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REFLECTIONS IN A DARKLING GLASS: A COMPARATIVE CONTEMPLATION OF THE *HARVARD COLLEGE* DECISION

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I. INTRODUCTION

In its landmark 2002 decision *Harvard College v. Canada (Commissioner of Patents)*,[1] the Supreme Court of Canada declined to extend the subject-matter of the Canadian Patent Act to include "higher", or multicellular organisms. The majority opinion penned by Bastarache J. sidestepped the question of whether "lower" or single-celled organisms fit within the Act, but reasoned that the subject-matter categories "art, process, machine, manufacture or composition of matter" recited in the Act are exhaustive rather than illustrative, and that transgenic animals cannot fit the common definition of the categorical language. In particular, despite a masterfully reasoned dissent by Binnie J., the judgment reasoned that Parliament had not considered "higher" or multicellular transgenic organisms when enacting the patent statute. Clearly worried over the environmental, social and moral questions raised by the new technology, the majority further concluded that the structure of the Patent Act reflects no legislative consideration of such questions, and legislative consideration is required before such creatures could be covered by the Act.

Comparison of the judgment to the previous United States Supreme Court case of *Diamond v. Chakrabarty*[2] is perhaps inevitable. Nearly 20 years before the Canadian decision, the landmark *Chakrabarty* opinion launched a new era of U.S. biotechnological

* Copyright 2003 by Dan. L. Burk, Oppenheimer, Wolff & Donnelly Professor of Law, University of Minnesota. My thanks to Boalt Hall Law School at the University of California, Berkeley, and to the University of Minnesota Law School for their financial support in conducting this research. My special appreciation goes to the staff of the law libraries at Boalt Hall and University of Minnesota for literary sleuthing above and beyond the call of duty.

1. (2002), 219 D.L.R. (4th) 577, 21 C.P.R. (4th) 417 (S.C.C.).
2. 447 U.S. 303 (1980).

innovation by addressing the patentability of living organisms, concluding over a vigorous dissent that genetically engineered microorganisms fall within the subject-matter of the U.S. patent statute. Interpreting statutory language essentially identical to that before the Canadian Supreme Court in the *Harvard College* decision, the U.S. majority concluded that the statute's subject-matter recitation is representative, not exhaustive, and that transgenic organisms must be considered "compositions of matter" in any event. The *Chakrabarty* opinion further concluded that the legislative brief of the statute extended U.S. patent law to "anything under the sun made by man",[3] and that concerns over the social impact of new technologies should be explicitly addressed by the legislature, not read into the inclusive subject-matter of the patent statute.

Even this cursory recitation of the two cases' reasoning makes clear the U.S. court's rejection of precisely the arguments, inferences and statutory interpretation that the Canadian court embraced. Indeed, it is tempting to view the *Harvard College* decision as a mirror image of *Chakrabarty*, in which the majority and dissenting positions of the U.S. opinion are simply inverted. Bastarache J.'s *Harvard College* majority reasons follow the minority arguments penned by Brennan J. in *Chakrabarty*, while Binnie J.'s *Harvard College* dissent relies even more heavily on the reasoning of the *Chakrabarty* majority opinion. Despite the difference in organisms considered, the Canadian judgment might be taken for a back-to-front exploration of the issues already resolved — albeit differently — in the United States.

But the Canadian judgment is more than simply an inversion of *Chakrabarty*. As Alice discovered in her looking-glass odyssey, objects on the other side of the mirror are not simply inverted back to front, but frequently distorted in the most wild and wonderful fashion. Viewing matters from the inside out shows us the familiar in new and startling ways. Dickens embodied this effect in the startling word "moor-eeffoc" — that is, "coffee-room" viewed from the inside of a glass door, which became for him and for subsequent generations of writers the key to a sudden realization of the strangeness surrounding us in seemingly settled and ordinary circumstances.[4]

3. *Ibid.*, at p. 309 (citing S. Rep. No. 82-1979, at p. 5 (1952); H. R. Rep. No. 82-1923, at p. 6 (1952)).
4. See John Forster, *The Life of Charles Dickens* (London, Chapman and Hall, 1872), p. 29. Dickens appears to have seen this word primarily as a surprising reminder of the childhood circumstances under which he first noticed it. It was Chesterton, and later

In the same fashion, far from being merely *Chakrabarty*'s reflection in a darkling glass, the *Harvard College* judgment offers a new vantage point from which to view a landmark U.S. opinion that has for the most part become simply part of the landscape in American patent law. The impact of *Chakrabarty* has been underappreciated, not so much as the key decision enabling biotechnology patenting, but as the key decision enabling a peculiar statutory and institutional structure in U.S. patent law. That role is highlighted by comparison with the analytical assumptions latent within *Harvard College*. By the same token, juxtaposition of the two cases throws into high relief the startling features of the Canadian court's reasoning, and it is these unexpected aspects of the decision that I primarily hope to highlight in this article.

