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Propertizing Thought

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PROPERTIZING THOUGHT

*Kevin Emerson Collins**

THE United States Supreme Court unexpectedly accepted certiorari in *Laboratory Corp. of America Holdings v. Metabolite Laboratories, Inc.* to address whether a particular patent claim recites patentable subject matter under Section 101 of the Patent Act. However, after oral argument, the Court dismissed the writ as improvidently granted. The convoluted and truncated nature of the proceedings, combined with the notoriously murky status of contemporary Section 101 doctrine, has left the twin impressions that at least some members of the Court believe that something is wrong with patent claims like the *Laboratory Corp.* claim, but that nobody has a good handle on what that something really is.

This article stakes out a new position, arguing that if the *Laboratory Corp.* claim is problematic, it is because the claim *propertizes thought*. Patent claims propertize thought when they recite acts of thinking about the inventive information that is revealed to the public in the disclosure of a patent. Thought-propertizing claims are conceptually problematic because they force us to confront the largely unquestioned coexistence of both claiming and disclosing regimes within patent law. Each regime vests an entitlement in a different party: claims create private rights to exclude for patentees while disclosures create privileges of access for the public. The two potentially conflicting regimes have to date persisted without significant controversy only because each has governed a distinct resource. A claimed and privatized inventive widget is intuitively something altogether different from the disclosed and freely available information about what makes the widget inventive. In a thought-propertizing claim, however, the effects of the dual regimes of claiming and disclosing are focused on a single resource. Thought-propertizing claims purport to privatize acts of thinking about the very inventive information *qua* information traditionally made freely available to the public under the disclosure regime.

* Associate Professor of Law, Indiana University School of Law—Bloomington. For their insightful comments on various drafts of my project on the propertization of thought, I thank John Applegate, Jim Chen, Joshua Fairfield, Paul Geller, Paul Goldstein, Leandra Lederman, Mark Lemley, Jeffrey Rachlinski, Peggy Radin, and Ellen Sward. Many thanks also to the attendees of: the Stanford/Yale Junior Faculty Forum, the faculty workshops at the University of Illinois College of Law and Cardozo Law School, the Intellectual Property Scholars Conference at the UC Berkeley School of Law, the Jurisgenesis Conference at Washington University in St. Louis, and the Law and Society Workshop at Indiana Law in Bloomington. All errors and imperfections are, of course, mine and mine alone.

This article also explores two options for addressing the patentability of thought-proprietary claims. First, we can make a distinction between different types of thought-proprietary claims. We can attempt to identify the thought-proprietary claims that are the most subversive of the goals of the disclosure regime, and we can hold that only these claims recite unpatentable subject matter while allowing patents to issue on other claims that propriety thought. Second, we can conclude that the propriety of thought is axiomatically in conflict with the disclosure regime and categorically bar thought propriety claims from patentable subject matter.

INTRODUCTION	319
I. DEFINING AND CLASSIFYING THE PROPERTIZATION OF THOUGHT	323
A. ROUTINELY PATENTABLE METHOD CLAIMS	324
B. <i>LABORATORY CORP. OF AMERICA HOLDINGS v.</i> <i>METABOLITE LABORATORIES, INC.</i>	325
C. THE TWO CHARACTERISTICS OF A THOUGHT- PROPERTIZING CLAIM	329
1. <i>An Act of Thinking</i>	329
2. . . . <i>that is Necessary for Patentability</i>	331
D. THE PROPERTIZATION OF REASONING AND CLAIM 13 .	335
1. <i>Reasoning: Objects of Thought and Logical</i> <i>Arguments</i>	335
2. <i>Claim 13 as a Claim to a Statistical Syllogism</i>	339
II. GENERALIZING THE CLAIM 13 TEMPLATE	342
III. SECTION 101 AND THE PROPERTIZATION OF THOUGHT.....	344
A. DISTINGUISHING OTHER SECTION 101 DOCTRINES AND PROPOSALS.....	345
1. <i>Software is Unpatentable?</i>	345
2. <i>Inventions Outside the "Useful Arts" Are</i> <i>Unpatentable?</i>	345
3. <i>Methods Not Affecting Tangible Change Are</i> <i>Unpatentable?</i>	346
B. FILTERING OUT CLAIMS TO "LAWS OF NATURE" IN THE ABSTRACT.....	347
1. <i>"Laws of Nature" in Software Claims</i>	347
2. <i>"Laws of Nature" in Thought-Propertizing Claims</i> .	350
a. Identifying the Relevant "Laws of Nature"	350
b. Distinguishing Abstract and Applied Acts of Thinking	352
C. BARRING THE PROPERTIZATION OF THOUGHT.....	354
1. <i>Resuscitating the Mental Steps Doctrine</i>	355
2. <i>The Quid Pro Quo of Patent Disclosure</i>	357
CONCLUSION	360

INTRODUCTION

Patent law enforces two distinct property regimes. Each regime applies a different property rule to a different resource. A private right to exclude—the right with which patent law is most commonly associated—governs the claimed embodiments of an invention. Without authorization, I cannot perform the “attaching” and “welding” actions that are listed as the steps of a claimed method of making a widget in someone else’s patent. Simultaneously, however, patent law mandates the creation of a commons or a public domain. Although I cannot perform the “attaching” or “welding” actions, I have a legal privilege to think about the idea that animates the patented attaching/welding invention and to communicate my understanding of it to others.¹ Importantly, this privilege causes economic harm to the patentee. I may profit directly from my act of explanation as a consultant engaged to teach a technology, thus depriving the patentee of a potential market for his inventive information. My explanation may help the patentee’s competitor design around the patent claim and decrease the patentee’s monopoly power. Nonetheless, despite the harm to the patentee, the *quid pro quo* of patent law “exact[s]” information about an invention from the inventor.² Once disclosed, this inventive information passes beyond the control of the inventor. It becomes freely available to the public.

Historically, these two opposing regimes have co-existed without significant conflict. By informal practice, if not legal command, the boundary between the realms in which each holds sway has been marked by the intuitive line that divides goods that exist in the spatial world of extension from information goods that reside primarily in the realm of information and ideas.³ We readily differentiate the propertizable, real-world actions implicated in the process of making widgets from the unpropertizable information *qua* information about widget-making, so the dividing line be-

1. The opposition of these two property rules creates the duality of claiming and disclosing in patent law. Graeme B. Dinwoodie & Rochelle Cooper Dreyfuss, *Patenting Science: Protecting the Domain of Accessible Knowledge*, in *THE FUTURE OF THE PUBLIC DOMAIN: IDENTIFYING THE COMMONS IN INFORMATION LAW* 193, 193 n.4 (Guibault et al. eds., 2006).

2. *Eldred v. Ashcroft*, 537 U.S. 186, 216 (2003) (“[I]mmediate disclosure is not the objective of, but is *exacted from*, the patentee. It is the price paid for the exclusivity secured.”) (citing *J.E.M. Ag Supply Inc. v. Pioneer Hi-Bred Int’l, Inc.*, 534 U.S. 124, 142 (2001)).

3. This intentionally imperfect opposition is a variant of the more commonly used material/immaterial dichotomy. This article refers to the “spatial world of extension” rather than the material world because many actions recited in conventional method claims are events that exist only for a brief spatiotemporal moment. It refers to the “realm of information and ideas” rather than to immaterial information because we commonly accept that nothing more than information *qua* information is at issue, even when the information has material form insofar as it is inscribed in the world of extension in the form of writing or sound waves. Any difference in the legal treatment of the two realms flows not from some inherent distinction in materiality, but rather from a policy-based conclusion that the propertization of information, along with the communication and thought required to take advantage of such information, does not produce the social benefit that the propertization of many other resources may produce.

tween the regimes has persisted, largely unquestioned and never precisely delineated.

However, an inventor who seeks to claim, and thus propertize, the human “act” of mentally processing or drawing logical conclusions from newly produced, inventive information threatens this informal détente at the heart of patent law.⁴ When an inventor seeks to propertize human thinking, which of patent law’s two opposing property regimes should apply? Is the traditional line that marks a distinction between the embodiments and idealizations of an invention merely a path-dependent appendix of an industrial society that emphasized the production of tangible goods, implying that in our contemporary knowledge economy we should treat the acts of “knowing” and “reasoning” just like any other “attaching” or “welding” step in a conventional method claim? Or, is thought still different in some relevant way, suggesting that a useful discovery that can only be embodied in the form of human cognition should not give rise to patent rights?

In 2005, the Supreme Court granted certiorari in *Laboratory Corp. of America Holdings v. Metabolite Laboratories, Inc.*⁵ to determine whether claim 13 of the United States Patent Number 4,940,658 (the “’658 patent”) recited a patentable invention under Section 101 of the Patent Act. Claim 13 describes a two-step method of diagnosing a B vitamin deficiency. In the first step, a doctor measures the amount of the protein homocysteine in a patient’s blood. This first step is not inventive; it can be accomplished by using any method of testing at all. In the second step, a doctor thinks about the implications of the results of the homocysteine test to reach a conclusion about the existence *vel non* of a B vitamin deficiency. If the patient’s level of homocysteine is elevated, the diagnosis is a B vitamin deficiency; if the patient’s homocysteine level is normal, the diagnosis is the absence of a B vitamin deficiency. The inventive step of the claimed method is nothing more than using two bits of information—one that the doctor uncovers through the use of a freely available technology and another that the inventors were required to disclose to the public in their patent application—to reach a logical conclusion. The invention’s only embodiment in the spatial world of extension occurs, for a materialist, in our gray matter or, for an idealist, in our disembodied minds. If the claim is valid, the patentee’s rights to exclude transgress the intuitive boundary that distinguishes the claimable and propertizable embodiments of an invention from the freely available inventive information itself. In other words, if it is valid, claim 13 propertizes thought.

