

**The Evolution of Intellectual Property
Institutions**

P.A. David

93-009

April 1993

Mailing address:

**Paul A. David
MERIT/Faculty of Economics
University of Limburg
P.O. Box 616
6200 MD Maastricht
The Netherlands**

**Phone:
(31) (0)43-883875**

MERIT

Maastricht Economic Research Institute on Innovation and Technology P.O. Box 616 6200 MD Maastricht Netherlands

THE EVOLUTION OF INTELLECTUAL PROPERTY INSTITUTIONS

by

Paul A. David

*William Robertson Coe Professor of American Economic History
Stanford University
and
Visiting Fellow, All Souls College, Oxford*

March 1993

Material in this paper was presented to the Tenth Congress of the International Economic Association held in Moscow, 24-28 August 1992, as a contribution to the session on "Institutional Evolution and Regime Transitions in Historical Perspective". This version has been prepared for publication in Volume I of Tenth Congress Proceedings, entitled System Transformation: Eastern and Western Assessments, A. Aganbegyan, O. Bogomolov and M. Kaser, eds., forthcoming from MacMillan Co., London, in 1993.

THE EVOLUTION OF INTELLECTUAL PROPERTY INSTITUTIONS

The array of modern laws and administrative procedures concerned with intellectual property rights (sometimes referred to herein as IPRs) once again have emerged as the topic of widespread and intense discussion and debate in the United States and internationally, throughout both the industrially developed and the developing worlds. Episodic reconsiderations of the whole system of patent and copyright protections can be traced at least as far back as the patent controversy of the 1850s and 1860s, which witnessed thoroughgoing efforts by free traders in a number of European countries to abolish patent monopolies, and which actually led to the patent system being abolished in the Netherlands (see, e.g., Machlup and Penrose (1950)). Lately, however, the pendulum of institutional reformist sentiment appears to be swinging in the opposite direction, towards the broader extension and stronger enforcement of rights in intellectual property rights in science and technology. In this paper I shall try to show why economists will make a more useful contribution to discussions of IPR reform proposals if they begin to approach the subject less as a matter of optimal mechanism design, and take more notice of the historical, incremental nature of the process by which these legal institutions evolved to their present forms in the West, and are likely to continue to evolve.

I. Economics and the Re-Emergence of Intellectual Property Rights Issues

Many new forces have converged to thrust IPR issues into its present position of salience (see, e.g., OTA 1986, Benko 1987, WIPO 1988, Rushing and Brown 1990). Investment in research and development has accelerated and become prominently identified as a central aspect of corporate and national strategies of global competition. The shortening of product life-cycles, and the advance of techniques that make "reverse engineering" and outright copying of novel products easier, has made it more difficult for firms to appropriate the benefits generated by innovations simply by guarding new technologies as trade secrets while quickly moving down their production learning curves to seize a cost advantage over potential imitators. Such concerns have been felt especially in the chemicals, pharmaceuticals, electronics, and information technology industries. Further, a widening of the areas of legal ambiguity and dispute has resulted from the application to new technological developments of the existing body of law pertaining to patents, copyrights, and trade secrets, particularly, in the fields of biotechnology and computer and information technologies (see Barton 1991, Samuelson 1992).

Adding to the pressures that are being generated within the sphere of scientific and engineering research itself, international competition has provoked a serious reexamination of the merits and drawbacks for the diverse national interests involved of achieving global "harmonization" of protections for intellectual property (see, e.g. Mody 1990, Siebeck 1990). Among the developments forcing these issues into prominence have been (1) the widening international markets for R&D-intensive goods and services, (2) the tensions created by the U.S. government's use during the 1980's of bilateral trade negotiations to secure the official subscription of developing countries to U.S. positions on the treatment of various forms of intellectual property, and (3) recurrent attempts to link the availability of private direct foreign investment to the willingness of recipient countries to accord patents, copyrights and trade secrets much the same measure of protection that they presently receive in the investors' "home" territories.

Although couched in the language of "harmony" and "standardization" of legal conventions, the ongoing debates about proposals for global harmonization of intellectual property protections are, in large measure about the desirability of achieving such uniformity at a strong, rather than a weak standard of property rights enforcement. What is being advocated by many in the industrialized West amounts to the universal extension of the institutions and administrative rule structures that first came into existence in those societies, and which have been codified by the Paris Convention for the Protection of Industrial Property (patents and trademarks), the Berne Convention for the Protection of Literary and Artistic Works (copyrights), and other international conventions.

Unlike the discussions of intellectual property institutions in earlier eras, which engaged the attentions of great political and social philosophers, the modern protagonists seem rather unconcerned with questions regarding the "natural rights" of inventors and authors to the fruits of their creative efforts, or the justice of claims advanced on behalf of all humanity to benefit from the collective, social processes through which new scientific and technological ideas arise (for exceptions see, e.g., Dworkin 1981, Davis 1989, Berg 1991). Rather, in keeping with the more pervasively utilitarian spirit of our times, the statutes, legal rulings, administrative regulations and other institutional arrangements affecting patents, copyrights, and trade secrets are widely accepted as public policy instruments designed to enhance economic welfare by stimulating technological progress (see, e.g., Machlup 1958, Wright 1983, Kaufer 1989, Siebeck 1990, Besen and Raskin 1991).

Thus, even though the rhetoric of argument may on occasion appeal to notions of justice and equity, it is modern economic analysis and the latter's characteristic preoccupation with

questions of *efficiency* that now sets the terms of reference in national and international policy discussions involving IPRs. On the one hand, microeconomic analyses highlighting the so-called "appropriability problem" caused by the public-goods-like attributes of scientific and technological information, have come to constitute the most widely accepted over-arching interpretation and supporting rationale for public interventions aimed at correcting the effects of "market failure" -- by creating private property rights to exploit new knowledge, as well as by directing public investments into activities that stimulate invention and innovation (for the *locus classicus* of these arguments, see Arrow 1962).