In doing so, I shall resist as best I can the temptation to engage in a sharp doctrinal critique of the *Harvard College* majority reasons, although they surely deserve one. The judgment is badly reasoned and rife with logical inconsistencies, such as a rationally indefensible distinction between "lower" and "higher" organisms, as well as an inexplicable reliance on vitalism to conclude that "higher" organisms — but not "lower" ones — constitute something other than compositions of matter. Apparently in Bastarache J.'s world, some ineffable "force that through the green fuse drives the flower"[5] provides a mystical dividing line between animal, mineral and vegetable, although that distinction seems more properly a matter of religion than a matter of law.

The opinion cries out for such critique, and perhaps one of the other participants in this symposium will provide it. For my part, I come not to bury Bastrache J.'s opinion, but to praise it. Despite all its conspicuous faults, it constitutes an astonishingly bold policy maneuver, launching the Canadian patent system on an original and innovative trajectory that is probably unique in any industrialized nation. Admittedly, one suspects that the originality is inadvertent, and that what I perceive as boldness may simply be imprudence. But consciously or unconsciously, by rejecting not

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Tolkien, who interpreted the incident as an icon of re-viewing the ordinary. See Gilbert Keith Chesterton, *Charles Dickens* (New York, Dodd, Mead, & Co., 1906), pp. 47-48 (1906); J.R.R. Tolkien, "On Fairy-Stories", in *Essays Presented to Charles Williams* (Oxford, O.U.P., 1947), pp. 74-75.

5. See Dylan Thomas, "The Force that Through the Green Fuse Drives the Flower", *The Poems of Dylan Thomas* (2003).

only the doctrinal but the structural assumptions that have undergirded the U.S. patent system for the past 20 years, *Harvard College* provides us with what is bound to be a fascinating experiment in patent policy, or perhaps the negative control in a larger international experiment in patent policy. I begin exploration of that larger experiment by describing the positive control, the United States.

II. BEYOND BIOTECHNOLOGY

The landmark decision of the United States Supreme Court in *Diamond v. Chakrabarty* has become almost synonymous with its narrow holding extending the scope of patent law to living subject-matter, thus fostering the use of patents within the biotechnology industry. What tends to be forgotten is the almost immediate impact of *Chakrabarty* on the subject-matter question in other areas, most notably patenting of computer software. During the same period that *Chakrabarty* and other biotechnology cases were wending their way through the lower courts and ultimately to the Supreme Court, software cases were under active consideration in the same courts, and the history of the two technologies is clearly intertwined. Both technologies were perceived to raise issues regarding the patentability of "laws of nature" or "products of nature", that is, fundamental materials or principles drawn directly from a natural state. Resolution of this issue for one technology helped define the limits of patentability, facilitating resolution of the issue for the other technology.

Software in some senses blazed the trail for biotechnology, as cases involving software patentability reached the Supreme Court first. The court initially seemed to indicate that software algorithms could not be protected under patent law.[6] In *Gottshalk v. Benson*,[7] the Supreme Court considered an automated method of transforming one type of numerical notation to another. This algorithm the court likened to a mathematical equation, a paradigmatic example of the "laws of nature" that are excluded from patentable subject-matter. The court reached much the same result in the subsequent case of

6. See generally Pamela Samuelson, "Benson Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions" (1990), 39 Emory L.J. 1025.

7. 409 U.S. 63 (1972).

Parker v. Flook,[8] where the software in question was used to set an "alarm limit" in an industrial chemical process. Like principles or laws of nature, numerical inputs and outputs were considered to lack the tangibility necessary to come within patentable subject-matter.

But the court modified its approach in *Diamond v. Diehr*[9] to hold that software could be patentable under rather stringent constraints. In particular, the Supreme Court specified that the operation of the computer program must be tied to some physical result — almost a "fixation" rule for patent law.[10] In *Diehr*, the court firmly rejected the contention that an industrial process was unpatentable subject-matter when governed by a computer processor that employed a mathematical equation as part of its control algorithm. The court instead held that software that is instantiated or embedded within some tangible artifact may be patentable subject-matter; only pure or "naked" algorithms, algorithms in the abstract, are excluded from patentability.

This requirement of a physical result linked to the computer process was at first applied with some rigor.[11] However, lower courts, particularly the Court of Appeals for the Federal Circuit, have incrementally stretched the *Diehr* holding to the point that patent now covers essentially any sort of software, in almost any embodiment.[12] As a consequence, throughout the last decade of the twentieth century, lower U.S. courts became progressively bolder in affirming software patents, so long as the claims were tied to some physical substrate. This led to what has been termed the "doctrine of magic words",[13] whereby all manner of software inventions were classified as anything but software in order to meet the formality of the subject-matter definition. To constitute patentable subject-matter, the software needed simply to produce some physical change in a machine, which the steps of a software algorithm unquestionably

8. 437 U.S. 584 (1978).
9. 450 U.S. 175 (1981).
10. *Ibid.*
11. See, *e.g.*, *In re Schraeder*, 22 F.3d 290 (Fed. Cir. 1994) (method held unpatentable when not limited by physical elements or process steps).
12. See *In re Beauregard*, 53 F.3d 1583 (Fed. Cir. 1995) (appeal dismissed when patent office agreed that claims drawn to embodiment of software in a floppy diskette encompass patentable subject-matter).
13. Julie E. Cohen and Mark A. Lemley, "Patent Scope and Innovation in the Software Industry" (2001), 89 Calif. L. Rev. 1 at p. 16.

do: the execution of each step in a computer program places the hardware in a different electrical or magnetic state.[14]

Thus, stored data in a conventional computer memory were held patentable, since the storage of the data places the machine in a different state than it would otherwise have been.[15] Storing data or computer code on a magnetic disc was similarly considered to produce a novel and non-obvious article of manufacture, since the magnetic disc with the stored data differs from the disc without it.[16] Consequently, the courts ultimately threw out the subject-matter recitations of the statute, concluding that "it is of little relevance whether [a software] claim . . . is directed to a machine or a process",[17] since under this view the "process" produces a series of different "machines".