The proceedings in *Laboratory Corp.* were convoluted to say the least, but what is certain is that the question of whether or not patent law should sanction the propertization of thought was never raised as a struc-

4. One of the intuitions underlying an objection to the propertization of thought is that thought and action are opposites. Nonetheless, to follow conventional patent-law terminology, this article refers to thinking as an act.

5. 126 S. Ct. 601 (2005) (granting the writ).

turing principle for the debate. During most of the proceedings, no Section 101 argument was in play at all. The Supreme Court unexpectedly requested advice from the Solicitor General about whether certiorari should be granted to review whether claim 13 was invalid under Section 101. Its request, however, did not mention the propertization of thought. It framed the debate differently. Citing its cases on software, it queried whether claim 13 failed to recite patentable subject matter because “one cannot patent ‘laws of nature.’”⁶ Rhetoric and doctrine do not always rigidly structure the nature of the arguments that the Court entertains, but in this instance, the Court’s chosen framework stuck and held fast. After the Court granted certiorari (against the advice of the Solicitor General), the parties and the amicus briefs all delved into the Court’s difficult-to-decipher software jurisprudence to frame their arguments. In the end, however, the Court apparently did not find these software-oriented arguments to be illuminating. After oral argument, a fractured Court reversed course and dismissed the writ as improvidently granted.⁷ In a dissent from the dismissal of the writ, Justice Breyer, joined by Justices Stevens and Souter, argued that the Court should have decided the case because claim 13 was so unpatentable that it did not present even “a case at the boundary” of patentability under the “law of nature” doctrine.⁸

This article offers a new conceptual framework for the debate over the patentability of claim 13—a sorely needed commodity after the messy ending of the *Laboratory Corp.* proceedings—that focuses on the propertization of thought. The notion that at least some human cognition should lie beyond the realm of patentable subject matter is not without precedent, but it is currently out of vogue. From the 1950s through the early 1970s, the PTO and the courts employed the mental steps doctrine to invalidate some claims that involved mental processes. However, the courts abandoned the mental steps doctrine over a quarter-century ago, and the doctrine was notoriously ill-defined and under-theorized even in its heyday. To overcome the ambiguities that plagued the mental steps doctrine, this article undertakes two tasks. First, it defines the propertization of thought and provides a preliminary taxonomy of different ways in which thought can be propertized. Second, it offers two alternative approaches to the application of Section 101 doctrine to a thought-propertizing claim. It provides a rhetoric and structure for the debate over the propertization of thought to help the patent community to comprehend and address the looming conflict between the property generated by patent claims and the public domain generated by patent disclosures.⁹

6. *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 543 U.S. 1185, 1185 (2005) (quoting *Diamond v. Diehr*, 450 U.S. 175, 185 (1981) (establishing the conditions under which claims to computer software are patentable)).

7. *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 126 S. Ct. 2921, 2921 (2006).

8. *Id.* at 2927 (Breyer, J., dissenting from the dismissal).

9. This article is the first in a trilogy addressing the propertization of thought. It is largely a framing piece. The latter two articles stake out firmer normative positions. *See*

Section I defines the propertization of thought and provides a vocabulary for describing the structure and effect of a thought-propertizing claim. Simply stated, a claim propertizes thought if it allows a patentee to exclude the public from thinking about information that the patent document containing the claim has made available to the public. Although the types of processes that constitute thinking are varied and complex, many thought-propertizing claims—like claim 13 of the '658 patent—are likely to describe *reasoning*—the process of using *objects of thought* as premises and conclusions in *logical arguments* that are intended to demonstrate the truthfulness of the conclusions. This section argues that claim 13 is a claim to a specific instance of a particular type of logical argument: a statistical syllogism.

Illustrating that the question posed in *Laboratory Corp.* has importance far beyond the field of medical diagnostics, Section II uses a claim to a statistical syllogism as a template and demonstrates that thought-propertizing claims will, if valid, be employed to protect inventive information in a wide variety of technological fields.

Section III proposes two different approaches that a court applying Section 101 could use to deal with patent claims that propertize thought. Extrapolating from the Supreme Court's jurisprudence on the patentability of software, the first approach differentiates between two types of thought-propertizing claims. Under this approach, some thought-propertizing claims are patentable, but others are not. To draw this line between the patentable and the unpatentable, a court applying this approach should initially identify both objects of thought and logical arguments as "laws of nature." It should then conclude that claims reciting acts of thinking about these "laws of nature" in the abstract, or their proxies, are unpatentable subject matter, whereas claims to acts of reasoning that apply these laws of nature to achieve limited and useful ends are patentable. Under this first approach, a claim to a statistical syllogism like claim 13 is either patentable or, at least, close to the boundary of patentability. In contrast, the second approach is categorical. It deems all thought-propertizing claims to be unpatentable. Rather than relying solely on the historical mental steps doctrine for support, however, this article makes a structural argument and builds on the core disclosure principles of patent law. It argues that the propertization of thought is impermissible because the information disclosed in a patent document must be placed into a limited-purpose public domain that guarantees the public at least a privilege to think about the disclosed information.

Kevin Emerson Collins, *Constructive Nonvolition in Patent Law and the Problem of Insufficient Thought Control*, 2007 Wisc. L. REV., available at <http://ssrn.com/abstract=939413> [hereinafter *Propertizing Thought II*] (advocating in favor of a constructive nonvolition exemption to strict liability for patent infringement and demonstrating the heightened need for such an exemption in cases involving thought-propertizing claims that recite reflexive acts of thinking); Kevin Emerson Collins, *Propertizing Thought: Efficiency, Autonomy and Personhood* (work in progress) (formulating normative arguments in support of a wholesale bar on the propertization of thought).

The conclusion evaluates Justice Breyer's reasoning on the merits of *Laboratory Corp.*—the only guidance that we currently have from the Supreme Court on how courts applying Section 101 should address the propertization of thought. Justice Breyer is incorrect to state that claim 13 does not present “a case at the boundary” of patentability under the contemporary “laws of nature” doctrine.¹⁰ However, perhaps Justice Breyer is correct to conclude that claim 13 should be so unpatentable that it does not present “a case at the boundary” of patentability. Perhaps contemporary Section 101 doctrine is ill-suited to addressing the propertization of thought. If this is true, then Section 101 should be revisited, and it should bar the propertization of thought altogether. It should be reoriented to focus on the *quid pro quo* of patent law and the preservation of the benefit produced by the unfettered disclosure of inventive information *qua* information.

I. DEFINING AND CLASSIFYING THE PROPERTIZATION OF THOUGHT

This section defines a thought-propertizing claim as a method claim that recites an act of thinking about information offered to the public in the disclosure. It suggests that many acts of thinking in thought-propertizing claims will be acts of reasoning, and it demonstrates that claim 13 of the '658 patent recites a specific form of reasoning, namely, a statistical syllogism.

More broadly, this section and the following one are intended to dispel two common misconceptions about patent law and the propertization of thought. One misconception posits that patent law routinely propertizes thought insofar as it offers protection for intangible assets. Routinely patentable method claims grant inventors rights to exclude in order to promote the generation of knowledge, but they further this goal by allowing inventors to exclude only from conduct in the world of extension that embodies the inventive information. Another misconception posits that the propertization of thought is a fanciful or far-fetched problem of

10. *Lab. Corp.*, 126 S. Ct. at 2927. Justice Breyer was in part concerned with the reflexive and involuntary nature of the act of correlating recited in claim 13. *Id.* at 2925 (noting that “any competent doctor reviewing [the homocysteine] test results . . . automatically correlate[s] those results with the presence or absence of a vitamin deficiency”); see also *id.* at 2924. The reflexive nature of the act of correlating does create an overbreadth problem to the extent that strict liability for patent infringement is equated with absolute liability. Doctors who are merely trying to practice the prior-art homocysteine assay yet who have read the '658 patent will perform the claimed method even though they have not willfully chosen to do so. This overbreadth problem, however, need not be a Section 101 problem. See Collins, *Propertizing Thought II*, *supra* note 9 (arguing that strict liability for patent infringement should be subject to a constructive nonvolition exemption and that many defendants in infringement suits involving reflexive thought-propertizing claims qualify for this exemption). To avoid the overbreadth problem that flows from patents on reflexive acts of thinking, this article makes the patentee-favoring assumption that all defendants who perform the method recited in claim 13 ordered the homocysteine test with the intent only of diagnosing a B vitamin deficiency.

theory that does not arise in contemporary patent practice. *Laboratory Corp.* and its ability to be used as a template, however, suggest otherwise.

A. ROUTINELY PATENTABLE METHOD CLAIMS

A published, issued patent has two distinct sections. The first section is the written description, which this article refers to as the disclosure or specification.¹¹ Loosely formulated, its principal function is to inform the public about the nature of the contribution to technological progress that the inventor offers to society.¹² The second section is the claims. Claims mark the “metes and bounds” of an inventor’s property interest.¹³ They are texts that describe (or, in patent lingo, “read on”) the propertized real-world embodiments of an invention. The owner of a patent may exclude others only from using goods that fall within the scope of a claim.¹⁴

Claims may describe either of two different types of embodiments. Some claims describe objects or substances—things in the material world that usually have temporal persistence.¹⁵ Object claims may describe widgets, molecules, or organisms. Other claims describe a method or process—a series of actions or events that occur at a given spatiotemporal moment.¹⁶ Method claims may recite a way of making a chemical (“pour, mix, and increase heat”), a manner of using a hammer (“align with nail, draw back, and pound”) or a method of conducting business (“receive, process, and send”).

