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CHAPTER SIX

Authorship and Artifacts: Remaking IP Law for Future Objects¹

Rights to Expressions: History and Theory

The development of the legal-institutional notion of intellectual property (IP) is rather recent, historically speaking. It arose in the western world in various forms, beginning in the mid-1500s and early 1600s. In both Italy and Britain, monarchs began granting ‘letters patent’ to individuals who might improve the local useful arts (by invention) or help to grow their nation’s coffers in other ways. One of these ways was, ironically, through piracy. As Britain tussled with Spain over the riches of the New World, the British crown encouraged buccaneers to work against the Spanish, becoming *legitimate* pirates (renamed ‘privateers’), through the grant of ‘letters patent’. These letters from the monarch gave privateers exclusive rights to a portion of the proceeds from their raids on Spanish ships, forts, and colonies. A sovereign’s grant of a monopoly right was a strong incentive also to publish certain works, and to encourage the immigration of creative, inventive persons and their inventions or other creative works.²

Before sovereigns invented letters patent, and then eventually copyrights, there was simply no natural way for an author or inventor to protect the fruits of his or her inventiveness or creativity against economic exploitation by any other diligent copier. If one had a great new idea, and wished to profit from it without others copying and depriving one of direct profits, then one had two options: secretiveness or obscurity. Obscurity meant devising inventions in ways that could not be readily reverse-engineered, and secretiveness meant practicing one’s art away from the public eye. Either meant risking a great deal. Secrets could be spilled, or independently discovered, and obscurity could be punctured with a bit of knowledge and work. Ultimately, the world of innovation before IP emerged included every possible attempt to keep the lid on new knowledge as much as possible, and ran counter to the scientific trend of the Renaissance and Enlightenment.³

Scientific discovery requires openness. It is only by independent confirmation of scientific results by other researchers that general knowledge advances. As the scientific method developed, and institutions of science

grew (including scientific colloquia, journals, and other modern elements of the scientific process), the value of openness replaced secretiveness in the realm of discovery and invention. In the nineteenth and twentieth centuries, IP laws often worked in concert with the development of science and industry to promote the transfer of knowledge between the two, and encouraged economic growth and innovation without reliance upon secrecy, which ultimately hinders science. The development of those laws captures some fascinating relationships among people, intentions, artifacts, and related objects. There are some clear trends, some discoveries of first principles, and some questionable applications that bear discussion. All of these provide an interesting background for discussing the nature of the objects involved, and considering the theoretical and practical consequences of applying new potential models for protecting or otherwise encouraging innovation. Let's first look at the categories of being discovered in the development of IP laws, and then consider whether they might be at all based upon first principles or whether they are all just pragmatic categories.

The law has distinguished primarily between those things that are patentable and those that are copyrightable. Patentable objects include new, useful, non-obvious inventions. They may be either products, compositions of matter, or processes. These sorts of things are considered primarily utilitarian. On the other hand, works whose uses are primarily aesthetic have been granted copyrights. I have argued extensively that nothing 'grounds' IP rights, not in the way that real property (land) or chattels (goods – objects that may be physically possessed to the exclusion of others) are grounded in the brute facts of possession.⁴ Simply put, while the token you make of your idea (a novel or a steam engine) is your property, the *idea* (the type) can be copied by anyone sufficiently patient or skilled in the art upon which the token you made is based. If your neighbor makes his own steam engine, you have not been deprived of anything, nothing was taken from you leaving you with less than you had. It is this intangible, easily spread nature of ideas that impelled states to begin creating IP rights.

In order to encourage innovation, and to provide an institutional bulwark against the natural inability of inventors and authors to exclude others from copying or using their works, states devised and enforced IP regimes, including the modern forms of copyright and patent. These rights to 'intellectual property' are utterly distinct from traditional forms of property law developed both through common law and positive enactments. While

most property rests upon rights to possession and exclusion of others from the things (property) possessed, IP rights involve no possessory right to any particular object. Rather, an IP holder has an *exclusionary* right over the reproduction or first sale of any token instantiating the type he has created. Thus, the author of a novel can forbid others from selling a copy of his story without paying him royalties (at least the first sale of the particular token expressing his story – used books and other media may be sold without paying royalties). The inventor of a new device or process may forbid others from selling tokens of that device, or employing the process he invented (again, the first sale of the object only) without paying license fees. IP diverges from ordinary modes of ownership in that it depends upon some underlying notions of types and tokens, as well as distinctions among nature, abstract entities, and artifacts, all of which are not just philosophically interesting, but practically complicated with the arrival of new types of expressions.