The courts had rather less difficulty implementing the Supreme Court's direction with regard to biotechnology, although the same issues were implicated. Long before *Gottshalk v. Benson*, the Supreme Court had in *Funk Bros. v. Kalo Inoculant Co.*[18] extended the "laws of nature" doctrine to "products of nature", rejecting as unpatentable a mixture of microorganisms drawn unchanged from their natural state. *Funk Bros.* provided the precedent for *Gottshalk*, and also formed the basis for the U.S. Patent Office rejection of a purified bacterial culture claimed in *Ex Parte Bergy*,[19] as well as for rejection of a genetically modified microorganism considered in *In re Chakrabarty*.[20] Both these decisions were overturned by the Court of Custom and Patent Appeals in sequential appeals, on the grounds that each organism met the subject-matter requirement by virtue of human intervention.[21] *Bergy* was appealed to the Supreme Court, which vacated the appellate judgment and remanded for consideration in light of *Parker v. Flook*[22] — clearly, the High Court saw a close connection between the subject-matter question presented by software and that presented by transgenic organisms.

14. See, *e.g.*, *In re Alappat*, 33 F. 3d 1526 at p. 1545 (Fed. Cir. 1994) (en banc).
15. *In re Lowry*, 32 F.2d 1579 (Fed. Cir. 1994).
16. See *In re Beauregard*, *supra*, footnote 12.
17. *State Street Bank & Trust Co. v. Signature Fin. Group*, 149 F.3d 1368 at p. 1371 (Fed. Cir. 1999).
18. 333 U.S. 127 (1948).
19. 197 U.S.P.Q. (BNA) 78 (BPAI 1976).
20. 571 F.2d 40 (C.C.P.A. 1978).
21. *Ibid.*; 563 F.2d 1031 (C.C.P.A. 1977).
22. *Parker v. Bergy*, 438 U.S. 902 (1978).

On remand, the intermediate appellate court considered the *Chakrabarty* and *Bergy* cases together, but rejected any connection to *Flook*, stating that no algorithm, formula or law of nature was involved in the biotechnology applications.[23] *Chakrabarty* was then appealed without its companion case, to become the landmark patentability opinion that opened the doors of the U.S. Patent Office to commercial biotechnology.[24] The opinion's expansive approach to subject-matter was quickly applied to transgenic animals, transgenic plants and other biotechnological subject-matter.

1. Permissive Patenting

In a very real sense, then, the *Chakrabarty* opinion was not simply the answer to the question of whether life forms were patentable, but to the contemporary question of whether software should be patentable, although some time was required for the answer to be embraced in software as it was in biotechnology. It was in the context of business methods that the expansion of patentable subject-matter to "anything under the sun made by man" reached its predictable endpoint.[25] Well before the Supreme Court's consideration of software patentability, business methods had become essentially a suspect class of subject-matter, as they typically involved either abstract mathematical processes or manipulation of symbolic *indicia* that had long been excluded from patentability.[26] But with the progressive acceptance of such processes or symbolic manipulations under the guise of software, the presumption against patentability of business methods became itself suspect, particularly as such methods became increasingly implemented via software-based products.

The ultimate end-point of this progression was the decision of the Federal Circuit in *State Street Bank & Trust v. Signature Financial Group, Inc.*,[27] declaring the patentability not only of automated business methods, software and transgenic mice, but quite literally of "anything under the sun made by man". Relying upon the expansive statutory reading of *Chakrabarty*, the Federal

23. *In re Chakrabarty*, 596 F.2d 952 at p. 977 (C.C.P.A. 1979).
24. *Chakrabarty, supra*, footnote 2.
25. See Robert P. Merges, "As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform" (1999), 14 Berkeley Tech. L.J. 577.
26. See Dan L. Burk, "Patenting Speech" (2000), 79 Tex. L. Rev. 99.
27. *Supra*, footnote 17.

Circuit opted "not to place any restrictions on the subject matter for which a patent may be obtained beyond those specifically recited" in the statute. This has thrown wide the doors to a disturbingly permissive collection of issued patents, many of which can only be described as uncommonly silly.[28] The full effects of this expansive approach have yet to be gauged, but those effects arise from embracing the fullest possible meaning of *Chakrabarty*'s expansive declaration on subject-matter.