To understand the rights to exclude conveyed by a routinely patentable method claim, consider the following whimsical yet actually patented method claim that describes a method of exercising a cat:¹⁷

11. Technically, the specification encompasses both the written description and the claims. See 35 U.S.C. § 112 ¶ 1, 2 (2007). To the extent that the claims do more than mark boundaries and actually convey substantive information about the nature of invention to the public, they too are part of the disclosure.

12. The disclosure must communicate to the public how to make and use the invention and demonstrate that the inventor was in possession of his invention. See *id.* ¶ 1 (codifying the enablement and written description requirements).

13. *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 510 (1917).

14. More accurately, a patentee has a right to exclude others from making, using, selling, offering to sell, and importing the claimed embodiments of an invention. 35 U.S.C. §§ 154(a)(1), 271(a) (2007).

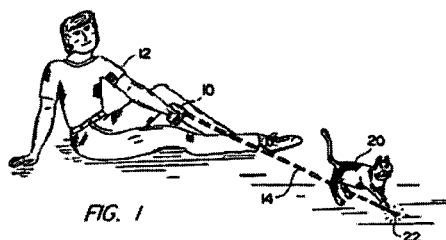
15. See *id.* § 101 (listing a “machine, manufacture, or composition of matter” as patentable subject matter).

16. See *id.* (listing a “process” as a patentable invention).

17. U.S. Patent No. 5,443,036 fig.1; col.3 l.2 (filed Nov. 2, 1993). The author takes no position on the obviousness of this claim.

What is claimed is:

1. A method of inducing aerobic exercise in an unrestrained cat comprising the steps of:
 - (a) directing an intense coherent beam of invisible light produced by a hand-held laser apparatus to produce a bright highly-focused pattern of light at the intersection of the beam and an opaque surface, said pattern being of visual interest to a cat; and
 - (b) selectively redirecting said beam out of the cat's immediate reach to induce said cat to run and chase said beam and pattern of light around an exercise area.



The patentee does not claim a right to exclude others from possessing a cat, making a laser pointer, using a laser pointer in a classroom, or even from “directing” a laser pointer with a cat present without subsequently “redirecting” it. The property interest pertains only to the use of the entire series of actions that make up the recited method.¹⁸ Furthermore, the patentee is without any rights that would allow him to exclude the public from discussing, communicating, or thinking about the cat-exercising method. Whenever inventive information *qua* information is at issue, rather than the acts of “directing” and “redirecting” the laser pointer, a public privilege of access and use prevails when a routinely patentable method claim is at issue.

B. *LABORATORY CORP. OF AMERICA HOLDINGS v. METABOLITE LABORATORIES, INC.*

Not all method claims, however, are routinely patentable. The proceedings in *Laboratory Corp. of America Holdings v. Metabolite Laboratories, Inc.* illustrate that some claims propertize thought. Thought-propertizing claims challenge the public’s privilege to access and use the inventive information disclosed in a patent because the only inventive aspect of the claimed embodiment is located in the mind of a thinking infringer.

During the 1980s, academic researchers conducted research on the well-known, blood-borne protein homocysteine. They made, *inter alia*, two discoveries. First, they discovered a new and more accurate “panel test” that used mass spectrometry to measure the amount of total homo-

18. See *Canton Bio-Medical, Inc. v. Integrated Liner Techs., Inc.*, 216 F.3d 1367, 1370 (Fed. Cir. 2000) (applying the “all-elements rule” to process claims and holding that direct infringement only occurs when “each of the claimed steps of a patented process [is] performed”).

cysteine (“homocysteine”) that exists in human blood.¹⁹ Second, they observed an unexpected fact about the chemical composition of human blood. They noticed an inverse correlation between the concentration of homocysteine and two B vitamins: cobalamin and folate. Samples with an elevated level of homocysteine were likely to have a B vitamin deficiency, and samples with an unelevated level of homocysteine were likely not to have a B vitamin deficiency.²⁰

The researchers filed a patent application with the PTO that was eventually issued as the '658 patent. The '658 patent contains, *inter alia*, two distinct families of method claims—one to protect each of the above discoveries. Describing the panel test, claim 1 recites a “method of assaying” or testing the concentration of homocysteine in human blood.²¹ Based on the inverse correlation between homocysteine and Vitamin B, claim 13 describes a method of detecting a B vitamin deficiency:²²

13. A method for detecting a deficiency of cobalamin or folate in warm-blooded animals comprising the steps of:
 - assaying a body fluid for an elevated level of total homocysteine; and
 - correlating an elevated level of total homocysteine in said body fluid with a deficiency of cobalamin or folate.

Importantly, the scope of the assaying step extends beyond the proprietary panel test of claim 1. A doctor may infringe claim 13 by using any method of testing for homocysteine.²³ The method may be proprietary or it may be in the public domain. The method may have been known prior to the researchers' work, it may have been discovered by the researchers, or it may have been developed after the researchers' work.

19. See *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 126 S. Ct. 2921, 2923 (2006); *Metabolite Labs., Inc., v. Lab. Corp., Inc.*, 370 F.3d 1354, 1358 (Fed. Cir. 2004). Cf. *infra* notes 61–62 and accompanying text (describing the panel test in greater detail).

20. See *Metabolite Labs.*, 370 F.3d at 1362. Technically, the researchers discovered two distinct correlations. First, they discovered that an elevated homocysteine level correlates with a B vitamin deficiency. Brief for Respondents at *2–*3 n.2, *Lab. Corp., Inc. v. Metabolite Labs., Inc.*, 126 S. Ct. 2921 (2006) (No. 04-607), 2006 WL 303905 (“Total homocysteine was elevated in [95–] 99% of the patients who had [a B vitamin] deficiency . . .”). Second, they discovered that an unelevated level of homocysteine correlates with the absence of a B vitamin deficiency, i.e. that individuals who did not have an elevated homocysteine level were unlikely to have a B vitamin deficiency. *Id.* (“Only two of fifty subjects without [a B vitamin] deficiency had elevated total homocysteine.”). Cf. *infra* note 28 (noting that the Federal Circuit’s construction of the term “correlating” in claim 13 encompasses the diagnostic use of both of these correlations); *infra* note 91 (examining the distinct logical arguments that result from using the two correlations as premises).

21. U.S. Patent No. 4,940,658 col.41 ll.1–19 (filed Nov. 20, 1986). Cf. *infra* notes 61–63 and accompanying text (describing claim 1 in greater detail).

22. *Id.* at ll.59–65. Cf. *infra* note 28 (explaining that the Federal Circuit construed claim 13 to encompass two distinct diagnostic methods: a method for detecting a B vitamin deficiency and a method for detecting the absence of a B vitamin deficiency); *infra* note 91 (detailing the two distinct logical arguments that fall within the scope of claim 13).

23. *Lab. Corp.*, 126 S. Ct. at 2924 (noting that the parties agree on this construction of “assaying”). Technically, this construction was not reviewed by the Federal Circuit because it was not a point of controversy between the parties. *Metabolite Labs.*, 370 F.3d at 1364 n.1.

The defendant in *Laboratory Corp.* was Laboratory Corporation of America Holdings (“LabCorp”), a company that provides blood analyses, including homocysteine tests, for medical doctors. For a number of years, LabCorp sub-licensed the right to perform the panel test from Metabolite Laboratories (“Metabolite”), the exclusive licensee of the ’658 patent, but LabCorp eventually switched from the panel test to the newly developed “Abbott test” and stopped paying royalties to Metabolite for homocysteine assays.²⁴ In response, Metabolite sued, alleging that LabCorp was infringing claim 13 but not claim 1. Metabolite did not allege that LabCorp directly infringed the claim; it did not suggest that any LabCorp technician ever performed the second correlating step. Rather, Metabolite alleged that the doctors who ordered the homocysteine blood work from LabCorp were the direct infringers.²⁵ These doctors ordered and paid for the assay and then mentally diagnosed their patients by performing the correlating step. Metabolite alleged only that LabCorp was liable for the doctors’ direct infringements because LabCorp aided and abetted the doctors when it offered the homocysteine-testing service and marketed the service as a valuable tool for diagnosing a B vitamin deficiency.²⁶

Given the controversy that was soon to ensue, the proceedings before the district court and the Federal Circuit Court of Appeals were relatively unremarkable. A jury found that the doctors infringed claim 13 directly and that LabCorp was secondarily liable.²⁷ The Federal Circuit affirmed the jury verdict.²⁸

At this point the case took an unexpected turn toward Section 101 of the Patent Act and its gate-keeping role that limits patentable subject matter.²⁹ At no point in the proceedings below or even in petition for

24. *Lab. Corp.*, 126 S. Ct. at 2923; *Metabolite Labs.*, 370 F.3d at 1359.

25. *Lab. Corp.*, 126 S. Ct. at 2924; *Metabolite Labs.*, 370 F.3d at 1364.

26. The district court held LabCorp liable for both contributory liability and active inducement (two different theories of secondary liability), but the Federal Circuit affirmed only on the basis of active inducement. *Metabolite Labs.*, 370 F.3d at 1365.

27. *Id.* at 1359.

28. Although it did address several invalidity arguments that LabCorp had raised on appeal, *id.* at 1365–69, the Federal Circuit focused primarily on the construction of the term “correlating,” *id.* at 1360–64. The Federal Circuit held that a doctor could infringe claim 13 if the homocysteine assay revealed either an elevated or unelevated level of homocysteine. *Id.* at 1363 (“In essence, ‘correlating’ means to relate the presence of an elevated total homocysteine level to either a cobalamin or folate deficiency, or both . . . and also to relate the absence of an elevated total homocysteine level to a deficiency in neither.”). To reduce the damage award, LabCorp had argued that the correlating step literally referred only to thought about an “elevated” level of homocysteine and that the step should therefore be construed narrowly to read only on the act of correlating an elevated level of homocysteine to a B vitamin deficiency, not the act of correlating a normal homocysteine level with the absence of a B vitamin deficiency. *Id.* at 1364.