At the same time, on the other side of the argument and in continuation of a long tradition, economic analysis yields a number of fundamental criticisms of the systems that have been erected to achieve that purpose by creating temporary monopoly rights in intellectual property. It is generally agreed that the aim of a coherent and efficient public policy for furthering technological progress would be to encourage the minimum number of firms to invest in bringing forth new technological know-how, and fostering its application in the commercial sphere by a large number of competitive suppliers. Nevertheless, it is cogently observed that the patent system appears to institutionalize an incentive structure that tends to yield just the opposite results. Rather baldly put, the patent system induces many firms to participate in wastefully duplicative and secretive R&D "races", in the hope of securing the "prize" of an exclusive right to the commercial use of a novel product or process design, the conferral of which tends to restrict the number of firms that will put the new technological knowledge to immediate competitive uses. (See Wright 1983, Kaufer 1989, David 1992a for surveys of recent literature on the economics of patents.)

Modern economic analysis remains hard put to explain or rationalize how an institution supposedly designed to promote welfare through technological progress came to have such perverse effects. Indeed, candor obliges one to acknowledge that economists as a body have been notably unable to agree in formulating much in the way of straightforward, practical advice for the guidance of lawyers, jurists and public policy makers in matters touching on intellectual property protection (see Priest 1986). For example, they have little if anything to say about the following obtrusive discrepancy between their envisioned world of optimal institutional design and reality: the principle conclusion of welfare analysis (in the tradition of Nordhaus 1969, and Scherer 1972) is that the optimal patent length will vary across the range of industries and inventions, because it is sensitive to market demand conditions and technological factors affecting the response of production costs to investment in R&D;

whereas, the plain facts of life are that national patent systems with very few exceptions go on awarding every patentee the same duration of protection.

To take another, very topical illustration of the same point, the modern economic theory of patents and copyrights is uninformative on the question of why the latter should be held in practice to be appropriate for protecting intellectual works in the form of writing, whereas the former are applicable to intellectual works that take the form of "machines". Existing intellectual property systems do assume that writings and machines are two quite different categories of works, each protectable under a distinctive protection regime (see Samuelson 1992:pp.16-17). Patents, typically, are available for inventive advances in "the useful arts", following a rigorous examination conducted by a government agency, based upon a detailed specification of the nature of the invention, its differences from the prior art, and how it came to be made. Copyright subsists in an original work of authorship fixed in a tangible medium of expression from which it can be perceived, but does not require "novelty"; under the modern U.S. Copyright Act, the owner's rights (except for the right to injunctions against infringers) exist independently of any formal registration, prior examination, or determination of the validity of the claim to originality of expression (see Bender 1986). Although patent rights are considerably shorter in duration than those of copyright, they are generally regarded as stronger in conferring protection against independent developers, not just against those who copy the innovation. Moreover, "ideas" or "functional content" are afforded protection under patent law, whereas these are unprotectable under copyright law. Now, inasmuch as the economic analysis of IPRs starts by accepting patent rights and copyrights as "natural" or "primitive" institutional distinctions, it has not been able readily to supply guidance to lawyers debating what to do about economically important intellectual works that fail to fit neatly into one or the other of those two categories. As Pamela Samuelson (1992) has remarked, it is precisely such a failure which lies at the roots of much of the current legal controversy surrounding the protection of computer software, for, software aptly has been characterized as "a machine whose medium of construction happens to be text", and whose creation, therefore, inevitably is an act both of invention and authorship.

One source of the limited practical utility of economic analysis in the re-shaping of intellectual property institutions has been the unfortunate tendency on the part of too many economists to slip into modes of analysis that are essentially *ahistorical*, in seeking both to rationalize and to critique IPR provisions from the standpoint of social welfare theory and optimal mechanism design. The habit is an old one, and deeply entrenched in the literature of microeconomic policy analysis; much has been said, and much could still be said about

the disabilities to which it leads. But, on this occasion it seems important simply to insist that those who would prescribe institutional reforms in the domain of IPRs should not allow their familiar modes of analysis to obscure this bald truth: the complex body of law, judicial interpretation, and administrative practice that one has to grapple with in the area of intellectual property rights has not been created by any rational, consistent, social welfare-maximizing public agency.

Instead, what we are faced with is a mixture of the intended and unintended consequences of an undirected historical process, upon which the varied interests of many parties, acting at different points, some widely separated in time and space, have left an enduring impress. That being the case, it would be really quite remarkable were the historical evolution of legal institutions concerning patents, copyrights and trade secrets, somehow, to have bequeathed to us a set of instruments optimally designed to serve either the public policy purposes, or the private economic interests of individuals and firms who currently seek such protections. Indeed, the first step towards an understanding of many of the policy dilemmas that arise today in regard to the introduction or alteration of intellectual property institutions would seem to be an acknowledgement that the existing statutes enacted by legislative bodies in the West should not be construed as model policy instruments, each contrived to attain some (national) social welfare optimum. If these institutional arrangements are to be viewed as utilitarian appendages of the body politic, it would be far more illuminating to recognize their essential nature as most closely akin to the "thumb" of the Giant Panda -- so justly celebrated by Stephen Jay Gould (1980: Ch.1) as a striking example of evolutionary improvisation yielding a construct that is inelegant yet serviceable. The Panda's thumb is not anatomically a finger at all, much less an opposable, manipulating digit, but, in actuality, is a complex structure formed by the marked enlargement of a bone that otherwise would be a component of the animal's wrist (but for the effect of some genetic mutation) and the related extensive rearrangement of supporting musculature. By this means its owner is enabled to grasp and strip the leaves from the stalks of the bamboo plant, on which the creature feeds exclusively. It is, as Gould says, "a contraption, not a lovely contrivance", and one whose obvious mechanical limitations stem from its remote accidental origins.

Evolutionary processes in biology work largely with the materials that are close to hand. So does institutional evolution, and especially the processes of incremental change and adaptation in legal and other rule-systems that accord great weight to precedent (see, e.g., North 1991, David 1992b). Accordingly, even though the array of legal provision and

administrative rules that we refer to today as comprising the "patent system" and "copyright system" have undergone considerable adaptations in specific form and function over the course of their long history, they appear remarkably resistant to rapid and radical reform. As the nature of new technologies changes, however, it has become evident that the familiar legal contraptions of "patents" and "copyrights" are rather ill-suited to the realities of some of the situations in which they are being put to work (see, e.g., OTA 1986, WIPO 1989) and stand in need of modification or supplementation.