It is worth noting that despite some early obstinacy, the European Union has followed the same pathway as U.S. law, although a bit more slowly. Article 52 of the European Patent Convention ostensibly excludes computer programs from the definition of "invention". But finding resistance futile, the EPO was inexorably drawn toward the same interpretation of this requirement that U.S. courts had previously adopted. Consequently, computer program patents routinely issue from both the EPO and national patent offices under the "magic words" theory that programs produce the required technical effect when run on a machine.[29] The EU has shown some ambivalence about following the United States the next step down the road of business methods patenting, but as of the time of this writing, appeared poised to head in just the same direction, explicitly extending patent protection to any method running on a machine.[30]

Much like the EU, Canada appears to have begun the slide down this same slippery slope. The Canadian case law is sparse, but follows both the pattern and the trajectory set in U.S. cases, albeit trailing the U.S. doctrinal development by a decade or so. The principal Canadian software decision, found in the 1981 Federal Court of Appeal decision *Schlumberger Canada Ltd. v. Commissioner of Patents*,[31] reflects the U.S. Supreme Court's *Gottschalk* jurisprudence of the previous decade. *Schlumberger* contemplated

28. See James Gleick, "Patently Absurd", *New York Times Magazine* (March 12, 2000) at p. 44; see also John R. Thomas, "The Patenting of the Liberal Professions" (1999), 40 B.C. L. Rev. 1139; Rochelle Cooper Dreyfuss, "Are Business Method Patents Bad for Business?" (2000), 16 Computer & High Tech L.J. 263.

29. See Wolfgang Tauchert, "Patent Protection for Computer Programs — Status and Current Developments" (2000), 31 Int'l Rev. Indus. Prop & Copyright L. (IIC) 812 at pp. 818-19.

30. See Proposal for a Directive of the European Parliament and of the Council on the Patentability of Computer-Implemented Inventions, COM (2002) 92 Final 2002/0047 (COD).

31. (1981), 56 C.P.R. (2d) 204, [1982] F.C. 845 (C.A.), leave to appeal to S.C.C. refused 63 C.P.R. (2d) 261.

claims drawn to a computerized method of analyzing seismic prospecting measurement data. The Canadian court held the claimed invention to constitute unpatentable calculations. Much as in the parallel U.S. cases, this holding was based largely upon characterization of the method as a "mere scientific principle or abstract theorem" and so unpatentable under s. 28(3) of the Canada's Patent Act. The opinion contains not only the familiar "laws of nature" rationale, but a "mental steps" rationale, reasoning that that if the calculations were performed mentally by a human, rather than by a computer, the subject-matter would not satisfy the statutory definition of invention.

Based on the *Schlumberger* opinion and its subsequent interpretation by the Patent Appeal Board, the Canadian Intellectual Property Office in 1995 issued examination guidelines limiting software claims to those included in a new and useful process, where integrated with another system that comprises patentable subject-matter. But the doctrine has continued to shift, as evidenced by the 1998 decision of the Patent Appeal Board in *Re Motorola Inc. Patent Application No. 2,085,228.* The application at issue disclosed a method and device for rapidly and efficiently determining an inverse trigonometric value of an input value. Although this would seem to be the type of abstract application precluded by the *Schlumberger* opinion, the board reasoned that the application met the patentability criteria because the claims were drawn to read-only memory coupled to modification means, limiting the patent to a specific physical configuration. Thus, the patentee would be able to exclude others from using the specific device claimed, but not the underlying algorithm.

Thus, while the 1995 guidelines of the Canadian Intellectual Property Office appear to limit software patenting to physical devices implementing software-related processes,[32] this stance in fact recapitulates the familiar U.S. "doctrine of the magic words"; inventors must simply avoid claims with preambles reciting "a computer program" or "computer software" and instead claim the software in terms of the state of the machine. The next step on that path, already well-trodden by U.S. courts is to realize that the snark is a boojum, and that the "devices" on which patents have been issuing are in truth software patents, and might as well be labeled such. This throws wide the doors for a decision like *State Street,* admitting into

32. <http://strategis.ic.gc.ca/sc_mrksv/cipo/patents/mopop_dnld-e.html>.

patentable subject-matter business methods and disembodied but "useful" processes of every sort.

Or perhaps not. Without the *Chakrabarty* slogan of "anything under the sun made by man", a decision paralleling *State Street* becomes less likely. The Supreme Court of Canada has in *Harvard College* rejected such a reading of the Canadian statute, and there is no reason to think that the "unique concerns" raised by software are better addressed by the structure of the Act than are those raised by complex living organisms. Neither is it likely that software was any more within the contemplation of Parliament in 1869 when it adopted the Act's language defining "invention" than were transgenic mice. Nor is software likely to fit the confined definitions of "machine", "composition of matter" or "manufacture" adopted in *Harvard College*; under that approach all these words connote materiality, which software lacks. Software might constitute an "art" or "process", but if such inventions must be instantiated by physical means, as *Schlumberger* suggests, then the slide down the slippery slope to *State Street* might be arrested.

Thus, the narrowest implication of such reasoning is that the *Harvard College* decision unexpectedly sets Canada on a new path, not merely for biotechnology patenting, but for software patenting — rather than following the well-worn track trodden by the United States and the European Union, Canada may perhaps have broken away from the road that its predecessors have found leads inexorably from tangible results to "magic words" to the let-it-all-in doctrine of *State Street*. But the broader implications of this conclusion are rather more startling: if *Harvard College* remains undisturbed, Canada becomes, as I have suggested above, the negative control in the patent system experiment begun by the United States in *Chakrabarty*. And it is to the broader implications of that experiment that I turn next.