29. The plain meaning of Section 101 is relatively unimportant. The text of Section 101 merely lists four categories of patentable subject matter: “a process, machine, manufacture or composition of matter.” 35 U.S.C. § 101 (2007). To date, the Supreme Court has treated the list as a set of generic, semantically empty placeholders that can describe anything. See *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980) (holding that “anything under the sun that is made by man” falls within the scope of Section 101). Exclusions from patentable subject matter come from judicial opinions, not the text of the statute. See, e.g.,

certiorari had LabCorp expressly invoked Section 101,³⁰ but the Supreme Court reframed the question. The Court requested a brief from the Solicitor General on the question “Is [claim 13] invalid [under Section 101] because one cannot patent ‘laws of nature, natural phenomena, and abstract ideas’?”³¹ Although the Solicitor General argued that certiorari should be denied because the record below was insufficiently developed and the case was not “an appropriate vehicle for resolving the Court’s question,”³² the Court ignored this advice and nonetheless granted the writ.³³

In the end, however, after the parties and numerous amici had addressed the “law of nature” or “natural phenomenon” question, the Court’s desire to address the Section 101 question waned. Two and a half months after oral argument, the Court publicly reversed course and dismissed the writ as improvidently granted.³⁴ Justice Breyer, joined by Justice Stevens and Justice Souter, dissented from the dismissal. After conceding that the record below was not a detailed one and acknowledging that the nature of a claim to unpatentable subject matter under Section 101 was at times “not easy to define,”³⁵ Justice Breyer opined that “this is not a case at the boundary. It does not require us to consider the precise scope of the ‘natural phenomenon’ doctrine or any other difficult issue. In my view, claim 13 is invalid no matter how narrowly one reasonably interprets that doctrine.”³⁶

Diamond v. Diehr, 450 U.S. 175, 185 (1981) (“laws of nature, natural phenomena, and abstract ideas”); Gottschalk v. Benson, 409 U.S. 63, 67 (1972) (“[p]henomena of nature, . . . mental processes, and abstract intellectual concepts”); Mackay Radio & Tel. Co. v. Radio Corp. of Am., 306 U.S. 86, 94 (1939) (“a scientific truth, or the mathematical expression of it”).

30. See *Lab. Corp.*, 126 S. Ct. at 2925. LabCorp’s invalidity-related arguments, however, did have strong Section 101 overtones. See *id.* at 2925–26 (noting that LabCorp cited *Diamond v. Diehr* and argued to the Federal Circuit that claim 13, if valid, allowed “a patent on a scientific correlation” and “a monopoly over a basic scientific fact”).

31. *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 543 U.S. 1185, 1185 (2005) (quoting *Diehr*, 450 U.S. at 185). Cf. *supra* note 29 (explaining the role of judicial exceptions to patentability under Section 101).

32. Brief for the United States as Amicus Curiae, *Lab. Corp.*, 543 U.S. at 1185 (No. 04–607) 2005 WL 2072283.

33. *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 126 S. Ct. 601, 601 (2005).

34. *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 126 S. Ct. 2921, 2921 (2006).

35. *Id.* at 2926.

36. *Id.* at 2926–27; see also *id.* at 2928 (“In my view, [the] correlation is an unpatentable ‘natural phenomenon,’ and I can find nothing in claim 13 that adds anything more of significance.”). Justice Breyer’s substantive argument in support of this conclusion only rebuts two arguments that Metabolite made in its brief. First, Justice Breyer notes that the first step of claim 13 is not limited to methods of assaying that necessarily produce a physical transformation. *Id.* at 2927–28; cf. *infra* text accompanying notes 111–114 (discussing the safe harbor of patentability for claims that affect tangible change). Second, he dismisses a literal interpretation of the Federal Circuit’s “useful, concrete and tangible result” standard articulated in *State Street Bank*. *Id.* at 2928; cf. *infra* note 131 and accompanying text (questioning whether *State Street Bank* is a faithful interpretation of the Supreme Court’s jurisprudence on Section 101).

C. THE TWO CHARACTERISTICS OF A THOUGHT-
PROPERTIZING CLAIM

The *propertization of thought* is a term of art. It refers to the private right to exclude created by a method claim when the invention that justifies the issuance of the claim is nothing more than the act of thinking about information offered to the public in the patent's disclosure. As explored below, a claim propertizes thought if and only if it satisfies two criteria: it must recite an act of thinking and the act of thinking must be an integral aspect of the claim's patentability.

1. *An Act of Thinking . . .*

The first characteristic of a thought-propertizing claim is the recitation of at least one step that describes *thinking*. In its common usage, thinking is a broad and vague term that encompasses a diverse set of processes facilitated by the human brain.³⁷ In fact, it is the most general of terms for describing mental processes; it is "the grand superordinate of mental activities which permeates all of the others."³⁸ In this article, thinking is employed more narrowly to refer to processes involving "the systematic transformation of mental representations of knowledge."³⁹

Grossly construed, this characteristic is an obvious one. If a method claim does not at least recite one process that can be performed by human cognition, then the claim does not propertize thought. There are, however, a number of implications of this definition of thinking that may not be self-evident. First, thinking does not include the brain activity required for bodily motion. When a human performs the "directing" and "redirecting" steps of the method of exercising a cat,⁴⁰ neurons fire inside the skull of the infringer. This brain activity, however, is not thinking because it does not implicate mental representations of knowledge.⁴¹ Second, thinking does not include observing by itself. The mental step must process or transform information; it cannot merely input informa-

37. Some definitions of thinking include processes enabled by animals or computers, but a restriction of focus on "thinking by hominids with electrochemically powered brains" is not unusual. Keith J. Holyoak & Robert G. Morrison, *Thinking and Reasoning: A Reader's Guide*, in THE CAMBRIDGE HANDBOOK OF THINKING AND REASONING 1, 2 (Keith J. Holyoak et al. eds., 2005) [hereinafter THINKING & REASONING].

38. *Id.* at 2; see also *id.* at 1 (illustrating the variety of meanings of "thinking" in everyday language).

39. *Id.* at 2.

40. See *supra* fig.1 accompanying note 17 (presenting the method).

41. Some historical formulations of the mental steps doctrine expressly excluded the mental processes required for bodily motion from the set of impermissible mental steps. See, e.g., *Ex parte McNabb*, 127 U.S.P.Q. (BNA) 456, 457-58 (Pat. & Tr. Office Bd. App. 1959). Nonetheless, the fact that some form of mental process is required for bodily motion is still today commonly viewed as a problem inherent in an administrable thought-sensitive implementation of Section 101 doctrine. See *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 126 S. Ct. 2921, 2926 (2006) (Breyer, J., dissenting) (suggesting that it is difficult to establish mental processes as a limitation on patentable subject matter because "all conscious action involves a mental process") (citing DONALD S. CHISUM, 1 CHISUM ON PATENTS § 1.03[6] (2007)).

tion into the mind. Again, this qualification on thinking is required because observing is often a necessary complement to an act of human motion.⁴²

Third, thinking must be a *systematic* process. This restriction on the nature of thinking entails two distinct constraints. The first constraint is that thinking must be something more than the unconstrained association of concepts.⁴³ This is an anti-surrealist constraint. Imagining the chance encounter of a sewing machine and an umbrella on an operating table is not thinking unless some structure is provided to explain why these concepts in particular are associated.⁴⁴ The second constraint is that thinking does not extend to experiencing aesthetics (for example, “appreciating the beauty of a painting”) or emotional states (for example, “feeling despondent”). Importantly, this constraint on the nature of thinking is not intended to suggest that aesthetic or emotional responses should be patentable even if thinking is not. From a historical perspective, the opposite view has held sway. Courts have suggested that they might invalidate a method reciting a “step requiring the exercise of subjective judgment without restriction” even as they have concluded that rational mental processes should be patentable.⁴⁵ Rather, the point of this constraint is to pick the more difficult fight. Even if we were to agree on the easier question that claims reciting the experiencing of aesthetics or emotions should be invalid (for whatever reason⁴⁶), we must still discuss the patentability of mental processes that are capable of systematic description. Unless the line between the two is difficult to draw, the fact that the former should be beyond the reach of patent law is not probative of whether the latter should be as well.⁴⁷

Fourth and finally, human cognition need not be the only manner in which the information-processing task recited in the claim can be performed. For example, consider a claim that recites the step “adding variable X to variable Y.” This step may be performed either by the human

42. Some historical formulations of the mental steps doctrine expressly excluded pure perception from the set of impermissible mental steps. See, e.g., *Ex parte McNabb*, 127 U.S.P.Q. (BNA) at 457–58.

43. *Holyoak & Morrison*, *supra* note 37, at 2.

44. This constraint may be unnecessary given the project at hand. All thinking must be constrained in some fashion to be sufficiently useful to satisfy patent law’s utility requirement. See *infra* notes 55–57 and accompanying text (explaining the utility requirement).

45. *In re Musgrave*, 431 F.2d 882, 893 (C.C.P.A. 1970). Cf. Donald S. Chisum, 1 CHISUM ON PATENTS § 1.03[4] (2007) (“A patent may not properly issue for a method dependent upon the aesthetic, emotional or normative reactions of a human actor.”).