Central to the controversies surrounding the adaptation of intellectual property law, both to new technologies and new national contexts, are the difficulties of achieving consistency in the application of legal principles, and the concerns for preserving the force of precedent, circumscribing ambiguities and uncertainties in the enforcement of rights, and reducing the costs of legal transactions and litigation. Unfortunately, the economist's conventional approach is one of evaluating specific institutional arrangements and policies *in isolation*, and that does not naturally accommodate the foregoing important class of systemic concerns, with which traditional legal scholars so often are occupied. As a consequence, the literature on the economics of patents, copyrights, and trade secrets rarely notices the problems that arise at the interfaces, or in the interstices between those regions of the law. Neither has it paid much concern to the interrelationships and connections between intellectual property and the larger matrix of the law of property, tort, and contract (however, see Cheung 1982, as an exception).

Nevertheless, largely for reasons of precisely the sort that conventional economic analysis has tended to overlook, it is characteristic for legal institutions in politically and culturally stable societies to undergo incremental evolution, rather than radical reformation; for them to preserve many aspects of outward continuity even when it becomes apparent that there has been a change in the circumstances of many of the economic actors affected by the institution, and that a radical transformation has occurred in the inner rationale and motivation for its maintenance (see David 1992b). Explicit recognition of some of the ways in which historical legacies of surprising antiquity continue to shape the nature of the legal protections afforded intellectual property, and thereby affect the allocation of innovative activities, is perhaps the most expedient and effective route to increasing the relevance and realism of the policy recommendations that economics can offer in this area.

II. Intellectual Property Law and Some Legacies of History

Although the history of intellectual property rights in the West is replete with instances of redefinition and reinterpretation in response to pressures to better accommodate or advance the economic interests of members of the society upon whom those laws most directly impinged, many of the structure's gross features continue to reflect the remote historical circumstances in which they originated. The existence of these legacies from the past ought not be ignored, nor should the problematic aspects of such continuities with contexts very far removed from those of the present day be minimized. In persisting, they necessarily impinge upon and influence both the search for new technologies and the organization of economic activities based on the exploitation of the resulting additions to the stock of knowledge.

II.1 Patents

Patents began as instruments used by noble or republican governments in later medieval and early Renaissance Europe primarily to induce the transfer and disclosure of foreign technologies. Even the most cursory attention to this bit of history should give pause to one casual supposition which the basic economic analysis of the patent system has fostered -- viz., that the protection of intellectual property has been instituted where governments recognized there was more to be gained by stimulating indigenous inventive activity, than by applying knowledge of techniques and products that could be "borrowed" freely from the rest of the world.

Patent, the English adjective, means "open", and the noun form abbreviates the term "letters patent" (a literal translation of the Latin *litterae patentes*) -- which refers simply to open letters. These were the official documents by which certain privileges, rights, ranks or titles were conferred and publicly announced; hence they carried the seal of the sovereign grantor on the inside, rather than being closed by a seal on the exterior (see Hill 1924: p. 406). The "openness" involved, thus, was in no sense connected with any disclosure of an invention -- notwithstanding which, misapprehensions about this bit of etymology persist to the present day (see, e.g., Bugos and Kevles 1991). Only much later did the granting of letters patent evolve into social contrivances for the encouragement of original invention.

In the fourteenth century, such grants were employed to encourage the introduction of foreign technologies through the emigration of skilled artisans from abroad, as in the case of the letters patent given to the Flemish weaver, John Kempe, by Edward II in 1331, or the protection granted to two Brabant weavers to settle at York in 1336, or the similar grant

conferred in 1368 upon three clock-makers from Delft (see Federico 1929: p.p 293-95). England at his time was technologically laggard in comparison to many regions on the continent of Europe, and, understandably, was endeavouring to "borrow" the more advanced industrial practices. It was hoped that the foreign master craftsmen would introduce English apprentices to the "mysterie" of their respective arts; but, because they were not likely to remain in control of the newly skilled workers once these had passed into journeyman's status, a cohort of potential domestic competitors would thereby be created from whom the foreign master obviously wished to be protected.

Many of the basic features of the patent are better suited to its initial purposes and historical contexts than to the subsequent use to which the contrivance has been put. The disclosure provisions of modern patent systems, for example, were an essential and natural aspect of the effort to induce foreign artisans to reveal a "mystery", and train domestic craftsmen in its pursuit. Making the conduct of the trade or craft -- and the consequent training of apprentices and journeymen -- a condition for the privilege conveyed by the patent was quite straightforward, since that was the whole object of the exercise. Protecting the instructors from the competition of their students, by giving them a monopoly of the trade directly addressed the spillover problem -- since there was no way those they trained were likely to benefit except by setting up in competition as soon as they learned the "mysterie". (See David and Olsen 1992 for further discussion and formal analysis of this neglected aspect of patent monopolies.)

Even the duration of these early English patents -- 14 years, with 7 year extensions possible -- was not fixed arbitrarily: 7 years was the term of service of an apprentice, and so the protection afforded was to last at least for two generations of trainees. Inasmuch as this was the conventional term of apprenticeship irrespective of the trade or craft, there was some considerable logic to fixing the term of the patent award uniformly across all branches of industry-- even though, as has been pointed out, modern economic analysis finds this aspect of the contemporary patent system difficult to rationalize.

Granting monopolies also made sense fiscally for sovereigns whose powers of taxation and borrowing were very circumscribed. It shifted the market risks to the foreign artisan, and transferred to him also the bother of collecting the excise tax in the form of the markup over his production costs. Finally, there was no need to ascertain that the grantee had originated anything, only that at the time of the grant the practice was not being carried on - - and hence could be presumed to be unknown -- within the sovereign's domains. The criteria of "originality, novelty, and non-obviousness" that have emerged as definitions of

what does and doesn't qualify as an invention at the U.S. Patent Office, and elsewhere, might well be seen as the make-shift results of a two hundred year long struggle to utilize the grant of patent privileges to accomplish a restricted purpose for which, originally, it had not been designed (see Lubar 1990).