III. SETTING PATENT POLICY

I have suggested that the *Harvard College* decision excludes more than mice from Canada's Patent Act, and the reasoning employed to obtain that result likewise resonates throughout the Canadian patent system. In both the United States and in Canada, the assumptions built into, respectively, *Chakrabarty* and *Harvard College* carry important consequences for the patent system as a whole. The first of these concerns what we might term the default

setting of the patent statute. Unlike *Chakrabarty*, which set the U.S. statutory default to allow patenting of new technologies, while inviting Congress to exclude from the statute any newcomers to which it objects, *Harvard College* sets the Canadian default to exclude from patentability new technologies, with an invitation to Parliament to include any newcomers that it wishes to consider. *Chakrabarty* assumes that the door is open and it is up to Congress to shut it; *Harvard College* assumes that the door is shut and it is up to Parliament to open it.

This in turn has profound structural consequences for the institutions touched by the statute: the courts, the legislature and the administrative agency that plays gatekeeper to the system. I shall focus on the first of these actors, with an additional few words about the last. Oddly enough, each of the North American statutory defaults is set in the name of judicial deference. The United States Supreme Court defers to Congress the task of explicitly excluding unwanted subject-matter; the Canadian Supreme Court defers to Parliament the task of explicitly including desirable new subject-matter. Where the U.S. *Chakrabarty* opinion effectively assumes for the judiciary the role of technological gatekeeper, the *Harvard College* majority explicitly rejects such a role for the courts.

This places upon the legislature the onus of accommodating new innovation, passing *sui generis* statutes or specialized patent amendments for the benefit of each technological advance. Explicit in the Canadian decision is the requirement of a statutory amendment to bring "higher organisms" within the scope of the Act. But implicit in that reasoning is the need for a statutory amendment to bring any new technology within the scope of the Act. I have already shown how Bastarche J.'s majority opinion places software outside the contemplation or wording of the Act, and it is similarly unlikely that Parliament has contemplated nanotechnology or quantum computing, or whatever the next wave of socially transformative — but probably socially controversial — technology should prove to be.[33]

But past experience with such specialized statutes is not encouraging. In the United States, the poster child for failed *sui generis*

33. For an early preview of the coming controversies over nanotechnology, see Glenn Harlan Reynolds, "Environmental Regulation of Nanotechnology: Some Preliminary Observations" (2001), 31 Envir. L. Rep. 10681; Fredrick Fiedler and Glenn Harlan Reynolds, "Legal Problems of Nanotechnology: An Overview" (1995), 3 S. Cal. Interdisc. L.J. 593.

legislation has been the notoriously neglected Semiconductor Chip Protection Act.[34] Passed at the behest of the U.S. semiconductor industry after six years of legislative debate, the SCPA created a detailed set of rules designed to protect the "mask work" or circuit design pattern etched into semiconductor chips. The statute was tailored specifically to the purported needs of the industry, including special provisions on reverse engineering and other practices common to semiconductor circuit design. The ostensible reason was to protect American innovation from foreign competitors. But the statute has virtually never been used to enforce the rights it created, generating only one published judicial opinion since its enactment.[35] The most likely reason is that the particular focus of the SCPA — duplication of mask works — is obsolete because the nature of the semiconductor business changed to make the manufacturing process much more difficult — and hence harder to imitate at low cost.[36] The foreign competition so feared by U.S. chip fabricators has all but vanished, and the industry appears to be thriving without recourse to its specialized statute.

A similar story could be told regarding industry-specific patent statutes, such as the biotechnology-specific amendments to the U.S. patent statute's obviousness provisions.[37] Like the SCPA, the biotechnology obviousness provisions were enacted after lobbying by the biotechnology industry, which claimed that the general standard for obviousness failed to meet the special process-based characteristics of their industry, requiring *a sui generis* standard. But the biotechnology amendment became irrelevant nearly as soon as it was enacted, in part because general patent standards now reach the same result,[38] and lack the more onerous procedural requirements of the specialized provision.

Preliminary studies of the U.S. Plant Patent Act and Plant Variety Protection Act (PVPA), as well as the European Union's relatively recent database directive, suggest that similar stories might be told in the cases of those specialty statutes as well.[39] The sorry history of

34. 17 U.S.C.A. §§ 901-914 (hereafter SCPA).
35. See *Brooktree Corp. v. Advanced Micro Devices*, 977 F.2d 1555 (Fed. Cir. 1992).
36. See Mark A. Lemley *et al.*, *Software and Internet Law*, 1st ed. (New York, Aspen Publishers, 2000) at p. 411 (making this point).
37. *Cf.* 35 U.S.C. § 103(b).
38. See *In re Ochiai*, 71 F.3d 1565 (Fed. Cir. 1995).
39. See Mark D. Janis and Jay P. Kesan, "U.S. Plant Variety Protection: Sound and Fury . . .?" (2002), 39 Houston L. Rev. 727 (reviewing use of United States PVPA); Stephen M. Maurer *et al.*, Europe's Database Experiment, 294 Science 789 (reviewing impact of EU Database Directive).