46. The doctrine that courts employ to invalidate claims to subjective states of mind has varied. Compare *In re Musgrave*, 431 F.2d at 893 (suggesting that such a claim might be indefinite under 35 U.S.C. § 112 ¶ 2), with *Greenewalt v. Stanley Co.*, 54 F.2d 195, 196 (3d. Cir. 1931) (holding a claim that relied upon “emotional or aesthetic reactions” to be non-statutory subject matter).

47. Cognitivism—the belief that the entire mind “is to be understood as an information processing system”—suggests that all activities of the mind are thinking and that the rough distinction between subjective and objective thought is merely the level of complexity involved in the systematic processing of information. JOHN HAUGELAND, HAVING THOUGHT 26 (1998). But see *id.* at 33–40 (discussing several difficulties of cognitivism).

mind or by a machine such as a calculator or programmed computer. Nonetheless, a claim containing this step recites an act of information processing that *can* be performed by the human mind, so it describes an act of thinking. The critical fact is that human cognition is within the scope of the recited step. Whether the recited step reads only on human cognition (for example, “*mentally* adding variable X to variable Y”) is irrelevant.⁴⁸ A step reciting an act of thinking must be interpreted broadly in this fashion to avoid reducing the set of thought-propertizing claims to a null set. Nearly all systematic transformations of knowledge may be performed by either the human mind or by machines external to the mind.⁴⁹

2. . . . that is Necessary for Patentability

The second characteristic of a thought-propertizing claim addresses the respective roles of the mental and extra-mental steps in the claim. In a claim that propertizes thought, the extra-mental steps do not constitute a patentable method in and of themselves. Conversely, if the extra-mental steps in a claim do recite a patentable mini-method within the claim as a whole, the claim does not propertize thought.

The reason for this qualification is simple. The recitation of an act of thinking is harmless to the public when that act has been appended onto an otherwise patentable method claim. In this situation, the thinking merely restricts the scope of a patentee’s right to exclude. The recitation of the thinking, however, does serve still valuable, pragmatic functions: it makes the utility, and hence the value, of the claim more intuitively self-evident to examiners, judges, competitors, and the investing public.⁵⁰

48. “Adding variable X to variable Y *with a calculator*,” however, does not recite an act of thinking. Cf. *supra* note 37 and accompanying text (tying thinking to the human mind).

49. The thinking step need not be performed by an unaided human mind. The step may recite an act that realistically can be performed only by a human mind that is aided by objects or actions in the world of extension (provided, of course, that the objects or actions are themselves freely available and not propertized by the claim). Pencil, paper, and the act of writing are canonical examples of such tools. Cf. *In re Prater*, 415 F.2d 1393, 1394–95 (C.C.P.A. 1969) (treating a step performed by the mind in conjunction with pencil and paper as a mental step under the historical mental steps doctrine). The more that these tools are a *de facto* necessity to perform the act of rational information processing, however, the less valuable the thought-propertizing dimension of the claim is to the patentee. When the claimed method is time and labor intensive for a human to perform, the market demand for an extra-mental machine capable of performing the process is significant, and the benefit to the patentee of a claim broad enough to read on thinking is small. Cf. *id.* at 1400–01 & n.21 (noting that a patent applicant voluntarily disclaimed the mental performance of the complex information-processing steps recited in the claims). In contrast, when the claimed method is easily performed by the unaided human mind, as is true in claim 13 of the ‘658 patent, the demand for such a machine is close to nonexistent, and the benefit of a thought-propertizing claim is great. Therefore, it is likely to be the thought-propertizing claims that read on simple mental processes that will form the front lines in the debate over the propertization of thought.

50. Furthermore, the slight reduction in claim scope that results from the addition of the thought-based steps in a claim that does not propertize thought is of little or no economic significance to the patentee. There is no value in performing the non-thought-based steps without performing the thought-based ones as well. The exception to this rule, how-

More specifically, a claim is exempted from thought-propriety status if the steps other than the acts of thinking recite a novel, nonobvious, and useful method.⁵¹

Painted with broad brushstrokes, the novelty and nonobviousness requirements mandate that the patentee demonstrate that the claimed method represents an advance over the technological status quo as it existed at the time the patent applicant invented the claimed method.⁵² Only if the act of mental information processing is required to demonstrate that the claimed invention is an improvement over the prior art is the patent applicant seeking to hinge his or her status as a patent-eligible inventor on her offer of a mode of thinking to society. Only in this situation—when an inventor offers an inventive pattern of thought to society and nothing more—does a claim propriety thought.⁵³ Importantly, claims that propriety thought are necessarily claims in which the inventor seeks to control the public's ability to think about information disclosed by the publication of the patent document itself. For the act of thinking to be inventive, it cannot have been used by anyone or become obvious to a person having ordinary skill in the relevant art at an earlier point in time.⁵⁴

The utility requirement invalidates inventions that lack a known use that is valued by some segment of society.⁵⁵ The contemporary utility requirement is employed primarily to weed-out claims to inventions where the logical chain of reasoning connecting the invention to a bona fide consumer use contains extremely weak links.⁵⁶ Importantly, how-

ever, occurs when an unforeseen technological development employs the non-thought-based steps without requiring the thought-based steps.

51. This list excludes the disclosure requirements of section 112 paragraph 1 because a disclosure adequate to justify the full method claim will always be sufficient to justify the hypothetical claim to the embedded extra-mental method. 35 U.S.C. § 112 ¶ 1 (2007).

52. See generally *id.* §§ 102(a), 103(a) (codifying the novelty and nonobviousness requirements).

53. Insofar as it examines the relative roles of the mental and extra-mental steps in staking out an advance over the prior art, the necessary-for-patentability qualification on a thought-propriety claim echoes the distinctions drawn in dicta in the seminal mental steps case of *In re Adams*, 188 F.2d 165, 166 (C.C.P.A. 1951). Cf. *infra* text accompanying note 161 (discussing the “point of novelty” approach to subject matter patentability). *Adams*, however, never considered the possibility that the advance over the prior art might lie in a combination of the mental and extra-mental steps. See *In re Adams*, 188 F.2d at 166 (discussing the possibility that the advance over the prior art might reside in either the mental or extra-mental steps). If the nonobviousness of a claim depends on a combination of a mental and an extra-mental step, the claim propriety thought.

54. This generalization is subject to an important exception. The mode of thought must be new at the time that the patent applicant invents his method, not at the time the claim is filed (let alone at the time that the application is subsequently published and made available to the public). See 35 U.S.C. § 102(a), (e) & (g)(2) (2007) (measuring novelty at the time of invention). Therefore, it is possible that the mode of thought can be first presented to the public by someone other than the patent applicant and still be subsequently claimed by the patent applicant. In this situation, however, the patentee's position is even weaker than when the patentee first presented the information to the public.

55. See 35 U.S.C. § 101 (2007) (requiring patentable inventions to be “useful”).

56. Most utility cases address claims to chemical compounds (or methods of making chemical compounds) that are useful only as the subject of further research toward an unspecified goal that will be determined primarily through trial and error. See *Brenner v.*

ever, a statutorily sufficient utility need not directly produce the good that is valued by the consumer at the very end of the production process. If data point B is information with a known utility that is of value to end consumers, and if one of ordinary skill knows how to employ data point A to produce data point B (through, for example, the simple, rational, and mental processing of information), then a claimed method for producing data point A satisfies the utility requirement.⁵⁷ Therefore, the extra-mental steps of a claim that recites an act of thinking need only to effect tangible change or produce data that is a known half-way house to a marketable or useful good to avoid being labeled as a thought-propertizing claim. In contrast, a claim propertizes thought if the extra-mental steps fail to produce information or effects that reside on a known pathway to a likely-to-be-useful good.

This second characteristic of a thought-propertizing claim necessarily implies that there are claims that recite acts of thinking yet that do not propertize thought. To illustrate this possibility in a concrete fashion, the remainder of this part analyzes the difference between claim 1 (reciting the “panel test” method of measuring homocysteine) and claim 13 (reciting a method of detecting a B vitamin deficiency) of the ‘658 patent.⁵⁸ Both recite acts of thinking, but only claim 13 propertizes thought.

The distinction between claims 1 and 13 cannot be found in the purpose of the claims; both recite techniques for observing facts (albeit non-visual facts) and produce information about the nature of the world. Their only difference is the specific fact targeted: claim 1 produces information about homocysteine levels in human blood, while claim 13 produces information about B vitamin levels. This difference, however, is not of any consequence to subject matter patentability. Rather, the difference between claims 1 and 13—and the nature of the propertization of thought—lies only in the recited techniques employed to achieve these purposes.

Claim 13 propertizes thought because it possesses the two relevant characteristics. The correlating step recites an act of thought, and the assaying step (the only extra-mental step) is not a self-sufficient, valid method claim. Although the assaying of homocysteine has utility, it is

Manson, 383 U.S. 519, 536 (1966) (“[A] patent is not a hunting license.”); *In re Fisher*, 421 F.3d 1365, 1371 (Fed. Cir. 2005) (requiring a “specific and substantial utility”); *In re Brana*, 51 F.3d 1560, 1564–65 (Fed. Cir. 1995).

57. The Federal Circuit’s recent decision in *In re Fisher* illustrates this point well. In *Fisher*, the court distinguished between two categories of expressed sequence tags (“ESTs”)—short stretches of DNA that allow researchers to determine, *inter alia*, which genes are being expressed in a cell at any given time. *In re Fisher*, 421 F.3d at 1367 (explaining EST technology). The court held that a claim to an EST that has value because it identifies a gene whose function is not yet known does not satisfy the utility requirement. *Id.* at 1374. However, the court hinted that claims to ESTs that correspond to genes of known function would satisfy the utility requirement. *Id.* Thus, the utility requirement mandates only that the claimed invention be a link in a chain that stretches all the way to a known and valued utility.

