text searching system. I had better luck with the word "new." It appears 11 times, but only in contexts like "new present location," "new Array," or "New Date." What's reflected in the language is what I found in the techniques used: Nothing novel or new! Just simple techniques belonging to the basics of computer science studies. There is only one single novel feature in the whole patent, namely, the addition of numbers to the blocks to show nesting blocks[10]. It's so trivial that the patent should have never been granted. Yet there is something new in this patent. They coined a new expression. You all know what an "inventive mind" is, and you have a clear understanding of an "inventive spirit." But, have you ever heard of an "inventive system"? You can read in the summary of the invention by Microsoft: "In the preferred embodiment of the invention, the inventive system is implemented by a computer containing ..."[11]

10 Nichols, Kenneth. (1998). *Inventing Software, The Rise of "Computer-Related" Patents. Westport, CT: Quorum Books,* p. 58.

11 *United States Patent 5,412,807, "System and method for text searching using an n-ary search tree*

They even provide the "technical contribution", which is needed by European and German patent laws to grant a patent on software, which reads: "The inventive system and method is easily incorporated into a microcomputer." This kind of linguistic slip is typical for this and other patents. They are often poorly written, vague, ambiguous, and even misleading. I am specialized in text classification and data mining systems, and I am sure that if I had had to create a system like the one described in this patent, I would have come up with something similar without having read the patent. A program like that is always complex due to the thousands of mostly trivial details. The task of deciding if "my" program is infringing the patent is impossible for other software developers, and, above all, for lawyers and judges.

This patent is great for highlighting another widely used practice with software patents. What the patent's owner has claimed to have invented is actually something really trivial or something else which is not patentable at all. But this "invention" is hidden inside a large system. Reading the patent specification is like peeling an onion. You peel off layer after layer and then you find there is nothing in it. This approach to writing patents provides a sponger on the patent system with a dual benefit: First of all, a patent like this will be granted in the majority of cases, because the patent attorney either isn't equipped to understand the basis of the patent application or doesn't have the time to peel it down to its core. The other benefit bears fruit if the patent owner starts suing others: Judges, lawyers and even computer science

experts won't be capable of fully understanding the claims of the patent. So the patent sponger is likely to win.

Having heard all this, you might be asking yourself: Do we really need copyright and patent laws as an economic incentive to create? Do people only do useful work for our society when they are financially rewarded? No, not always! There is a whole movement of thousands of people who create art, literature, music, and – yes, software – without receiving payment and other rewards. These people have forfeited their potential individual claims to patent or copyright their contributions. What is more – they have repeatedly proven they can be more successful than companies. Apache is an open source web server software which is used to run 315 million websites![12] Open source software can be freely distributed and changed as long as it remains free and open to all. Two out of three web-servers run on the Apache software. Microsoft is ranked second but has only captured slightly more than 15% of the market share. Another example I would like to mention is that for years, Microsoft has been a monopolist in desktop PCs. One competitor after the other, like Staroffice and Netscape, has been crushed. No company has been able to even scratch the surface of Microsoft's monopoly. Yet, a David has dared to fight Goliath. To be precise: not just one David, but a host of Davids. These "Davids" work for free and put the fruit of

12 http://news.netcraft.com/archives/2011/09/06/september-2011-web-server-survey.html

their labor under open source licenses, like the Gnu Public License. Those people, working without the constraints of intellectual property, are now threatening Goliath with a safer and, in many areas, more cleverly designed operating system called Linux. Microsoft has tried its best to get rid of this unusual competitor. All the methods they have used to intimidate their competitors and to retain their market share have failed – except resorting to copyright and patent laws. Microsoft continues to threaten the users of Linux and other Open Source software with lawsuits. Apple and Microsoft want to stop the Open Source operating system Android, which is a challenge to their markets. Instead of competing with Android mobile phones and pads by producing superior products, Microsoft prefers mudslinging about intellectual property.

So, I'd like to come back to my opening words. I have been robbed of living out my first dream. Nevertheless, I now have a new one. I have a dream that the lawmakers will realize that patent and copyright laws should be changed but this time in the other direction, so that they do not restrict our potential to develop, create, or invent. Terms of duration should be significantly shortened, patents and copyrights should be less generously granted, "fair use" should be fair again, and free adaptations should be possible without threats of litigations. I have a dream that courageously reformed patent and copyright laws will one day serve the benefit of all and not just a lucky few.

Figure 6

But I don't want you to think that I am ending my lecture with a daydream. Let me close by leaving you with an impression of how copyright laws are limiting the public's access to important information, much of which is so vital for democratic society. Look what happened to me when I searched for the complete version of one of Martin Luther King's most famous and moving speeches. Instead of being able to read or listen to Martin Luther King's famous speech "I have a dream" on the Internet I got the following message (Figure 6): "This video is no longer available due to a copyright claim by EMI Music Publishing."

Contributors and Editors

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petence Center "Regulation and Innovation". Since May 2008 he has also held the endowed Chair of Standardisation in Rotterdam. From April 2010 he has led the new research group "Public Innovation" at the Fraunhofer Institute of Open Communication Systems in Berlin. As well as numerous articles on standardisation he has published further contributions on intellectual property rights and further innovation aspects in various refereed journals including Research Policy.

Bernd Klein is a computer scientist and head of Bodenseo, a computer related training company in Singen near Lake Constance. As a computer scientist he gained experience with software patents. Since founding his company Bodenseo, he has been confronted with general questions about copyright and patents. Thus he has acquired special knowledge and a solid background in intellectual property matters. He is currently teaching intellectual property related courses in cooperation with the lawyer Thomas Steinle, LL.M. In February 2010 he founded the German language special information website www.geistiges-eigentum.eu. The goal was to make difficult technical and legal matters accessible to the general public.

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