Most historical accounts place the origins of systematic state protection for intellectual property firmly in Renaissance Italy, whence it spread elsewhere, first on the continent of Europe, eventually reaching England. But, in the fourteenth and early fifteenth centuries the property rights in question typically took the form of grants for the exclusive exploitation of locally unfamiliar processes or devices that had been originated elsewhere, and more likely than not by individuals other than the one seeking the privilege. Venice took the lead in these developments: as early as 1332 its Grand Council established a privilege fund, providing loans and other rewards for a foreign constructor of windmills who offered to bring knowledge of this art to the city (see Prager 1944: p. 713); in 1416 the Council awarded one Franciscus Petri, from the island of Rhodes, a patent for a superior device for the fulling of fabrics -- giving Petri and his heirs exclusive rights for fifty years to build, alter, and reconstruct the apparatus he would erect for that purpose (see Prager 1960: p. 379; Mandlich 1958: pp.115-16, 149-50; and Long 1991: p. 877).

In this era the practice of granting such *privileggi*, which was hardly confined to Venice, sought the revelation and application of "secrets" -- whether of foreign provenance or the products of native genius. When, in 1421, the Florentine commune awarded a patent to Brunelleschi for a new design of ship which, he claimed, could haul loads more cheaply on the Arno River to the benefit of merchants and others, the nature of the bargain for disclosure was spelled out candidly by Brunelleschi's petition (Prager 1946: pp. 109-110):

"he refuses to make such machine available to the public in order that the fruit of his genius and skill many not be reaped by another without his will and consent, and that, if he enjoyed some prerogative concerning this, he would open up what he is hiding and would disclose it to all."

From about this time forward, the issue of patent privileges for various devices became increasingly frequent, and, by 1460, the Venetian Senate in its administrative practice was differentiating between grants of exclusive monopoly to sell products incorporating an "invention", and awards that forbade use of the device without permission while obligating the holder to grant licenses to others when "reasonable royalties" were offered (see Kaufer 1989: p. 4). Technology importation continued to figure as a primary objective: in 1469 a German, one Johann von Speyer, received an exclusive monopoly of the trade of printing in the Venetian domain in exchange for introducing the craft.

It has become conventional in modern historical accounts of the development of intellectual property protection in the West to assign great significance to the Venetian Senate's passage, on March 19, 1474 of the first general patent law. This seems quite understandable in view of the resonance between present-day preoccupations with stimulating invention and innovation and the language of the famous preamble (transl. by Gilfillan (1964: p. 11):

"We have among us men of great genius, apt to invent and discover ingenious devices....Now, if provisions were made for the works and devices discovered by such persons, so that others who may see them could not build them and take the inventor's honor [sic] away, more men would then apply their genius, would discover, and would build devices of great utility to our commonwealth."

Yet, most authorities view this statute merely as having codified prior practice, rather than enunciating any "novel" principle (see Frumkin 1945, Prager 1948, Phillips 1982, Long 1991). The law required the registration of any "new and ingenious" device not having been made hitherto within the Venetian domain, and prohibited all private parties save the inventor from making it for a period of ten years, on pain of penalties for violation of the code. Furthermore, it appears that between 1474 and 1490 very few patents actually were issued under the Venetian code; this despite the fact that the period right through to the middle of the sixteenth century saw the continued granting of many patent *privileggi* conferring exclusive production rights for terms varying between 5 and 80 years, as well as monopolistic trade privileges (see Kaufer 1989: p. 6).

Despite the rising interest in invention, and the spread on the continent of Europe of the use of patent grants to encourage the development of new industrial practices as an instrument of mercantilist policy in France during the mid-sixteenth century, in England the first clear provision for "patents of invention" -- as distinct from the technology transfer franchises sometimes referred to as "import patents" -- did not emerge before the seventeenth century. It did so then rather as an afterthought, in the course of a movement to free the economy and polity from the abuses of royal grants of monopoly privileges.

With the advent of the Tudor dynasty (1485), the former use of open letters as a means of encouraging national industry had given way to the negotiation by the Crown of secret agreements designed to attract skilled foreign artisans into its own service. German armorers, Italian shipwrights and glass-makers, French ironworkers were enticed to cross the Channel in this fashion. With Elizabeth I's accession to the throne (1558), however, the previous policy of general encouragement for technology transfers was reconstructed: in 1561-1571 many patents were issued by the Crown under this policy, starting with a grant

to two foreigners to introduce the manufacture of hard white Spanish soap, and another for the manufacture of saltpetre -- an item previously imported from Antwerp (see Federico 1929: 293-97). So extensively was the royal prerogative of awarding monopolies of all sorts exercised on behalf of Court favorites and the Crown's fiscal needs, that by 1601 Elizabeth was compelled to promise reforms in order to deflect a Parliamentary challenge to her authority in this regard. Nevertheless, this only deferred the conflict; the abuses and retaliatory efforts to curtail the royal prerogative escalated under James I, until in 1623 Parliament passed the Statute of Monopolies, declaring all crown monopolies, charters and patents thereafter contrary to law. An exception was allowed, however, in the case of royal patents conferring a monopoly for 14 years or less "to the first and true inventor" of a new manufacture (see Federico 1929: p.299).

It is upon this exemption that the British patent system and its derivatives elsewhere have been erected. Even so, the modern reading of the Statute of Monopolies as "the Magna Carta of the rights of inventors" (Machlup 1958: pp. 2-3), is somewhat anachronistic. The verb "to invent" carried far more extensive connotations at that time than it does today. For example, in a famous patent for a pump, granted by James I to Robert Crumpe in 1618, the sense of "invent" included "bringing into use, find, establish or institute manufacture" (Hill 1924: p. 416). In short, only originality in England might be sufficient, since technology transfer, commercialization, and industrial development objectives also were seen as worthy public purposes that could be served through the award of patent monopolies.

The United States' patent institutions were derivative from those of Britain's North American colonies, dating back to early 17th century grants of an *ad hoc* character, resembling import franchise contracts. The first such of these, granted in 1620 by a general court of the Virginia Company's stockholders sitting in England, was awarded to a Mr. Somerscalls for a tobacco curing process patent that was not clearly an original invention (see Bugbee 1967: p. 58). In 1641 the General Court of Massachusetts Bay adopted a number of provisions, including one patterned on the Statute of Monopolies and its exemption, thereby creating a statutory basis on which to grant future patents individually for "such new inventions that are profitable for the Countrie..."(Bugbee 1967: p. 61). Importation of inventions from the 'Old World' was a natural enough proposition for the 'New World' settlers, so it is not surprising that even while British courts during the eighteenth century increasingly construed the purpose of patents to be the encouragement of indigenous invention, American's continued to consider the potential utility of providing incentives for technology transfers. Moreover, even at a later stage, in respect to the conditions of economic

"openness" and competition for mobile resources, the situation of the American colonies and their successor States under the Articles of Confederation, bore a distinct resemblance to those of the city-states and principalities of the Renaissance and early modern Europe.