Recently, with the emergence of information and communication technologies (ICT – computers, internet, etc.), the law of IP has proven to be difficult to apply, with debates arising as to whether software can be patented or whether it should be copyrighted. Both have been done, a practice that challenges the previously mutual exclusivity of the two prevalent categories of IP. Even more recently, patenting of unmodified genes has raised further questions about the adequacy of IP to deal with emerging technologies and modes of innovation.⁵

The law of IP offers us a rich guide for understanding the nature of the underlying objects of *intellectual property* themselves. There are some long-standing categories in the law that reflect sensible distinctions among types of objects, even while there are some that may also be suspect. Let us consider some of these categories, based as they are on historical distinctions, and return to look critically on where the law might diverge from its own foundational rationales.

Nature, Creation, Artifact, and Invention

There have always been limits to what may be patentable or subject to copyright. One of the first hurdles to IP protection is originality.⁶ In order to be patentable or copyrightable, one must have devised something that did not already exist. This means it cannot have been the work of another, nor could it be something merely natural. Ordinarily, this is uncomplicated. Borderline cases have arisen rather more frequently recently than sometimes

challenge assumptions about creativity and inventiveness or highlight the rationale for this distinction. In the 1970s and 1980s, patenting algorithms as parts of computer software raised issues on the patent eligibility of mathematical formulas (discussed below), and more recently the distinction between the natural and the patentable has arisen in the debate over patents on genes. All patent statutes, however, hinge upon some measure of human inventiveness being brought to bear on nature – the creation of something that previously never existed.

There is then a class of objects that we have decided should never be protected by IP, even though we often consider it to be the domain of human conception. Science is focused upon discovering ‘laws of nature’ and describing them accurately. But there is much technology that depends upon scientific discovery. Descriptions of laws of nature, or theories, are not patentable although they are human inventions. To the extent that $F = ma$ describes a natural relation between force, mass, and acceleration (Newton’s second law), it is nonetheless a description, not the ‘law’ itself. In other words, force, mass, and acceleration exist, and preexisted Newton, relating as they do with or without human intention. Newton’s second law remains a human invention, describing a natural state of affairs. ‘ $F = ma$ ’ is, technically, an expression. It is a very useful expression, a statement describing natural relations that are universally true (setting aside for the moment questions raised by both Einsteinian relativity and quantum mechanics). So, while it is clear that the natural relations between force, mass, and acceleration cannot be the subject of IP law (as they are not *new*), why can’t the law *as formulated* be granted IP protection? Could Newton have patented or copyrighted ‘ $F = ma$ ’ given that it was a new formulation, conceived by a human, of something which is, after all, quite useful?

No current IP regime would allow Newton to patent his laws of thermodynamics, nor would doing so suit any of the purposes of IP law. Although expressions of scientific laws are the result of human creativity, and they are provisional models of natural phenomena rather than the natural phenomena themselves, granting IP protection to Newton’s laws, or relativity, or other depictions of natural phenomena, would inhibit invention rather than promote it. It would contravene the practical purposes of IP law, and it would defy sense, and would be akin to granting Joseph Priestley a patent to O_2 as discussed above. It would also be a very limited protection, guaranteeing only that others could not use the formulation of that law

of nature (which was a new expression), but not preventing anyone from *employing* that law given it is as old as the universe itself. There is a distinction between the process of science and that of invention. Science seeks to discover the laws that underlie natural phenomena; the purposes of science include improving understanding, prediction, and control over nature. Invention is often a result of science, but science is often not necessary for invention, nor is invention the necessary consequence of science. The objects of science and of technology are also different from their processes. While the depictions of natural laws are human constructs, for instance the languages of mathematics or of physics and their theorems and hypotheses, the goals of these sciences are to uncover truths about nature, resulting in more accurate descriptions, fuller understanding, more useful predictions, and better control.

Even if nature itself could be owned in any conceivable manner, extending control over its laws or products would not likely encourage innovation or authorship. The first essential distinction inherent in IP law between nature and invention is based upon sound division between those things that exist without human intervention and those that require it. The laws of thermodynamics exist with or without our depictions of those laws through languages or symbols. Depictions of those laws might be human creations, but their usefulness depends upon their hewing as closely as possible to the facts of nature. There will thus be a limited number of ways of depicting those laws usefully, unless we choose to multiply our languages of depiction, creating new physics or mathematics, or biological lexicons. But doing this would only impede innovation and hinder science.

In order to maximally encourage both science and innovation, there is a balance struck in the law of IP that prohibits protection of mere depictions of natural laws (the domain of science) and allows protection typically only for *applications* of those laws through some new technique: some artifact or inventive process. IP laws apply, based upon the pragmatic purposes of IP regimes, only to expressions that are new and useful, and that are not depictions of natural laws. We can see the usefulness of this distinction if we consider the difference between mathematical formulas and ‘algorithms’. A formula expresses an equivalence that is part of nature. The formula for the area of a circle, πr^2 , represents a truth about nature, and its discovery is generally attributed to the ancient Greeks. It depicts nothing new, but rather a truth that has always been a part of nature, even before the abstract

entities of mathematics were discovered and the languages of mathematics invented. Algorithms, however, are inventive. An algorithm is a description of a method for solving a problem. Thus, the following is an algorithm for determining the area of a circle: (1) measure the radius of the circle, (2) multiply the radius by itself, (3) multiply the result by π . The formula for the area of a circle represents an abstract entity – a type inherent in nature and not the result of human invention, an idealized mathematical construct that has no empirical counterpart in nature. It cannot be owned under any permutation of IP law. On the other hand, the algorithm described above is a process that can be applied to achieve desired results; although it relies upon laws of nature, it is not itself a law of nature. Under some interpretations of IP laws, particularly current US patent law, the algorithm might be patentable because of some ambiguity in the courts' interpretations of patent laws and a lack of clarity regarding the underlying objects at issue.