58. See *supra* text accompanying notes 21–23 (presenting claims 1 and 13).

clearly neither novel nor nonobvious because it reads on the prior art.⁵⁹ Claim 13 is valid vis-à-vis the prior art solely because of the inventiveness of the thought-based step.⁶⁰

Demonstrating that claim 1 does not propertize thought, however, requires further explanation. Measuring the amount of the protein not bound to other molecules was a relatively simple task to accomplish with a mass spectrometer even before the researchers' efforts. The problem that the researchers faced was that not all homocysteine is free-floating. Most homocysteine exists in the form of homocysteine-protein complexes, and the concentration of these complexes is difficult to quantify.⁶¹ To solve this problem, the researchers invented the following method (which paraphrases claim 1):

- (a) "combining" with a blood sample a known quantity of "homocysteine-X"—a molecule that forms complexes just like regular homocysteine does but that can be measured distinctly from homocysteine by a mass spectrometer;
- (b) "adding" a chemical to the sample that just momentarily breaks up homocysteine-protein complexes and allows them to re-form with the free-floating form of either homocysteine or homocysteine-X;
- (c) "measuring" the relative amounts of the remaining free-floating homocysteine and homocysteine-X in the sample using a mass spectrometer;
- (d) "calculating" the ratio of free-floating homocysteine and homocysteine-X in the sample;
- (e) "deriving" the total amount of homocysteine in the sample by multiplying this ratio by the amount of homocysteine-X combined with the sample in step (a).⁶²

The final two steps of claim 1's method recite acts of thought. The "calculating" step involves simple division, and the "deriving" step involves simple multiplication. However, the claim does not propertize thought because the extra-mental "combining," "adding," and "measuring" steps are a self-sufficient and valid, albeit truncated, method claim. They recite a method of producing mass spectrometry data *indicative of* the total amount of homocysteine in a blood sample. The spectrometry data produced by the truncated method satisfies the utility requirement; one of ordinary skill in the art can readily use it to determine the amount

59. See *supra* text accompanying note 23.

60. Although it is also possible to argue that claim 13 is nonobvious because of the combination of the thought-based and non-thought-based steps, this combination argument will not alter the claim's status as a thought-propertizing claim. See *supra* note 53.

61. U.S. Patent No. 4,940,658 col.7 ll.7-22 (filed Nov. 20, 1986) (explaining the problem).

62. *Id.* at col.41 ll.1-19 (reciting claim 1); *id.* at col.7 ll.18-55 (explaining the invention). The method is based on the assumption that the ratio of free-floating homocysteine and homocysteine X measured in step (c) after the bond-reshuffling compound has been added in step (b) is the same as the ratio of the total amount of complexed and free-floating homocysteine in the sample to the amount of homocysteine X added in step (a). *Id.* at col.8 ll.9-13.

of homocysteine in a blood sample. Additionally, the truncated variant of claim 1 without the thought-based steps must be novel and nonobvious if the claim as a whole is novel and non-obvious. The thought-based steps are simple arithmetic operations that are commonly used in interpreting data from a mass spectrometer. Because the first three steps of claim 1 are a valid method claim in and of themselves, the final measuring and calculating steps merely restrict the scope of a valid claim. A member of the public needs only to perform the first three steps to infringe the truncated claim, but he must perform those three plus the final two to infringe the full claim.⁶³

D. THE PROPERTIZATION OF REASONING AND CLAIM 13

This part defines with greater precision the nature of the thinking that is entailed by the correlating step of claim 13 of the '658 patent. First, it identifies *reasoning* as the subset of thinking most directly implicated in the propertization of thought under patent law, and it isolates two distinct mental activities required for a thinker to engage in a particular act of reasoning. Second, it demonstrates that claim 13 recites the act of reasoning through a statistical syllogism and thus allows a thinker to ascertain the truthfulness of a given conclusion, provided that the thinker accepts the truthfulness of two given premises.

1. Reasoning: Objects of Thought and Logical Arguments

To achieve greater specificity, the study of thinking can be divided into several (admittedly overlapping) subfields. *Reasoning* is the most easily systematized of these categories of thought, perhaps because it is the most reductive and the most readily abstracted from the context of the real world. Based on the long tradition established by the study of logic, the study of reasoning focuses simply on "the process of drawing inferences (*conclusions*) from some initial information (*premises*)."⁶⁴ In contrast, other types of thinking are much more closely identified with the mental activities that we understand ourselves to undertake in our everyday lives. *Judgment* involves "the assessment of the value of an option or the probability that it will yield a certain payoff"; *decision making* entails a "choice among alternatives"; *problem solving* describes a type of thinking requiring "the construction of a course of action that can achieve a goal."⁶⁵

This article focuses on the propertization of reasoning. Pragmatically, reasoning takes center stage because its form is the most systematized

63. If the recited acts of information processing cannot occur in the absence of the patentable extra-mental steps, then the extra-mental steps recite one form of what Paul Levinson has termed a "meta-cognitive technology." PAUL LEVINSON, *MIND AT LARGE: KNOWING IN THE TECHNOLOGICAL AGE* 106-09 (1988) ("Some technologies, such as telescopes and microscopes, are specifically designed to increase our knowledge by expanding the sensory experience upon which our cognitive faculties feed.").

64. Holyoak & Morrison, *supra* note 37, at 2.

65. *Id.*

form of thinking and is therefore a reasonable place to begin the foray into the propertization of thought.⁶⁶ And more pragmatically, this article addresses reasoning because the correlating step of claim 13 of the '658 patent recites a specific instance of reasoning.⁶⁷ This limitation on the scope of what constitutes thinking, however, is not as restrictive as it may at first appear. It is a mistake to view other categories of thinking as divorced from the process of reasoning. It is unquestionably true that logicism has fallen out of favor as a philosophical or psychological tradition.⁶⁸ Furthermore, everyday human thinking deviates from a rational theory of choice as a descriptive matter,⁶⁹ and there is even an active debate about whether abstract logic should be employed as a norm against which to measure human cognition.⁷⁰ Nonetheless, logical reasoning is clearly a component of judgment, decision making, and problem solving.⁷¹ To the extent that constituent components of the judging, decision-making, or problem-solving processes can be described as acts of reasoning, these types of thinking are also within the ambit of privatization because of the propertization of reasoning. Novel acts of reasoning have value insofar as they can simplify or rationalize these other thinking tasks, and patentees may directly claim reasoning to indirectly control other forms of thought in a wide variety of real-world contexts.

On a more technical level, some constraints imposed by the patent regime will also push the propertization of thinking in general toward the propertization of reasoning in particular. The language of the patent claim must be definite—it must describe a set of process-types that are capable of being adequately distinguished from all remaining, non-de-

66. Even inductive, as opposed to deductive, reasoning, see *infra* notes 74–79 and accompanying text (defining these terms), however, has proven difficult to reduce to a codifiable and justifiable set of principles. Steven A. Sloman & David A. Lagnado, *The Problem of Induction*, in THINKING & REASONING, *supra* note 37, at 97.

67. See *infra* notes 85–92 and accompanying text (demonstrating that the correlating step involves reasoning through a statistical syllogism).

68. Logicism posits that logic is the basis for rational human thought. See generally Mary Henle, *On the Relation Between Logic and Thinking*, 69 PSYCHOL. REV. 366, 370 (1962) (summarizing and defending the historical idea that logic is the science of thought). A modern variant of this view remained influential in the 1960s and 1970s. See Jonathan St. B. T. Evans, *Logic and Human Reasoning: An Assessment of the Deduction Paradigm*, 128 PSYCHOL. BULL. 978, 979–80 (2002) [hereinafter *Logic and Human Reasoning*] (discussing dual process theories of reasoning and the dominance of Piaget's theory of cognitive development). Today, logicism is largely rejected. *Id.* at 992 (“[T]here has been a progressive movement away from logicism.”).

69. See, e.g., Robyn A. LeBoeuf & Eldar B. Shafir, *Decision Making*, in THINKING & REASONING, *supra* note 37, at 243–65 (discussing challenges to the “rational choice theory” of decision making); Daniel Kahneman & Shane Frederick, *A Model of Heuristic Judgment*, in THINKING & REASONING, *supra* note 37, at 267–93 (discussing research into heuristics and biases); Daniel C. Molden & E. Troy Higgins, *Motivated Thinking*, in THINKING & REASONING, *supra* note 37, at 295–317 (reviewing motivational approaches to the study of basic thought processes).

70. See Evans, *Logic and Human Reasoning*, *supra* note 68, at 989–91 (reviewing “the rationality debate”).

71. See Holyoak & Morrison, *supra* note 37, at 3 (noting that these categories of thinking “overlap in every conceivable way”).

scribed process-types⁷²—and the process described must be capable of achieving a useful result with some degree of predictability and repeatability.⁷³ Therefore, claims intended to read on other modes of thinking are likely, at least some of the time, to take the form of simple, definite, and systematizable acts of logical reasoning.

Reasoning, in turn, is classically divided into two distinct categories. *Deductive reasoning* is a form of logical argument that guarantees the validity of the conclusion which, in turn, guarantees the truth of the conclusion if the premises of the argument are true.⁷⁴ Given the premises, the conclusion of a valid deductive argument necessarily follows. *Modus Ponens* is an archetype of deductive reasoning:

Premise 1: If it is raining, the ground is wet.

Premise 2: It is raining.