The Constitutional era ushered in a decisive shift towards preoccupation with protecting national inventive and literary activities, swept away the disparities of treatment that had arisen among the former colonies, and cemented into the structure of federal law the distinctions between patent and copyright protection that today are taken to be fundamental.

Despite the considerable attention to patent policy issues in the American colonies during the latter seventeenth and the eighteenth centuries, up to the hiatus created during the period of the Revolution itself, the first systematized patent provision in America emerged only in 1784, and then as a footnote to the copyright provisions in the South Carolina "Act for the Encouragement of Arts and Sciences." This statute's purpose was to establish literary property protection for a renewable fourteen year term, although the following interesting rider was included (Bugbee 1967: p. 93):

"The Inventors of useful machines shall have a like exclusive privilege of making or vending their machines for the like term of 14 years, under the same privileges and restrictions hereby granted to, and imposed on, the authors of books."

What renders this provision rather intriguing today is that it so closely coupled patent protection with copyright protection, assigning the former as most appropriate to "machines", and the latter to "books", but otherwise barely distinguishing the treatment of the one from the other. The language adopted by the Constitutional Convention in 1787 was influenced strongly by the previous state laws, and so spoke also of securing exclusive rights for "Authors and Inventors" in order to "promote the Progress of Science and useful Arts". Copyright and patents for invention were not mentioned explicitly -- nor were import franchise explicitly rejected -- as the means whereby this purpose might be accomplished.

The formal creation of a patent system during the early days of the U.S.'s nationhood was thus shaped most strongly by the experience of the former British colonies, and hence (except in rhetoric) was little influenced by actions of their revolutionary French contemporaries. The law of 1791, which formally established a patent system in France, continued the practices of the *ancien regime* under which inventors received royal privileges freeing them to exploit their inventions outside the confines of existing guild controls. What was rejected was the legal justification of the practise based upon assertion of the royal prerogative. The new, revolutionary dispensation provided, instead, for the issuance of "brevets d'inventions" grounded in the "natural rights" of citizens to the fruits of their creative genius (see, e.g., Hilaire-Perez 1991; MacLeod 1991: pp. 889-91). Americans were

not so ready to accept this rationale in place of the rather different English legal theory with which they had grown up, however sympathetic in other respects they might be to the French children of the Enlightenment. Even Thomas Jefferson (Koch and Peden, eds., 1972: p. 630) was disparaging of the argument for "natural rights" in intellectual property on behalf of authors and inventors.

The U.S. Senate complied with Washington's recommendation in his address of January 8, 1790, by appointing a Committee whose charge invited the consideration of provisions for the granting of technology importation franchises, as well as patents for invention and copyright protection, all within a single Act. Only the latter two provisions, however, were to emerge from the congressional deliberations of 1790-91 (see Bugbee 1967: pp. 125-148). Indeed, the response of the legislators to mounting pressure for grants of copyright led to the rapid passage of the Copyright Act (1790) first, which then made it necessary to pass a separate Patent Act in the following year, thereby creating the two distinct statutory bases for intellectual property protection in the federal law. Of course, it is the perpetuation of this legal separation -- one body of law having developed to protect inventors of "machines" and the other to protect the authors of "texts" -- that is the source of contemporary difficulties when new technologies, such as computer software is found not to fit neatly into either mold (see, e.g., Samuelson 1984, and Samuelson 1992, for further discussion). Of course, it is not suggested here that the separation between patent rights and copyrights which developed in U.S. law sprang simply from the accidents of the legislative history of the first Federalist administration. Quite the contrary, because the readiness of the members of Congress to deal separately with petitions for grants of copyright, as the State legislatures before them had done, reflected the long antecedent evolution of the law of copyright.

II.2 Copyrights

In its late medieval origins, the copyright privilege had nothing to do with the encouragement of intellectual creativity or originality of expression. Indeed, the very notion of claiming originality of authorship was a Renaissance departure from the scholastic tradition of seeking to cloak one's own ideas with the authority of Aristotle and the other "ancients" (see e.g. Long (1991)). Rights of literary property involving *published* works remained legally unprotected in Europe until the fifteenth century, when the introduction of the printing press made the rewards of publishing -- or plagiarism -- far greater than ever before. The new technology of printing also transformed the economics of the copying business, by substantially increasing the disparity between the cost of the first (printed) copy

and the unit costs of subsequent copies. Copyright law, from its origins, has been shaped more by the economics of "publication" than by the economics of "authorship" (see Patterson 1968; Plant 1974: Ch. 4).

Like the earliest patents of invention, the first known copyrights appeared in Renaissance Italy. By the end of the 1460s the craft of printing had been introduced in Rome and Venice, and, with the issuance of a series of privileges relating to books and printing by the Venetian Cabinet, Senate, and other governmental bodies, during 1469-1517, that city quickly assumed the lead in Italian printing. These *privilegii* included importation franchises the first of which, in 1469, awarded the German printer Johan of Speyer the exclusive privilege to conduct all printing in the city for five years in return for establishing the craft (see Prager 1944: p.715). There soon followed monopolies in the form of exclusive licenses to print or sell an entire class of books for a stipulated term; prohibitions of the importation of books printed abroad; patents for the improvement of printing and typography (see Bugbee 1967: pp.43-44.) The question of rights of authorship was largely disregarded, since much of the demand was for extant works (like the Bible) that were in the public domain, and whose authors -- even when identified -- were long since dead.

However, towards the end of the fifteenth century some privileges were awarded for the protection of authors which did have the character of modern copyright (see Bugbee 1967:p.45). More typical were the copyrights issued to editors and publishers for individual works written by others; these were petty monopolies, prohibiting publication of the work without permission of the grantee. Publishers were soon flocking to the government to reserve well-known titles for themselves, in the hope of either publishing themselves or selling the right to another printer at some future date; in 1517 the resulting shortage of available titles caused the Senate to revoke all such copyright *privileggi* henceforth to "new and previously unprinted works".