In a famous trilogy of cases decided within a ten-year span, the US Supreme Court was forced to consider the patentability of various algorithms due to the emergence of software and a scramble for patents over computer programs. Beginning in 1978 with *Gottschalk v. Benson*,⁷ followed by *Parker v. Flook* in 1978,⁸ and concluding with *Diamond v. Diehr*, in 1981, the US Supreme Court grappled with the question of when an algorithm should be patentable as opposed to when it may not be because it constitutes 'prior art'. In *Diamond v. Diehr*, which remains the prevailing law in the United States, a process that made use of a software algorithm was at first rejected by the Patent and Trademark Office (PTO) as ineligible for a patent. The process incorporated the 'Arrhenius equation',

$$E_a = -RT \ln\left(\frac{k}{A}\right),$$

into a process used to cure rubber. The Supreme Court reversed the judgments of the PTO and the lower court, holding that although the invention contained 'prior art', by way of a mathematical formula, the 'invention as a whole' was new. The patent could not foreclose use by others of the mathematical formula, but would prevent others from making or marketing the same invention, the new combination of natural phenomena and materials.⁹

So what is the common denominator to inventive objects that takes them out of the realm of the natural and makes them protectable by IP? Nature must somehow become transformed by human intention and action.

The result of that transformation is an expression of an idea, either by way of some artifact (a continuant) or by way of some action (an occurrent, like a service, dance, speech, etc.). The catch is that for occurrents to garner IP protection, they must somehow become transformed once more. They must become ‘fixed’ in some ‘tangible medium’. This poses a problem for some modern inventions whose dissemination has seemed at times to consist of selling the types rather than the tokens, or performing a service rather than exchanging a tangible good. The confusion between types and tokens, confounded because of the seemingly ephemeral nature of software, is not based upon any real distinction between software and other tokens sold or distributed under existing IP regimes. Each instance of a piece of software is clearly a token, and it is the token that is the subject of each software sale. A piece of software exists, in its saleable form, in a fixed medium. It is properly subject to either patent or copyright (strangely) under current interpretations of IP law. But this odd fact raises questions about the classifications of types of expressions embodied in the dichotomy between copyrightable and patentable objects, and suggests that it may be time to revise our current understanding and application of these categories.

Revising Our Relationships with Artifacts

We can see the emergence of a simple hierarchical taxonomy of IP. At the top is nature, or ‘brute facts’. While parts or tokens that are natural (a piece of land, an individual sheep) might be possessed and then owned under some positive institutional scheme, no claim of ownership nor reasonable means of possession of any of *nature’s* types could be conceived or exercised. No brute fact manner of enclosing nature or her laws could be created, nor would devising any institutional mode of that kind of ownership promote the goals of IP regimes: innovation, profit, and public benefit. IP regimes are creatures of institutional reality that grant monopoly rights to authors and inventors who *change* nature, who alter it in some *new* way. The objects of IP regimes are exclusionary rights over reproduction or first sale of any token of a certain type. So far, only continuants, created by humans, have been afforded the exclusionary rights of IP laws. A machine, a story, a song, a dance, as long as it becomes ‘fixed’ in some tangible form (as a continuant) may only be reproduced, sold, or otherwise enter the stream of commerce with some royalty to the authors or inventors. Speeches, dances, songs, services, and other occurrents, though they may be the products of human

intention, may not be protected under any current form of IP protection if they do not become, somehow, a continuant.

As with all IP regimes, this is a matter of choice and not necessity, although the choice might be firmly grounded in pragmatism. It is a choice that could well be challenged, as could that behind the artificial distinction between the objects of patent law and those of copyright law. In case distinctions among types of objects fail to promote the underlying goals of IP and its institutions, we should feel free to reconfigure these distinctions as we see fit, to better promote those goals, and as technologies and contexts change. The only restriction to how we might reconfigure these institutions is internal consistency, a criterion by which the current regimes utterly fail (as the examples of software and gene patents reveal).