such industry-specific statutes suggests that they will typically turn out to be failures, because they are drafted with the technology at the time of their passage in mind, and are not sufficiently general to accommodate the inevitable changes in technology. This general problem with statutory obsolescence was identified by Guido Calabresi more than 20 years ago,[40] and becomes particularly acute in the case of technologically oriented statutes.[41] Binnie J. seems to have had this problem well in mind when he observed in dissent that "[s]tatutory subject matter must be framed broadly because by definition the Patent Act must contemplate the unforeseeable".[42]

1. Statutory Tailoring

I have argued elsewhere in collaboration with Mark Lemley that where common-law rule making is available, it is the courts that both can and should engage in such deliberate modulation of a general patent statute.[43] The business of innovation is too dynamic for a patent statute to function in any other way. Not only do new technologies come into existence and old ones fade into obscurity, but the innovation profile of industries varies from sector to sector, and from time to time. There exist broad disparities across economic sectors in the cost of research and development, the length of product cycles, the return on investment, and the cost of obtaining patents itself. The incentives necessary to promote innovation in the pharmaceutical industry are not those necessary to software, or to semiconductors. The incentives necessary to a mature software industry are not those that were once necessary to nascent software developers.

Only a dynamically interpreted statute can hope to meet the needs of so many disparate industries. The likelihood that a unitary, unvarying and monolithic statute could supply the correct level of incentive under so many circumstances is essentially nil. The prospect of the legislature continually revisiting the circumstances of each industry and passing appropriate new legislation for each

40. See Guido Calabresi, *A Common Law for the Age of Statutes* (Cambridge, Mass., Harvard U.P., 1982).
41. See Suzanna Sherry, "Haste Makes Waste: Congress and the Common Law in Cyberspace" (2002), 55 Vand. L. Rev. 309.
42. *Harvard College*, *supra*, footnote 1, at para. 43.
43. See Dan L. Burk and Mark A. Lemley, "Policy Levers in Patent Law", 89 Va. L. Rev. 101 (2003); Dan L. Burk and Mark A. Lemley, "Is Patent Law Technology Specific?" (2003), 17 Berkeley Tech. L.J. 1155.

situation is equally untenable — as Grant Gilmore long ago observed, "getting a statute enacted in the first place is much easier than getting the statute revised so that it will make sense in the light of changed conditions".[44] In democratically elected legislatures, an enormous commitment of political capital is typically required to draft, promulgate and reach consensus on new intellectual property legislation, especially if the legislation is to be supported by credible fact-finding and reliable expertise. The issues involved are typically not magnets of populist sentiment, and are more likely to be viewed as esoteric and obscure to voters. We can anticipate serious legislative investigation of, and response to, specialized industry needs to be relatively rare events.

Indeed, the general populace's lack of interest in such legislative amendments lends itself to a corollary and more serious concern, as predicted both by public choice theory[45] and by practical experience. Each time the legislature reopens the patent statute to amendment, the opportunity arises for counterproductive lobbying by special interest groups, not the least of which will be the industry to which the amendment is directed. Technology-specific patent legislation encourages rent-seeking, either by those who stand to benefit directly from favourable legislation or by those who will seize each new legislative opportunity to hijack the amendment process for their own benefit. This has been the history of the U.S. copyright statute, where industry-specific rules and exceptions have led to a bloated, impenetrable statute that reads like the tax code, which is itself the product of such special-interest rent-seeking.[46] Patent law has some balance today in part because different industries have different interests, making it difficult for one interest group to push through changes to the statute. Industry-specific legislation is much more vulnerable to industry capture. It is no accident that the industry-specific portions of the patent law are among the

44. Grant Gilmore, *The Ages of American Law* (New Haven, Yale U.P., 1977), p. 95.
45. See Daniel A. Farber and Philip P. Frickey, "The Jurisprudence of Public Choice" (1987), 65 Tex. L. Rev. 873.
46. On the unnecessary complexity of the copyright laws, see Jessica Litman, *Digital Copyright: Protecting Intellectual Property on the Internet* (Amherst, N.Y., Prometheus Books, 2001), p. 25; Jessica Litman, "Revising Copyright Law for the Information Age" (1996), 75 Or. L. Rev. 19 at pp. 22-23; Jessica Litman, "The Exclusive Right to Read" (1994), 13 Cardozo Arts and Ent. L.J. 29 at p. 34.

most complex and confusing sections,[47] and that they have had some pernicious consequences.[48]

This viewpoint stands admittedly at odds with the conventional wisdom parroted by the *Harvard College* majority, that legislatures carry an inherent institutional advantage in detailed fact-finding, and in reflecting social consensus. But it is on this point of institutional competence that the divergence between *Chakrabarty* and *Harvard College* becomes most apparent. While deferring ultimately to Congress's legislative veto, the U.S. Supreme Court in *Chakrabarty* recognizes that statutes differ in the specificity with which they dictate the rules for judicial decision. Statutes exist on a continuum. At one end lie the kind of tightly drafted detailed rules — such as the U.S. tax code — that Grant Gilmore characterized as "aimed at an unearthly and superhuman precision".[49] As Gilmore noted, such statutes are drafted precisely to curtail judicial interpretation but are nearly impossible to adjust "to changing conditions without legislative revision".[50]