What was probably the first general copyright law in the world came in the form of a decree issued by the Council of Ten in Venice in 1544-45, prohibiting the printing of any work unless written permission from the author or his immediate heirs had been submitted to the Commissioners of the University of Padua, but no provision was made to maintain a register of protected works (Bugbee 1967: p.46). This step was prompted by the continued unauthorized printing of works for which copyrights had been granted. A further measure directed toward more complete regulation of the printing business came in 1548-49, with a Council decree establishing a gild into which all Venice's printers and booksellers were to be organized. An added motivation was to assist the Church in the suppression of heretical

literature. The same concern with censorship of a potentially dangerous new medium of communication, rather than securing the rights of authorship, animated the royal officials of sixteenth century France to issue licenses or privileges for the publication of acceptable books.

The French Crown proved better able than the Italian city states to resist the Church's efforts to share control of the printing business.

The Venetian printers' guild was closely resembled by the Stationers' Company which was chartered in England by Mary Tudor a few years later, in 1557. The object was to provide the Catholic sovereign with the instrumentality to effectively control what was could be printed for widespread circulation. Masters of the Company could search the premises of any printer or bookseller for works not printed in accordance with the licensing laws, and, whether or not censorship was obnoxious or desirable in their opinion, they had a strong economic motive to enforce their monopoly by suppressing publications not licensed by the Crown. Indeed, it has been suggested that censorship in England, particularly in the mid-seventeenth century, was more a product than a cause of the Stationers' monopoly (see Patterson 1968: p. 101; Plant 1974 on the Stationers' petition of 1643).

Thus, in England, copyright to begin with was simply a monopoly franchise granted for the purpose of regulating the business of printing and publishing. It had naught to do with the encouragement of "freedom of expression", nor was it intended to promote authorship *per se*. Nevertheless, while copyright was monopolized by the printers of the Stationers' Company, authors in England had personal property rights in their unpublished manuscripts, as well as contractual protections under the common law. These extended to a recognized interest in the integrity of the form and content of the work for which publication permission had been given, thereby restraining printers from making arbitrary alterations in texts once they were published and thereafter dispensing with the need to recompense the author. In short, under these arrangements it was necessary for a stationer, i.e., a printer-copyist, to obtain the author's permission to publish his manuscript, even though the author did not hold the copyright (see Patterson 1968: pp. 65-69).

The modern statutory protection of *authors'* copyrights in the U.S. and Britain arose in the early eighteenth century almost as an historical accident. In England during the closing decades of the seventeenth century, the passing of the era of political and religious censorship made it increasingly difficult for the Stationers' Company to interest the Government in the control of the new printing presses that were springing up throughout the country; when the Licensing Act that had given teeth to its monopoly was allowed to lapse in 1694, the competition intensified as country booksellers openly flouted the doctrine

of perpetual copyright which the Company had sought to establish on the evidence of assignments registered in its record books. After 15 years of increasingly chaotic conditions of unregulated competition, the London booksellers at last managed to secure new legislation, in the form of the 1709-10 Act of Queen Anne. This, the first Copyright Statute, did not give the booksellers the perpetual rights they had sought, but, instead, limited the exclusive right to printing new books registered with the Stationers' Company to a term of 14 years (following the precedent established in the case of patents under the Statute of Monopolies of 1623), and it gave the proprietors of the copyright on existing books the sole right to print for 21 years. Moreover, to open up the trade, the Act of Anne eliminated the guild monopoly on the holding of copyright: anybody now could hold the copyright for a new work -- printers, bakers, cobblers, and even authors.

From the foregoing brief account of the origins of copyright it is evident that the signal distinction between the protection of ideas under patent law and the protection of expression under the law of copyright owes a great deal to the fact that copyright arose in response to both internal and external interests in regulating the nature of competition in the printing and publication business, an industry in which decreasing costs were at an early date felt to be a source of instability. Copyrights, therefore, were inherently concerned with the security of property rights in the expression of ideas -- whether old ideas or new ones. Only much later have they come to be enlisted in the cause of stimulating the production of new knowledge. Is it so surprising, then, that in this new role they sometimes are found to perform rather awkwardly? Consider, as a simple case in point, the recent assignment of copyright law to the task of protecting intellectual property rights in computer software. There it has been observed that the protection afforded to unique expression offers no security for originators of novel algorithms and concepts for applications programs (such as spreadsheets, and relational databases). Yet, at the same time the opportunities that the law creates to protect original expression has had the effect of encouraging an excessive degree of variety in the "look-and-feel" of software, whereas some greater degree of standardization of the machine-user interface is widely felt to be desirable from the standpoint of economic efficiency (see, e.g., Farrell 1989; David and Greenstein 1990).

III. Concluding Reflections

Reflecting upon the major structural features of the institutions of intellectual property protection, and the ways in which these have evolved, it would seem that in these respects public policies effecting innovation in the industrial societies of the West remain "prisoners"

of our particular and peculiar history. Modern economic analysis of IPRs surely offers little basis for resisting that conclusion, for, as Fritz Machlup (1958) observed long ago, in summing up his review of the economics of the patent system:

"If one does not know whether a system 'as a whole' (in contrast to certain features of it) is good or bad, the safest 'policy conclusion' is to 'muddle through' -- either with it, if one has long lived with it, or without it, if one has lived without it. If we did not have a patent system, it would be irresponsible, on the basis of our present knowledge of its economic consequences, to recommend instituting one. But since we have had a patent system for a long time, it would be irresponsible, on the basis of our present knowledge, to recommend abolishing it."

One might be tempted to speculate that other societies, having been brought by a different path to the point of recasting their legal institutions and establishing new systems of property rights, will find themselves drawn by a combination of economic and political factors into attempts at achieving greater institutional "harmony" with the capitalist West in their treatment of IPRs; that by seeking to align their mechanisms for the direction of investments toward the goal of technological innovation with those of the West, they too will become captives of same history.