If we admit that there are good, practical reasons to provide some institutional incentives for authors and inventors to take the risk of realizing their ideas and exposing them to the marketplace, and concede that the current forms of IP that exist lack internal consistency, then we should feel free to alter our institutions. What we cannot alter is the distinction between the natural and the artificial. There is the world of unmodified nature, and there is everything else. The 'everything else' includes all modifications of nature by man (assuming we are not yet interested in creating IP regimes for animals). Novelty seems like a good criterion to preserve if we wish our IP regime to encourage innovation. But we might well question whether the current type/token distinction embodied in IP's idea/expression dichotomy necessarily captures something important, or potentially complicates or inhibits the ways in which we might encourage innovation, especially as we delve more deeply into exchanges of nanowares.

Ideas are certainly distinct from expressions, and ought never to be confused. But the law of IP grants protection to ideas that most IP practitioners deny. It's true that only *expressions* of protected ideas can be prohibited by IP regimes, and that no one may be denied the ability (perhaps founded upon some sort of right of conscience) to think an idea, even if he is not the original author. But the fact is that IP protects ideas by way of prohibiting their expressions in media other than minds. While this is less intrusive than prohibiting the holding of ideas in minds, it is still a significant restriction on speech, if not necessarily thought. It prevents the dissemination of certain ideas by certain routes. IP laws give authors and inventors limited monopolies over types, to the extent that others may not utilize those types in any number of possible ways.

While we generally speak coyly about IP curtailing *only* our relationships with tokens, the net effect is that it curtails our relations with types, except inasmuch as those types may still be comfortably nestled in our minds, if nowhere else.

So what prevents us from reconfiguring some future form of IP protection to encompass *types* proper, rather than the somewhat awkward and misleading manner in which they are now supposed only to cover tokens (expressions rather than ideas)? Considering the direction that innovation is going, as software, services, and products begin to merge with the advent of true nanotechnology, the type/token dichotomy as expressed currently in IP law may well be archaic. The present hierarchy of the law of IP looks like Figure 6.1.

Creation and Dissemination of Types versus Goods

It is not surprising that there are some seemingly arbitrary divisions and categories in the current scheme of IP as it is a feature of the positive law, ungrounded in any natural law and driven by purely pragmatic concerns. Why extend protection only to continuants and not, for instance, to a performance or a service? What is the distinction between ‘inventions’ and ‘works of authorship’? Is there reason to be flexible in light of emerging technologies and trends in existing technologies, and to reconsider this hierarchy and its current divisions? Moreover, might we reconsider the manners in which we choose to create our IP schemes? There is some reason to think we should.

Figure 6.1 The Current Ontology of IP Law

The emergence of ICT and the coming age of nanotechnology ought to continue to undermine the traditional distinctions inherent in the current law of IP. Things that we have considered to be ‘fixed’ objects will become programmable, fluid combinations of software and flexible materials. As the division between software and hardware breaks down, as did that between written works and machines through the development of software, patent and copyright will prove to be archaic modes of protection or encouragement for innovation. For instance, when innovators are no longer involved in disseminating physical goods, patents may *hinder* the creation and dissemination of new, nanotech-driven *types* given that a patent would technically prohibit the ‘reproduction’ (production, really) of the good by the consumer. Similar problems have hounded software patents and copyrights as multiple reproductions of the software are typically involved in each sale, as part of necessary installation procedures and archival backups. So far, IP law has worked through these technical impediments by developing kludges of sorts, exceptions that allow for what would otherwise be forbidden. The constant need for new kludges as technology evolves suggests, however, that we might need a completely revised framework and our old system ought to be scrapped. We can assume that the goal of IP remains the same: encouraging innovation and moving the products of ideas (eventually) into the public domain. These goals emerged out of the historical desire to promote innovation and prevent secrecy. But recently, secrecy has become a mere technical hurdle to overcome, and modes of innovation have changed. No longer do many innovations require large capital investments, and the tools for creating and disseminating new goods have become more accessible given both ICT and nanotechnology’s precursor: localized fabrication.

Just as the emergence of the PC allowed ‘basement programmers’ to create new and profitable goods with little capital investment, so too will computer-aided design, localized manufacturing, and eventually nanotechnology and desktop manufacturing allow for innovators to realize and distribute new physical goods without the traditional capital burdens of factories and physical distribution networks. But IP laws remain a significant impediment to this scenario for the reasons outlined above. The categories we are used to will not work. Innovation and dissemination will no longer be of the goods themselves, but of the types. Current IP regimes do not account for this sort of innovation, production, or distribution, and as we have seen with the wholesale violation of software copyrights and patents

through grassroots peer-to-peer (P2P) networks, innovators will be foolish to disseminate their creations without better, more flexible, and enforceable institutions and laws that take into account what will actually be created and sold. Consumers too will be wary of purchasing goods where the rights they might have to use those goods are ill-defined, and where the law might have made accommodation through yet another legal kludge, rather than through a profound reconsideration of the objects and relationships truly involved.