At the other end of the continuum lie general delegations of authority to judges to make correct decisions.[51] The Sherman Act presents a good example of such a statute, where a set of relatively short directions has generated a robust body of antitrust law. *Chakrabarty* treats the U.S. Patent Act as the latter kind of statute, lying closer to antitrust law than to a tax code. While the statute sets the basic parameters for patentability and infringement, it does not specify in detail how those basic principles are to be applied. And, in many instances, judicially created doctrines have played a major role in defining the scope of patent protection.[52] Such tailoring

47. In particular 35 U.S.C. §103(b) (biotechnological proceses), §155A (private patent relief), §156 (pharmaceutical patent term extension), and §287 (medical process patents).
48. The Hatch-Waxman provisions, 35 U.S.C. §156, in particular have been used on numerous occasions to violate the antitrust laws. Pharmaceutical patent owners have colluded with putative generic entrants to prevent the first generic entrant or any other from entering the market. See *Andrx Pharms, Inc. v. Biovail Corp.*, 256 F.3d 799 (D.C. Cir. 2001); *In re Cardizem CD Antitrust Litigation*, 105 F. Supp. 2d 682 (E.D. Mich. 2000).
49. Gilmore, *supra*, footnote 44, at p. 96.
50. *Ibid.*
51. The U.S. antitrust laws are an obvious example of the latter. The few sentences of Sherman Act, ss. 1 and 2, 15 U.S.C. §§1-2 (2000), have spawned a vast set of judicially created standards for identifying and punishing anticompetitive behavior.
52. See, *e.g.*, Richard Gilbert and Carl Shapiro, "Optimal Patent Length and Breadth" (1990), 21 Rand J. Econ. 106 (emphasizing the importance of patent scope to incentives); Robert P. Merges and Richard R. Nelson, "On the Complex Economics of Patent Scope" (1990), 90 Colum. L. Rev. 839 (same).

activity necessarily vests a fair degree of discretion in the judiciary in order to adapt the general statute to the particular circumstance. The *Chakrabarty* decision effectively situates in the courts such discretion for new technologies.

The formulation of statutory discretion to administer patent law thus reflects to some extent the long-running debate over the comparative merits of rules versus standards.[53] Within this debate, "rules" have been characterized as bright-line and definite decisional criteria. Because they are simple and straightforward, rules are cheap to administer; but due to their inflexibility, they may lead to costly outcomes if they fit a given situation poorly. Standards, by contrast, are characterized as flexible case-by-case decisional criteria that can take situational variance into account. But because standards are typically and intentionally stated indeterminately, they offer little guidance to expected behavior and so may impose costs associated with this uncertainty. Because of their flexibility and *a priori* indeterminacy, however, standards typically imbue courts or decision-makers with greater discretion than would a rigid decisional rule, and so standards will be favoured where greater discretion is needed.

Chakrabarty effectively takes a standards-based approach to patentable subject-matter, treating the subject-matter recitations of the U.S. statute as highly malleable indicators of the Congressional intent — products of nature remain outside the class of patentable subject-matter, whereas any technology considered to be the product of human intervention should fit one or more of the categories "process, machine, manufacture, or composition of matter".[54] *Harvard College*, by contrast, opts for what is essentially a rule-based

53. The body of literature on this topic is extensive. See, *e.g.*, Louis Kaplow, "Rules versus Standards: An Economic Analysis" (1992), 42 Duke L.J. 557; Duncan Kennedy, "Form and Substance in Private Law Adjudication" (1976), 89 Harv. L. Rev. 1685; Russell B. Korobkin, "Behavioral Analysis and Legal Form: Rules vs. Standards Revisited" (2000), 79 Or. L. Rev. 23; Eric A. Posner, "Standards, Rules, and Social Norms" (1997), 21 Harv. J.L. & Pub. Pol'y 101; Frederick Schauer, *Playing by the Rules: A Philosophical Examination of Rule-Based Decision-Making in Law and in Life* (Oxford, Clarendon, 1991); Pierre Schlag, "Rules and Standards" (1985), 33 UCLA L. Rev. 379; Cass R. Sunstein, "Problems With Rules" (1995), 83 Cal. L. Rev. 953.

For a debate on the merits of rules and standards in patent law, see Robert P. Merges and John Fitzgerald Duffy, *Patent Law and Policy*, 3rd ed. (Lexis Nexis, 2002), pp. 805-06; John R. Thomas, "Formalism at the Federal Circuit" (2003), 52 Am. U.L. Rev. 771; R. Polk Wagner, "Reconsidering Estoppel: Patent Administration and the Failure of *Festo*" (2002), 151 U. Pa. L. Rev. 159 at pp. 234-37.