Historical studies reveal that although patents, copyrights and legal protection of trade secrets are recognizable institutions familiar in western societies for centuries, policies bearing upon the protection accorded to intellectual property, and the juridical-institutional arrangements used to implement them, have been a mutable thing, adapting over time and across societies to the perceived needs and advantages of interested parties. The adaptations that may be seen in each form of protection, moreover, have occurred within the historical context of other, related institutional arrangements affecting the costs and benefits of maintaining specific IPRs.

An implication of this observation is that externally dictated efforts to achieve national compliance with a uniform international regime of IPR protection are almost bound to occasion conflict and controversy. Even where it is possible to argue that a new IP regime could be found that would be Pareto-improving for the countries involved, the need to align domestic and international laws adds additional constraints that tend to render such solutions impractical. As a result, discussions of the "correct" international system of protection for IP are more likely than not to degenerate into rhetorical efforts to impose institutional arrangements that may be well adapted to the national purposes and the domestic legal contexts of one country (or several similar countries), upon societies that are quite different in those respects.

The supposed trade-off between promoting technological progress and technology diffusion, or transfer, has led to the view that strong protection of IP rights must serve the former goal, at the expense of the latter. This has served as a rationale for the conflicts between the technologically advanced and the developing nations over IP issues: an interest in weak or minimal protection for IP is imputed to the developing countries' limited capacity to innovate technologically, and their comparative advantage in imitating the products and processes originated elsewhere. But, this is not necessarily the case. Indeed, just the opposite point may be made both on modern theoretical grounds, and by reference to historical experience: legal protection of intellectual property rights in the form of state-sanctioned monopoly franchises can have seriously detrimental consequences for the processes of discovery and invention, and may be instrumental in bringing about the successful transfer and commercial application of new scientific and technological knowledge. (For further development of this point, see Arora 1991, David 1993:Sect.7).

Thus, it is possible that for those economies whose near term interests would be served by encouraging transfers of commercially applicable knowledge from existing centers of innovative activity in the areas of science and technology, the traditional IPR devices of patent and copyright -- having their remote historical origins in just such strategies for national economic development -- may prove to be very useful. Indeed, in those contexts they may well be more readily attuned and more efficacious than they presently appear to be to the purposes that innovation-oriented firms and governments in the West are seeking to apply them.

REFERENCES

- Arora, Ashish (1991), *The Transfer of Technological Know-How to Developing Countries: Technology Licensing, Tacit Knowledge, and the Acquisition of Technological Capability*. Unpublished Ph.D. Dissertation, Stanford University, November.
- Arrow, Kenneth J. (1962), "Economic Welfare and the Allocation of Resources for Invention," in *The Rate and Direction of Inventive Activity: Economic and Social Factors* (Princeton, N.J.: National Bureau of Economic Research), pp.609-625.
- Barton, John H. (1991), "Adaption The Intellectual Property System to New Technologies." Paper presented to the National Research Council Conference on The Global Dimension of Intellectual Property Rights in Science and Technology, Washinton D.C., 8-9 January 1992. Stanford University School of Law, December.
- Bender, David (1986), "Protection of Computer Programs: The Copyright/Trade Secret Interface," *University of Pittsburgh Law Review*, vol. 47 (906).
- Benko, Robert P. (1987), *Protecting Intellectual Property Rights: Issues and Controversies* (Washington, D.C.: American Enterprise Institute for Public Policy Research).
- Berg, Jeff (1991), "Moral Rights: A Legal, Historical and Anthropological Perspective," *Intellectual Property Journal*, vol. 6, September 1991.
- Besen, Stanley M. and Leo J. Raskind (1991), "An Introduction to the Law and Economics 6 Intellectual Property," *Journal of Economic Perspectives*, vol. 5(1), pp.3-27.
- Bugbee, Bruce (1967), *Genesis of American Patent and Copyright Law*, (Washington, D.C.: Public Affairs Press).
- Bugos, Glenn E. and Daniel Kevles (1991), "Plants as Intellectual Property: American Practice, Law, and Policy in World Context," mimeo (forthcoming in *Osiris*, 1992-93).
- Cheung, Steven N. S.(1982), "Property Rights in Trade Secrets," *Economic Inquiry*, vol. 20 (1), January 1982.
- David, Paul A. (1992a), "Intellectual Property Institutions and the Panda's Thumb: Patents, Copyrights, and Trade Secrets in Economic Theory and History," Center for Economic Policy earch Publication No. 287, Stanford University. April. Forthcoming in the Proceedings of the National Research Council Conference on The Global Dimension Intellectual Property Rights in Science and Technology, Washinton D.C., 8-9 January 1992.
- David, Paul A. (1992b), "Why are Instituions the 'Carriers of History'?": Notes on Path-Dependence and the Evolution of Conventions, Organizations and Institutions." Paper presented to the Stanford Institute for Theoretical Economics (SITE) Workshop on "Irreversibilities", held at Stanford University, 8-22 July, 1992.
- David, Paul A. (1993), "Knowledge, Property and the System Dynamics of Technological Change," *Proceedings of the 1992 World Bank Conference on Development Economics*, L.Summers and S. Shah, eds., Washington,D.C.:World Bank. March.