Setting aside the categories of patent and copyright, and their inherent shortcomings, can the taxonomy of types in Figure 6.1 guide a revised outline of IP protection? If we accept that converging technologies will continue to undermine divisions between types of expressions, could a unified scheme, covering all potential expressions, be employed in place of current copyright and patent laws? I proposed one such scheme in *The Ontology of Cyberspace*, in which I suggested a single system of protection, much like copyright (but with shorter terms of protection), that could be extended to all expressions (including inventions). There is no theoretical reason to think we couldn't pursue some alternative, although devising a workable system from scratch seems daunting.

In fact, numerous alternate schemes to traditional IP protection have already emerged through the development of licensing systems, moving the means of protection into the hands of producers and consumers, and avoiding the institutional costs of formal registration of patent or copyright. If states are to remain involved, then it seems that in order to encourage maximal innovation and reduce barriers to entry, lightweight schemes like copyright (which involves no complex or costly review process, and only a very inexpensive registration for *prima facie* proof of first authorship) could replace the unnecessary dual copyright/patent system now employed. Our decisions should be guided by both the practical goals behind the institutions of IP and the underlying ontology, which is founded upon some well-deserved distinctions between ideas and expressions.

Ultimately, we could envision an economy of *types* rather than goods. In some ways, the software industry already functions this way. With increasing frequency, consumers download software rather than purchase it burned already on a CD or DVD. What they are purchasing, often by accepting a complex End User License Agreement (EULA), is a right to reproduce the type as an instance on their PC. What is transferred is not the program in its final form, but rather the right to reproduce some intermediary

form, and then to unpack and install the program in a final useful form. A unified treatment of all expressions, and licensing systems, depending on private arrangements between consumers and producers is already working as a model for alternate approaches to disseminating nanowares. These schemes treat the transaction as an exchange not of the final token, but of a right to the use of a type through various intermediate tokens, in ways that current IP regimes cannot. The current copyright system also serves as a model for this sort of exchange, as the sale of a book transfers most importantly certain rights to the type inherent in the token. In the future, the marketplace for all goods will look more like this, where types are the primary unit of exchange, their values and prices unencumbered by costs associated with mass production and capitalization, and parties to exchanges will be free to work out the details of the rights involved in each new exchange.

Ethical Problems with Traditional IP

We have seen above how the law of IP has been warped, and its principles extended beyond reason. We have delved a bit into the practical problems posed by attempts at applying the current IP scheme to nanowares. But there is a fundamental moral argument that can be made against the very notion of IP, and that helps to argue for a new conception that will be outlined in the subsequent chapters. Simply put, IP draws an unwarranted and *anti-natural* relation between authors (or inventors) and artifacts. Patents and copyrights extend protection over things that *ought* not to be protected, if we are to take seriously a number of basic assumptions we otherwise hold regarding freedom of expression, freedom of conscience, and rights to tangible property. Let's examine how IP law might not just be inefficient, impossible to apply to a future of nanowares, and costly, but also unethical *per se*.

AXIOM 1: We have fundamental rights to autonomy over our bodies and our minds.

I take this axiom as uncontroversial in western, liberal democracies. Liberalism presupposes that we are by nature entitled to certain freedoms, and among these are freedoms over our bodies, minds, and our property. This principle is the cornerstone of modern democratic republics, and can be traced back to Greece, as well as Enlightenment Europe.

The right to autonomy involves obligations for others to not interfere with our bodies, our minds, and our property. Individual sovereignty means that we can dispose of our bodies as we wish, direct our thoughts in any way we please, and hold our property without interference. Since Locke and later Mill, this liberty entails the peaceful enjoyment of these rights against not only others but also the state. The limit of our liberty is where our acts interfere with the liberty of another, as expressed by John Stuart Mill's 'harm principle' or 'principle of liberty'.

AXIOM 2: We have fundamental rights to freedom of expression consistent with Mill's harm principle.

This is partially implied by Axiom 1, our expressions are the results of the exercise of both our bodily and mental autonomy. An expression is the making-manifest of ideas into the world outside of minds. Speech acts and artifacts are the primary means of expression, although physical acts are also expressions. Limits to free expression typically center around the harms caused by them, with laws that prohibit certain expressions being generally disfavored. Instead, laws regarding limits to expressions typically focus on punishment *after the fact* for harms that have been caused. 'Prior restraint' of expression is generally disfavored. Which brings us to our first premise:

PREMISE 1: All man-made objects intentionally produced are expressions, and IP law involves monopolies over expressions.

IP rights are not positive but negative. They are exclusionary. The holder of a patent or a copyright has the right to exclude others from doing certain things with types. The objects of all IP law are both the ideas (or types) *and* the expressions (tokens). This is so because IP laws limit what others may express, and give owners of copyrights and patents the exclusive right to make and sell their expressions. Exclusive control of expressions restricts what one may do with types. Although anyone can *consider* any type, *think* of it in any way, *muse* about it, or even *discuss* it (as long as one doesn't verbatim reiterate an aesthetic expression in some fixed medium), protected types cannot be expressed by others. A machine is an expression, as is a novel, in that each manifests some idea into the world beyond the mind that

conceives it. One is primarily utilitarian, and the other is primarily aesthetic. In each case, the holder of the IP right can prevent expression of the same idea in the same or substantially similar way by anyone else. IP is thus a limit on expression unlike other limits on expressions in that it limits expressions without consideration of harm or potential harm.