54. 35 U.S.C. §101.

approach, attempting to find a bright-line, even formalistic definition to what lies within the parallel subject-matter recitations of the Canadian statute. Both pay lip service to legislative intent, but both approaches involve active judicial reconception of the statute — in the one case to adopt a position of ongoing judicial maintenance of the statute, in the other to adopt a position of judicial diffidence toward the statute's upkeep.

As a general principle, the flexibile U.S. approach, favouring ongoing judicial oversight, will better accommodate new and different technologies within the general framework of a patent statute. However, even though a standards-based approach is required to enable ongoing judicial oversight, the process of statutory tailoring will not itself be necessarily standards-based. Where commonalities within an industry can be identified, tailoring may sometimes be best accomplished via judicial application of a bright-line rule. At other times it may be best accomplished case by case, via application of a flexible standard. Additionally, the definitional line between rules and standards is not always pristine, and to a large extent depends on the level of abstraction at which decisional discretion is viewed. Standards operationalize case-by-case determinations, but only by laying down a broad decisional criterion. The choice to decide certain types of cases under a standards regime is itself an establishment of directive precedent that channels the discretion of future courts.

Skeptics of the judicial approach might well observe that litigation is not cost-free, that judicial expertise is bounded and that appellate courts in particular are not entirely immune from problems of public choice. However, all advantages are comparative, and the question is not whether courts are the perfect tailors, but whether, given the evils of industry-specific statutes previously described, courts are better situated to engage in tailoring than are legislatures. The effects of special interest lobbying are blunted in the judicial context, particularly where judges are appointed to life tenure. Relevant costs are also largely sunk costs, as court-based tailoring occurs within a particular context, whereby litigation costs purchase not only resolution of a private dispute, but the public good of judicial decision making — the costs of dispute resolution in effect subsidize statutory upkeep. Within this context, courts have substantial ability to profile an industry and adapt competition policy according to the profile, within a reasonable time frame and at reasonable cost. Courts are routinely expected

to fill this function in areas such as antitrust. Common-law courts can fulfil a similar role in patent law, and have indeed done so with regard to a variety of other patentability criteria.[55]

Courts and legislatures are of course not the only institutions available to address statutory upkeep; administrative agencies constitute a third option about which I promised earlier to offer a few words, although I fear my few words may not be entirely laudatory. There is of course an argument to be made that agencies offer the best of both institutional worlds, having greater expertise and investigatory resources than courts, without the special interest rent-seeking of legislatures. But in reality, it is necessary to recognize that administrative agencies often partake of the worst of both worlds.[56] Administrative agencies are by no means independent of legislative forces of public choice, and the same legislator who succumbs to the pressure of special interest groups likely controls the budget of the agency that deals with those groups.[57] But at the same time, neither is the staff of the administrative agency directly accountable to voters, removing even the threat that voters might overcome collective action problems to impose discipline on imprudent or improper actions. Additionally, the problem of direct capture may be greatly exacerbated in this context. To the extent that an administrative agency interacts repeatedly with a particular constituency, especially a constituency with whom it shares particular expertise, that constituency is likely to exercise undue influence on the agency's rulemaking process.

This is not to say that there cannot be a carefully modulated adjunct role for an agency, in this particular case the Patent Office, to play in statutory upkeep. Most particularly, there may be such a role if the agency can be held to what it does best, which is fact-finding, without becoming involved in setting legal standards, which is the strong suit of the courts. Something very like this is occurring in the United States where the Supreme Court has extended to the Patent Office a standard of review that grants it judicial deference in fact-finding, without (so far) granting deference in statutory interpretation. This may be in part a response to another U.S. experiment, the specialized patent jurisdiction of the

55. See Burk and Lemley, "Policy Levers", *supra*, footnote 43, at p. 198.
56. See Calabresi, *supra*, footnote 40, at pp. 46-47.
57. *Ibid.*, at p. 48.

United States Court of Appeals for the Federal Circuit.[58] But it seems notable that a substantial chunk of the *Harvard College* majority reasons are devoted to drawing almost precisely the same line: deference to the Commissioner of Patents on matters of fact, while cabining his discretion in matters of law. The judgment shows a Canadian Supreme Court determined to limit its role in patent oversight by deferring statutory updates to Parliament, while simultaneously carefully preserving its institutional position by reserving to itself the interpretive task of determining Parliamentary intent.

IV. CONCLUSION

I have suggested that the impact of the *Harvard College* decision may reach far beyond the narrow implications of its holding for biotechnology; the assumptions on which the decision rests have profound implications for other new and existing technologies, for the administration of Canada's Patent Act, and for the institutional structure of the Canadian patent system itself. The decision does more than reject a particular doctrinal decision embraced by the United States. It embarks upon a grand experiment in innovation policy entirely orthogonal to that previously attempted in the United States. It may be that Canada would prefer not to play the guinea pig in such an experiment; indeed, if my previous writings on the patent system are to be believed, the Supreme Court of Canada has made exactly the wrong choice, and the results should be at least undesirable, and very possibly disastrous. But whatever the results prove to be, the attempt is quite remarkable, and will continue to be so, even though I draw these particular remarks to an end.

58. Rochelle Cooper Dreyfuss, "The Federal Circuit: A Case Study in Specialized Courts" (1989), 64 N.Y.U. L. Rev. 1.