Conclusion: The ground is wet.⁷⁵

Modus Ponens allows the thinker to produce water-tight information about the truthfulness of the conclusion to the extent that the thinker is assured of the truthfulness of the two premises.⁷⁶ In contrast, *inductive reasoning* is a form of logical argument in which “the truth of the premises renders the truth of the conclusion more credible but does not bestow certainty.”⁷⁷ Induction is frequently involved in lending credibility to beliefs about the unknown based on premises concerning the known: from the premises that all the swans we have seen to date are white, we may attribute some degree of credibility to the conclusion that the next swan we see will be white. Similarly, we may inductively infer that a diagnosis of an infection is more likely to be true based on the premises provided by the infections that we have seen in the past.⁷⁸ Inductive reasoning is not measured in terms of validity; it cannot guarantee the

72. See 35 U.S.C. § 112 ¶ 2 (2007) (requiring patent applicants to “particularly point out and distinctly claim” an invention).

73. Cf. Norman D. McClaskey, *The Mental Process Doctrine: Its Origin, Legal Basis, and Scope*, 55 IOWA L. REV. 1148, 1168 (1970) (arguing that some claims describing mental processes are indefinite and non-statutory subject matter because they fail to recite a repeatable method).

74. See Evans, *Logic and Human Reasoning*, *supra* note 68, at 979; Holyoak & Morrison, *supra* note 37, at 2.

75. In its generic form, *Modus Ponens* reads as follows:

Premise 1: If P then Q

Premise 2: P

Conclusion: Q

Jonathan St. B. T. Evans, *Deductive Reasoning*, in THINKING & REASONING, *supra* note 37, at 171 [hereinafter *Deductive Reasoning*].

76. Of course, the premises might not be truthful in that they might not correspond to the state of the actual world. For example, it might not be raining or the ground might not be wet even if it is raining if the ground is under a tree. The falseness of a premise, however, does not affect the validity of the form of a deductive argument. It only affects the truthfulness of the conclusion. For this reason, among others, deductive reasoning is of limited value in describing everyday human reasoning. See *id.* at 169–70.

77. Holyoak & Morrison, *supra* note 37, at 2.

78. See Sloman & Lagnado, *supra* note 66, at 95. Generically, this type of categorical inductive arguments may be represented: $P_1 \dots P_n/C$. *Id.* at 101.

truthfulness of the conclusion. However, any particular instance of inductive reasoning may be strong, rather than weak, and may thus confer a high, rather than low, degree of credibility on the conclusion.⁷⁹

On a yet finer level of granularity, there are two mental activities that converge in the performance of any specific instance of logical reasoning. These two dimensions of reasoning are inherent in the definition of reasoning itself,⁸⁰ and their distinction roughly parallels the standard difference in the study of language between the semantic and the syntactic. The first involves thinking about the content of the categorical statements or propositions—the stuff of which a particular instance of a logical argument is comprised. This first mental activity involves the invocation in the reasoner's mind of an *object of reasoning* or *object of thought*.⁸¹ For example, the deductive reasoner must consider the declarative statements "It is raining" (a premise) and "The ground is wet" (a conclusion), while the inductive reasoner must think about both the colors of the swans she saw in the past and the color of the next swan to be seen. Depending upon whether the thinker believes that a statement's content accurately represents the state of the actual world, whether this conviction is derivative of a societal consensus, and whether the statement is formulated at a high- or low-level of generality, an object of reasoning may alternately be described as fact, fiction, natural law, belief, or hypothesis.⁸² The second type of thought implicated in a specific act of reasoning is the *act of reasoning* or the *performance of the logical argument* itself. Performing the act of reasoning is akin to turning the handle of a mental machine that determines the validity or degree-of-credibility of the conclusion. When the premises are accepted as truthful, the act of reasoning becomes a truthfulness or degree-of-truthfulness determining machine. It is the mental process that results in a stamp of validity (or truthfulness) in a deductive argument or a higher degree of credibility (or likelihood of truthfulness) in an inductive argument being placed on the conclusion.⁸³

79. K. CODELL CARTER, A FIRST COURSE IN LOGIC 34 (2004).

80. See *supra* text accompanying note 64.

81. This article uses the term of art *object of thought* to refer to what scholars of language often call a *proposition*. See Pascal Engel, *Propositions, Sentences and Statements*, in 7 ROUTLEDGE ENCYCLOPEDIA OF PHILOSOPHY 787-88 (Edward Craig, ed. 1998) (considering alternative conceptions of the nature of a proposition). Propositions are "the cognitive meaning expressed by a sentence and the content of a propositional attitude such as a belief or desire." *Id.* at 787 (summarizing the views of Gottlob Frege who used the term "thought" to refer to a proposition). Premises are objects of thought only when they have a specified content. If a logical argument is considered in its generic form and its premises are meaningless variables, see, for example, *supra* notes 75 & 78, then the logical argument may itself be deemed an object of thought.

82. Neither the validity of a deductive argument nor the strength of an inductive argument is affected by the truth or falsity of a premise. See *supra* note 76. However, the utility of a logical argument may depend on the truthfulness of the premises. For example, if the statistical generalization of claim 13 does not hold, the method is useless.

83. In some instances, the performance of a logical argument may produce or generate the conclusion as an object of thought rather than merely evaluate the validity or credibility as an existing object of thought. Cf. Evans, *Logic and Human Reasoning*, *supra* note 68, at 979 (noting that *conclusion evaluation tasks* and *conclusion production tasks* are two distinct variants of experiments used in experimental research on the deduction paradigm).

Importantly, the two types of mental activities that are wound up in an act of reasoning may, but need not, occur in tandem. The mental process of entertaining an object of thought may be performed in isolation. It is possible to entertain as an object of thought any proposition that can be employed as a premise or conclusion without engaging in an act of logical reasoning. One may mentally entertain the proposition “The ground is wet” without engaging in a *Modus Ponens* argument. Similarly, a logical argument may be the object of cognition in its generic form without attributing semantic content to the variables.⁸⁴

2. Claim 13 as a Claim to a Statistical Syllogism

The correlating step in claim 13 of the '658 patent recites one instance of a form of logical deductive reasoning that is referred to as a *statistical syllogism*. A syllogism is a familiar form of deductive logical argument that satisfies three conditions: (1) there are three categorical statements (two premises and one conclusion), (2) there are three terms or variables, and (3) each term appears in two different statements.⁸⁵ The following generically illustrates syllogistic reasoning that employs only universal statements:⁸⁶

Premise 1: All A are B.

Premise 2: All B are C.

Conclusion: All A are C.

A statistical syllogism is a sub-class of syllogistic reasoning, in which the premises and the conclusion fit the following mold: the first premise is a statement that an individual belongs to a group, the second premise is a *statistical generalization* about that group, and the argument “proceeds from [this] generalization to a conclusion about [the] individual” that has been identified as a member of the group.⁸⁷ The following generically

Because a patent applicant must disclose the utility of the acts of reasoning described in patent claims and therefore the conclusion, the propertization of specific instances of reasoning is likely to involve reasoning processes that confirm the truthfulness of a conclusion that has previously been entertained. For example, a doctor is likely to have entertained the possibility that a patient has a B vitamin deficiency even before obtaining the results of a homocysteine test that can be used to verify the truthfulness of this belief.

84. For examples of logical arguments in generic form, see *supra* notes 75 & 78.

85. CARTER, *supra* note 79, at 136. A syllogism may present either logically valid or invalid arguments. Evans, *Deductive Reasoning*, *supra* note 75, at 170. This article addresses only valid syllogisms. Claims to invalid statistical syllogisms are unlikely to satisfy the utility requirement.

86. *Cf. id.* at 179 (describing universal statements as one of the four kinds of statements in syllogisms).

87. Wikipedia, *Inductive Reasoning*, <http://en.wikipedia.org/wiki/inductive-reasoning> (last visited May 18, 2007). Some authorities state that syllogisms always employ deductive logic, see CARTER, *supra* note 79, at 136, while others classify statistical syllogisms as a form of inductive logic, see Wikipedia, *Inductive Reasoning* (Types of Inductive Reasoning, Statistical Syllogism) <http://en.wikipedia.org/wiki/inductive-reasoning>. The difference turns on whether the statistical generalization is accepted as a premise independent of the individual, observed instances that were employed to infer it. *Cf. infra* text accompanying notes 95–96 (describing inductive generalization as a form of logical argument that can be

illustrates a statistical syllogism, with the statistical generalization listed as Premise 2:

Premise 1: A is a member of group B.⁸⁸

Premise 2: All members of group B are C.

Conclusion: A is C.

More concretely, the following is a specific instance of a statistical syllogism, with the statistical generalization again listed as Premise 2:

Premise 1: John is a man who is over six feet tall.

Premise 2: Eighty percent of men over six feet tall are married.

Conclusion: There is an eighty percent probability that John is married.⁸⁹

The person who engages in this form of reasoning entertains a premise that identifies John as a member of a group (group: men over six feet tall) and a premise that identifies a characteristic of the group (characteristic: eighty percent probability of being married). By reasoning through the syllogistic argument, the thinker is able to deem the conclusion that John possesses the characteristic to be a valid one (and a truthful one insofar as the reasoner accepts the truthfulness of the premises).⁹⁰

used to generate a statistical generalization). If the statistical generalization is an independent premise, a statistical syllogism employs deductive logic.

88. This premise could be written "All A are B," but A is singular because A must be an individual according to the definition of a statistical syllogism.

89. In language more closely reflecting the generic example:

Premise 1: John is a member of the group "men who are over six feet tall."

Premise 2: All members of the group "men who are over six feet tall" have an eighty percent probability of being married.

Conclusion: John has an eighty percent probability of being married.