- David, Paul A. and Shane Greenstein (1990), "The Economics of Compatibility Standards: An Introduction to Recent Research", *Economics of Innovation and New Technology*, vol.1 (1-2): pp. 3-43.
- David, Paul A., and Trond E. Olson (1992), "Technology Adoption, Learning Spillovers, and the Optimal Duration of Patent-Based Monopolies," *International Journal of Industrial Organization*, March.
- Davis, Michael (1989), "Patents, Natural Rights and Natural Property," in *Owning Scientific and Technical Information*, edited by Vivian Weil and John Snapper (London: Rutgers University Press).
- Dworkin, Gerald (1981), "The Moral Right and English Copyright Law," *International Review of Industrial Property and Copyright Law*, vol. 12(4).
- Farrell, Joseph (1989), "Standardization and Intellectual Property," *Jurimetrics Journal*, vol.30 (Fall): pp. 35-50.
- Federico, P. J. (1929), "Origin and Early History of Patents," *Journal of the Patent Office Society*, vol. 11, pp.292-305.
- Federico, P. J. (1929), "Colonial Monopolies and Patents," *Journal of the Patent Office Society*, vol. 11, pp.358-365.
- Frumkin, Maximilian (1945), "The Origin of Patents," *Journal of the Patent Office Society*, vol. 27 (March), pp. 143-149.
- Gilfillan, S.C. (1964), *Invention and the Patent System*, Materials Relating to Continuing ~~Studs~~ of Technology, Economic Growth, and the Variability of Private Investment, Joint Economic Committee, Congress of the United States, (Washington, D.C.: Government Printing Office).
- Gould, Stephen Jay (1980), *The Panda's Thumb* (New York: W.W. Norton & Company).
- Hilaire-Perez, Liliane (1991), "Invention and the State in 18th Century France," *Technology and Culture*, vol.32 (4): pp. 911-931.
- Hill, Thomas A. (1924), "Origin and Development of Letters Patent for Invention," *Journal of the Patent Office Society*, vol. 6, pp.405-422.
- Hirshleifer, J., and J.G. Riley (1979), "The Analytics of Uncertainty and Information: An Expository Survey," *Journal of Economic Literature*, vol. 17, pp.1375-1421.
- Jefferson, Thomas (1972), *The Life and Selected Writings of Thomas Jefferson*, edited by Adrienne Koch and William Peden (New York: The Modern Library, 1972).
- Kaufers, Erich (1989), *The Economics of the Patent System* (Chur, Switzerland: Harwood Academic Publishers, 1989).

- Long, Pamela (1991), "Invention, Authorship, 'Intellectual Property,' and the Origins of Patents: Notes Toward a Conceptual History," *Technology and Culture*, vol. 32, n.4 (October), pp.846-884.
- Lubar, Steven (1990), "New, Useful, and Nonobvious," *American Heritage of Invention and Technology*, v. 6, n.1 (Spring/Summer), pp.8-16.
- Machlup, Fritz and Edith Penrose (1950), "The Patent Controversy in the Nineteenth Century," *Journal of Economic History*, vol. 10(1), pp.1-29.
- Machlup, Fritz (1958), "An Economic Review of the Patent System," Study no. 15 of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, 85th Congress, Second Session (Washington, D.C.: Government Printing Office).
- MacLeod, Christine (1991), "The Paradoxes of Patenting: Invention and Its Diffusion in 18th- and 19th-Century Britain, France, and North America," *Technology and Culture*, vol.32(4): pp. 885-911.
- Mandich, Giulio (1958), "Primi riconoscimenti veneziani di un diritto di privativa agli inventori," *Rivista di diritto industriale*, vol.7, pp.101-155.
- Mody, Ashoka (1990), "The New International Environment for Intellectual Property Rights," in *Intellectual Property Rights in Science, Technology, and Economic Performance: International Comparisons*, edited by Francis W. Rushing and Carole Ganz Brown (Boulder: Westview Press, 1990), pp.203-239.
- Nordhaus, William D. (1969), *Invention, Growth, and Welfare: A Theoretical Treatment of Technological Change* (Cambridge, Mass.: The MIT Press).
- North, Douglass C. (1991), "Institutions," *Journal of Economic Perspectives*, vol. 5(1), pp.97-112.
- Office of Technology Assessment (1986), *Intellectual Property Rights in an Age of Electronics and Information* (Washington D.C.: Congress of the United States, Office of Technology Assessment).
- Patterson, Lyman (1968), *Copyright in Historical Perspective* (Nashville: Vanderbilt University Press).
- Plant, Arnold (1934), "The Economic Theory Concerning Patents for Inventions," *Economica*, vol. 1 (February) :pp.167-195.
- Plant, Sir Arnold (1974), *Selected Economic Essays and Addresses* (London: Routledge & Kegan Paul. [Ch. 4 reprints the author's essay "The Economic Aspects of Copyrights in Books", 1934.]
- Prager, Frank (1944), "A History of Intellectual Property from 1545 to 1787," *Journal of the Patent Office Society*, vol. 26 (November), pp. 711-760.

- Prager, Frank (1946), "Brunelleschi's Patent," *Journal of the Patent Office Society*, vol. 28 (February), pp. 109-135.
- Prager, Frank (1948), translation of Giulio Mandich, "Venetian Patents (1450-1550)", *Journal of the Patent Office Society*, vol. 30 (March) pp.166-224.
- Prager, Frank (1960), translation of Giulio Mandich, "Venetian Origins of Inventors' Rights", *Journal of the Patent Office Society*, vol. 42 (June), pp.378-382.
- Priest, George L. (1986), "What Economists Can Tell Lawyers about Intellectual Property: Comment on Cheung," *Research in Law and Economics*, vol. 8, pp.19-24.
- Rushing, Francis W. and Carole Ganz Brown (1990), *Intellectual Property Rights in Science, Technology, and Economic Performance: International Comparisons* (Boulder: Westview Press).
- Samuelson, Pamela (1984), "CONTU Revisited: The Case Against Copyright Protection for Computer Programs in Machine-Readable Form," *Duke University Law Journal*.
- Samuelson, Pamela (1992), "Adapting Intellectual Property Law to New Technologies: A Case Study on Computer Programs." Paper presented to the National Research Council Conference the The Global Dimension of Intellectual Property Rights in Science and Technology, Washinton D.C., 8-9 January 1992. University of Pittsburgh School of Law, January.
- Scherer, F.M. (1972; 1984), "Nordhaus' Theory of Optimal Patent Life: A Geometric Re-Interpretation, *American Economic Review*, vol. 62, pp.422-427, reprinted in *Innovation and Growth: Schumpeterian Perspectives* (Cambridge, Mass.: The MIT Press), pp.130-141.
- Siebeck, Wolfgang E. (1990), "Strengthening Protection of Intellectual Property in Developing Countries: A Survey of the Literature," edited with Robert E. Evenson, William Lesser, and Carlos A. Primo Braga (Washington, D.C.: World Bank).
- WIPO (1988), "Existence, Scope and Form of Generally Internationally Accepted and Applied Standards/Norms for the Protection of Intellectual Property," WO/INF 129, (Geneva: WIPO) September.
- WIPO (1989), "General Information" (Geneva: WIPO).
- Wright, Brian D. (1983), "The Economics of Invention Incentives: Patents, Prizes, and Research Contracts," *American Economic Review*, vol. 73(4), pp.707.