The rights conferred by IP are not really property rights, but they interfere with property rights. The owner of a patent cannot claim possession of all instances of his or her patented type, but can limit what is done with each of those instances, as well as what is done (e.g. by unauthorized expression) with the type. IP limits what one may do with one's body (by expression) and one's property. Are such limits aligned with the ethical bases for autonomy, and for rights to other forms of property, or are they contrary?

PREMISE 2: Rights of ownership are grounded in brute facts of possession, and laws are just when they are grounded (and not contrary to) brute facts.

Property law is rooted in the same principles that ground Axiom 1. Autonomy in one's self, which I take to be a primary and fundamental right, means the obligation by others to leave us undisturbed in the peaceful enjoyment of the space we occupy. This means we are free to occupy a certain area of space, and hold what we possess, without others attempting to dispossess us of either our place or possessions, unless some prior claim to either exists. The justice of property law is grounded in the brute facts of self-possession and possession of material goods.¹⁰ We establish just ownership pre-legally, by the peaceful occupation (and improvement or use) of land and movables as long as we do not dispossess others in the process of their just ownership. This is a more or less Lockean conception of property. Property acquired by these means is acquired justly and neither our neighbors nor the state can justly deprive us of our justly acquired property.

Laws that deprive us of our property are thus unjust, and laws that recognize the grounded nature of just rights to possession are just. IP laws appear not to be related to brute facts at all. IP rights confer the right to exclude others from making reproductions of our expressions, they thus foreclose the use of a type by others, and confer no possessory rights over tokens. Ordinary property rights regard tokens and not types. Because there is no natural way to possess types to the exclusion of others, since a single idea can be held by many without

deprivation or trespass, IP laws were created to meet the perceived pragmatic need to encourage innovation *and* disclosure of innovations. These laws are recent, and not grounded in any brute facts. They are instead a *reaction* to the brute fact that ideas are non-rivalrous and non-exclusive, and thus freely available to all to capitalize upon once expressed.

Positive (man-made) laws (that are *just*) regarding property are founded upon *natural law*. IP law is not founded upon any natural law or brute facts. While some argue that authors have a *moral* right to the exclusive use of their expressions (and this point of view dates back about 200 years in French law in particular) most modern theorists of IP accept that there is no natural basis to claim that anyone has a right to exclusive use of one's expression *types* once expressed. If we base our moral claims on the notion of harms, as we do with other natural rights and obligations, it is difficult to support the notion that one who appropriates a type in any way causes the originator of that type any conceivable harm.

PREMISE 3: *There are parts of the world that are not susceptible to ownership.*

Both property and IP law already recognize this premise to an extent. Namely, there are portions of geophysical space over which no valid claim of ownership can be made, and there are parts of the universe about which no valid IP claim could be made. Just ownership, both as a brute fact and as an institutional one, derives from the exclusive and rivalrous qualities of certain types of things like geophysical places and material things. There exist things that are neither rivalrous nor non-exclusive which are thus not susceptible to either possession or ownership. There is simply no means by which certain physical phenomena like radio spectra, laws of nature, or abstract entities could be possessed. These sorts of objects cannot be enclosed logically. There are also parts of the universe that cannot be possessed *practically*. Property law recognizes that certain parts of the world, even geophysical places, cannot be enclosed to any *practical* extent, and thus excludes them from ownership claims. The law has established a category, based upon ancient monarchical practices, called the 'commons'. The commons were originally geophysical places (land) that the sovereign set aside for those with no means or land of their own to use to eke out a living. But we now can note the existence of other types of commons. The categories of commons are commons by choice

and commons by necessity. Commons by necessity likewise fall into two categories: that which exists by *logical* necessity, and that which exists by *practical* necessity.

Commons by choice are places or parts of the universe that could be possessed to the exclusion of others, and thus over which legitimate claims of ownership *could* logically exist but for the choice by a sovereign, or preferably by a community, to set aside some space or thing for common usage. This is the ancient form of commons recognized above, and existing since at least medieval European sovereigns began the practice. Commons by practical necessity have also existed for some time in the form of places that no sovereign could practically claim, and thus that could not be granted to subjects or citizens as legitimately owned. International waters are an example. Although one might be able now to mark with GIS some boundary for some part of the surface, or even three-dimensional space within an ocean, prior to GPS technology, marking out, defending, and thus properly possessing such a space was a practical impossibility. It remains quite difficult even now, though it is certainly now logically (and technically) possible. Radio spectra, sunlight, and even parts of outer space or the upper atmosphere also fall into this category. Each of these could be possessed in some logically conceivable way (tougher, though, with radio spectra, unless one is certain one will always have the biggest power source), and yet possession and control of each of these is practically extremely difficult.

Commons by logical necessity are those parts of the universe over which no exclusive possession could logically occur, and thus over which no grounded property claim could exist. Abstract entities (like *pi* or infinity), laws of nature, and naturally occurring phenomena and products all exist in ways that cannot be enclosed to the exclusion of others. No one could logically claim exclusive possession of abstract entities, and the 'possession' of one does nothing (and can do nothing) to dispossess others of its use. We all exist and enjoy the world, including our various freedoms, due to free, non-exclusive and non-rivalrous phenomena like gravity, evolution, the way that photosynthesis produces oxygen, gravity's effect on objects, etc. Moreover, attempts to curtail the use of these sorts of commons by others are attempts to exclude them from use and enjoyment of something that not only cannot logically be curtailed, but also the use and enjoyment of which are free and necessary to all. Thus, commons by logical necessity not only cannot be

monopolized, but *ought* not to be attempted to be monopolized due to the necessary harms associated with such an attempt.

PREMISE 4: *Ideas belong to the commons by logical necessity.*

Ideas are abstract entities. Expressions are not. Take any idea, for example, the idea of steam power, or the idea of a steam engine, or even the idea of a particular steam engine. You are now holding thoughts of these ideas in your brain, and the thoughts (for argument's sake) have material qualities. They exist in a certain place, for a certain time, in a certain 'shape' (in that certain neurons fire in specific ways to hold that idea in your thoughts). The ideas themselves lack any material attributes, just as the ratio *pi* lacks any material attributes. Ideas are instantiated in the world in various forms, sometimes by natural phenomena (like otters, rocks, stars), and sometimes by way of artifacts (like expressions, or even as thoughts). There is no manner in which the thinking of an idea can be done to the exclusion of others thinking that idea. Moreover, attempts to curtail others from thinking or expressing an idea are invasions upon basic rights enunciated earlier regarding freedom of conscience and expression.

It is logically inconceivable that one could claim a monopoly right over something like *pi*, or to any other idea. All ideas are abstract entities, even when they become instantiated in some expression. There are any number of possible configurations even of steam engines, and each configuration instantiates a number of ideas, including the idea of steam power, and that of steam engines, and the idea of *that particular* steam engine. IP rights grant monopoly privileges allegedly over particular ideas, but their reach is greater than any one particular apparatus or story. Anything that bears substantial similarities to a particular expression risks being found to violate the monopoly privilege granted under copyright or patent.¹¹

IP laws extend to ideas, and prevent their expression by others. This contradicts axioms stated above regarding freedoms of conscience and expression. IP laws are also not grounded in any brute facts nor natural law.

Conclusion

IP laws are not grounded in any natural right to expressions, and impede fundamental rights. IP law is *per se* unethical if we take seriously our rights to freedom of conscience and freedom of expression. There is no natural

basis for IP rights. They are monopolies granted as a privilege by sovereigns, a pragmatic attempt to encourage innovation because of the inherently *free* nature of ideas. If a positive law contradicts a natural right, it is the natural right that should prevail, and the positive law that ought to be called into question. This relatively new legal institution is often taken for granted, assumed to be necessary to propel innovation, and yet it appears to conflict with fundamental moral axioms commonly held. Besides having good reason to question the economic efficiency, success, and fair application of IP over time, we now have a *moral* reason to question these institutions. We can move forward now and consider what might replace them, what new institutions could be designed to be more efficient, to better encourage innovation in nanowares, and to be ethical.

Case Study

Publishing Goods

As discussed throughout this text, published expressions and manufactured ‘expressions’ were once easy to distinguish. A book did not appear to be like a clock, and vice versa. But both clocks and books were sold as goods, and inventors of clocks and authors of novels came to be protected through IP regimes designed to fulfill different perceived needs. In the one case, utilitarian expressions, such as clocks, were afforded patents, and in the other, aesthetic expressions were afforded copyrights. In this text and in others I have argued that the ontological distinctions between aesthetic and utilitarian expressions do not hold, and so a single unified scheme of protection (if we insist upon protection) would suffice for any man-made object intentionally produced. Let’s consider how a unified scheme would work, and how clocks and other utilitarian objects could be treated like novels, and whether a copyright-like scheme would accomplish the goals of IP, promote innovation, and help ensure profits for innovators. Finally, we’ll apply this logic to nanowares, and consider whether and to what effect a unified regime of IP would work.

When an author or other creator of aesthetic expression creates something new, it is automatically entitled to copyright protection under modern copyright regimes. At one time, that protection lasted a mere fourteen years, after which the work lapsed into the public domain. While protected, the creator enjoyed a monopoly over copies and first sales of his or her works. This monopoly is cheap to get, and valuable to hold, allowing creators of valued works to derive income from their works of creation, and ensuring that the public benefits from both the production of valued works and the movement of those works into the public domain for all to use after some time has passed. Other works are considered to infringe upon the creator's monopoly rights if they are 'substantially similar', and are not proven to be the result of independent creation. Unlike patent law, if two substantially similar works were genuinely created without either creator's knowledge of the other work, copyright holders may then each benefit from their acts of creation. In patent law, the first to get the patent wins, regardless of *bona fide*, innocent independent creation.

Arguably, copyright law has encouraged a great deal of aesthetic creation, ensuring for authors and artists monopoly rights over their works, allowing monopoly pricing while protected, and leaving sufficient room for the creation of similar, though not infringing works. The legal scheme created by copyright law means that no prior review of works is necessary, no expensive filing fees need be paid, and no attorneys need be consulted in order for creators of copyrightable works to be able to immediately begin to reap the rewards of their creativity. In case of dispute, the facts and entitlement to a monopoly under copyright are resolved in court. Over time, the copyright term has increased significantly, and now authors enjoy a monopoly during their entire lifetimes, and after they die their estates may continue to reap monopolistic pricing for an additional seventy years. But as mentioned above, copyright terms used to lapse even before an author died, in terms that were once as short as fourteen years.

Case Study: Publishing Goods (continued)

Could a copyright cover a steam engine? There is no reason to think it couldn't. Consider an inventor of a new machine and the creator of a new work of aesthetic expression. Each attempts to devise some unique expression of an idea. The steam engine created, for instance, by Robert Stirling and that created by James Watt, each express the idea of the translation of heat into pressure into mechanical energy. Each does so with a unique arrangement of mechanical parts. The novels *Ulysses* and *Odysseus* similarly represent the general idea of an epic adventure, and in fact *Ulysses* is purposely derivative of *Odysseus*. But the particular arrangement of parts, the characters, unique natures of the locations, etc. make the two works clearly distinct. Both Watt's and Stirling's steam engines have their merits, and each has increased the sum of human creation, and provided means to turn heat into mechanical energy. Consider what might have happened had Watt enjoyed a copyright rather than a patent on his steam engine. The energy spent by Watt in defending his patents, and in preventing competitors from entering 'his' markets, might have been better spent by Watt in improving his own engines, and the delay noted by Boldrin and Levine in the efficient adoption and widespread use of steam power might never have occurred. Watt could still have exacted monopoly rents over the use of his engines, and others could have entered the market with competing engines, as long as theirs were not substantially similar, or could be shown to be the result of independent creation.

For a more modern example, software publishers routinely copyright their expressions (and some also patent them). Comparing the elements of allegedly infringing software and comparing elements of allegedly infringing steam engines are analogous processes. Copyrighting software as expression also takes into account that expression can occur on different levels. Apple's expression of the idea of a graphical user interface differs from that of Microsoft, and that of Linux. Each uses elements that are so general and necessary to accomplishing the goal of allowing users to use a system with a mouse

and a pointer, but each has unique elements that make the particular product work in such a way. As well, the underlying algorithms differ. Just as two novels may tell the same general story even while the particular elements of each differ, so too can software accomplish generally recognized useful goals while preserving individuality of creation, and encouraging innovation in the particular arrangement of parts to accomplish the same goal.

Like software, nanowares will (or do) express ideas at different levels. They also do so in multiple configurations. The expression of the full design specs of the final product is itself a unique expression of the idea of the final product, and the final product is also an expression of the ideas inherent in that product. Treating both as a copyrightable whole solves, in many ways, the problems associated with attempting to patent something that requires eventual construction at the user end. A copyright on the full design specs, or other software used to transfer the entire set of instructions for construction of the final product by the user, would cover and prohibit unauthorized reproduction of those specifications. Extending that copyright to the final product, or recognizing that the final product too is a unique expression, affords the creator a monopoly also over the final product without the necessity for a patent search, filing, etc. Those who seek to try to infringe upon the copyright for the product do so at the risk of being sued if their products are substantially similar, and if they fail to prove that their product was the result of innocent, independent creation.

Applying a copyright scheme to nanowares would allow more rapid innovation, as well as reducing costs up front. Part of the value statement for nanowares is reducing the amount necessary for capitalization, and reducing barriers to entry for innovative products in new markets. Some would argue that rampant copying will mean that creators remain unprotected in a unified copyright regime, but liability for infringement upon copyrighted goods has worked for some time in helping to thwart bad-faith copying, and has arguably encouraged production of aesthetic works due to the possibility of monopolistic rewards. A single, copyright scheme may

Case Study: *Publishing Goods* (continued)

well work (but hopefully with significantly reduced time periods of protection) to both encourage and protect innovation in nanowares should we decide that institutional frameworks are necessary. We just need to recognize that there is simply no good reason to continue to pretend that there is a bright line distinction between ‘utilitarian’ and ‘aesthetic’ works.