90. There are competing psychological theories for describing the mental processes that give rise to human deductive competence. See Evans, *Deductive Reasoning*, *supra* note 75, at 171–74 (noting that "[b]oth the mental logic and mental models theories . . . provide abstract, general-purpose systems that can account for human deductive competence"). According to the traditional rules that govern the scope of a method claim, however, variation in the mechanics of the system of reasoning employed by the allegedly infringing thinkers should neither invalidate a thought-property claim nor negate infringement. Method claims typically recite steps that are defined by the accomplishment of certain tasks—e.g., "mixing," "directing," or "sending"—and they will encompass many different specific ways of performing that task. See *Cochrane v. Deener*, 94 U.S. 780, 787 (1876) ("That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed."). *But see* 35 U.S.C. § 112 ¶ 6 (2007) (requiring claims recited in step-plus-function format to be restricted to the means of accomplishing the function disclosed in the specification and its equivalents); *LizardTech, Inc. v. Earth Res. Mapping, Inc.*, 424 F.3d 1336, 1344–46 (Fed. Cir. 2005) (restricting the scope of a step in a software method to the process for accomplishing that step disclosed in the specification). Method claims that describe the steps of a logical argument read on a reasoner's use of the argument, regardless of the exact mental mechanism employed. Furthermore, patent law does not require that an inventor understand why his invention works. The science behind the invention may remain a mystery. *Newman v. Quigg*, 877 F.2d 1575, 1581 (Fed. Cir. 1989) ("[I]t is not a requirement of patentability that an inventor correctly set forth, or even know, how or why the invention works.").

Turning to the correlating step of claim 13 of the '658 patent, the doctor who diagnoses a patient with a B vitamin deficiency employing the claimed method necessarily reasons using the following statistical syllogism:

- Premise 1: Individual X has an elevated homocysteine level.
 Premise 2: Individuals with elevated homocysteine levels are very likely to have B vitamin deficiencies.
 Conclusion: It is very likely that individual X has a B vitamin deficiency.⁹¹

The correlating step of claim 13 describes the mentalistic processes of both entertaining two given premises and one given conclusion as objects of thought and employing valid syllogistic reasoning to prove the validity and truth of the conclusion. The identification of the correlating step of claim 13 as a particular instance of reasoning through a statistical syllogism has two important consequences. First, as explored in the remainder of this section, understanding the nature of the claimed act of reasoning reinforces two significant limitations on the scope of claim 13. Second, as explored in the following section, stripping claim 13 down to its logical structure demonstrates that it may be employed as a template for protecting inventive information and drafting claims in a diverse array of technologies.⁹²

The correlating step of claim 13 describes a particular instance of a statistical syllogism that employs the listed premises and conclusion. It describes neither the performance of a statistical syllogism generically nor the mere act of cogitating on the listed objects of thought. The research-

91. The Federal Circuit's broad construction of the claim term "correlating" included not only the act of reasoning from an elevated homocysteine level to a B vitamin deficiency, but also the act of reasoning from an unelevated homocysteine level to the absence of a B vitamin deficiency. *See supra* note 28. Each of these acts of reasoning is based on the discovery of a distinct correlation. *See supra* note 20. Both acts of reasoning, however, are statistical syllogisms. Each is merely a different instance that uses a different statistical generalization as the second premise. The second statistical syllogism that allows a doctor to diagnose the absence of a B vitamin deficiency runs as follows:

- Premise 1: Individual X does not have an elevated homocysteine level.
 Premise 2: Individuals without elevated homocysteine levels are very likely not to have a B vitamin deficiency.
 Conclusion: It is very likely that individual X does not have a B vitamin deficiency.

This second statistical syllogism, within the scope of the correlating step, makes the method of claim 13 more useful because it reduces the number of false negatives, i.e., the number of people who have unelevated homocysteine levels but nonetheless have a B vitamin deficiency. *See* Brief for Respondents at *2-*3 n.2, *Lab. Corp. v. Metabolite Labs.*, 126 S. Ct. 2921 (2006) (No. 04-607), 2006 WL 303905 (noting the small number of false negatives generated by the method of claim 13). However, this second statistical syllogism is not a necessary condition for the patentability of the statistical syllogism recited in the main text. A method will satisfy the utility requirement of patent law if it says something about an individual who has property A, even if it does not say anything useful about an individual who does not have property A. The absence of false negatives should not be relevant to the utility of a method for finding true positives.

92. *See infra* notes 94-100 and accompanying text.

ers do not claim to have discovered statistical syllogism as a generic mode of argument. Such a broad claim would clearly be neither novel nor non-obvious, as syllogistic reasoning was devised by Aristotle and studied extensively in the Middle Ages.⁹³ The novelty of the reasoning process hinges on the novelty of the statistical generalization, so the researchers only claim the act of reasoning through a statistical syllogism that incorporates the newly discovered statistical generalization. Furthermore, someone who mentally entertains any of the objects of thought implicated in the claimed statistical syllogism without performing the logical argument does not infringe. Provided that the syllogistic argument is not employed to determine the truthfulness of the conclusion, the public is free to entertain or develop convictions about either the premises or the conclusion. Doctors are free to perform each of the following types of thinking: believing or hypothesizing that a patient has an elevated homocysteine level, believing (or disbelieving) the scientific validity of the statistical generalization concerning the inverse correlation between homocysteine and B vitamins, and believing that a patient has a B vitamin deficiency (whether or not the doctor has performed a direct assay for B vitamins and therefore has a reasonable foundation for this belief). The only mental act that the public is not free to perform without obtaining authorization from the owner of the '658 patent is engaging in the act of syllogistic reasoning that derives the truth of the specified conclusion from the specified premises.

To understand the limited scope of claim 13, consider a hypothetical claim that recites the mere mentalistic process of thinking about the statistical generalization as an object of reasoning. Such a claim might read as follows: "Thinking about the statistical generalization that inversely correlates an elevated or unelevated homocysteine level with a B vitamin deficiency *vel non*." Presuming that claim 13 is novel and nonobvious, this hypothetical claim, too, is novel and nonobvious, as both rely on the same statistical generalization to distinguish prior-art thoughts. Yet, this hypothetical claim to thinking about an object of thought describes a different type of mental process than the process actually described by claim 13. Such a hypothetical claim to mentally entertaining an object of thought would, if valid, confer on the patent owner a radically different—and broader—set of rights to exclude.

II. GENERALIZING THE CLAIM 13 TEMPLATE

Laboratory Corp. is neither an anomalous case nor a case whose ramifications are limited to the field of medical diagnostic technology.⁹⁴

93. CARTER, *supra* note 79, at 137 ("During the Middle Ages, syllogisms were studied so extensively that each part of a syllogism and each syllogic form was named . . ."); Evans, *Logic and Human Reasoning*, *supra* note 68, at 169 (attributing the discovery of the syllogism to Aristotle).

94. The scientific and health communities have understandably framed *Laboratory Corp.* as a case about biotechnology and medical diagnostic technology, respectively. See, e.g., Rebecca S. Eisenberg, *Biotech Patents: Looking Backward while Moving Forward*, 24

The opposite, rather, is true. The logical structure of claim 13 is a template. Both the act of inductive reasoning that led to the researchers' discovery of the statistical generalization and the act of syllogistic reasoning described in the claim are models that can be used in a wide variety of different technological areas.

The researchers who were responsible for claim 13 arrived at their statistical generalization through a process of logical reasoning called *inductive generalization*—the use of inductive logic to reason “from a premise about a sample to a conclusion about a population.”⁹⁵ The researchers who filed the '658 patent observed that a sample pool of patients with elevated homocysteine levels were likely to have B vitamin deficiencies. Plugging these premises about individuals into an inductive generalization, they derived the statistical generalization that every member of the population that has an elevated homocysteine level is likely to have a B vitamin deficiency.⁹⁶

Importantly, inductive generalization is a technologically neutral reasoning process: the observation of any probabilistic characteristic shared by the group—whether the group is a set of humans or a set of inanimate objects—may be employed to infer a novel statistical generalization. In turn, any novel statistical generalization discovered through inductive generalization can be incorporated into a claim to a statistical syllogism. Like claim 13, the claim needs only to recite two steps: (1) determining whether an individual is a member of a group to determine a factual predicate for Premise 1 and (2) reasoning through a statistical syllogism that uses the statistical generalization as Premise 2 to affirm the truthfulness of a conclusion about that individual.⁹⁷ For a taste of the protection that an inventor can receive by claiming a particular instance of reasoning through a statistical syllogism, consider the following hypothetical inventions and claims:

1. Oil prospectors have been drilling for oil for many years. Finally, one oil prospector discovers, after collecting and examining a large data set, that trapped pockets of gas X are likely to form near oil deposits. He may claim the method of detecting oil deposits comprising the steps of (1) examining the soil for trapped pockets of gas X and (2) correlating the presence of trapped pock-

NATURE BIOTECHNOLOGY 317, 318 (2006) (framing *Laboratory Corp.* as a case about biotechnology); Aaron S. Kesselheim & Michelle M. Mello, *Medical-Process Patents—Monopolizing the Delivery of Health Care*, 355 NEW ENGLAND J. MED. 2036, 2036 (2006) (framing *Laboratory Corp.* as a case about patenting medicine and health care). By re-framing *Laboratory Corp.* as a claim about the propertization of thought, this article demonstrates that the validity of claim 13 will have ramifications in all fields of technology.

95. Wikipedia, *Inductive Reasoning* <http://en.wikipedia.org/wiki/inductive-reasoning> (Types of Inductive Reasoning, Generalization) (last visited May 18, 2007). Inductive reasoning is a core component of scientific thinking. See Sloman & Lagnado, *supra* note 66, at 107–11.

96. *But cf. supra* notes 20, 91 (explaining that the researchers inferred two distinct statistical generalizations from two distinct datasets).

97. See *supra* Part I.D.2.

- ets of gas X to the presence of an oil deposit.⁹⁸
2. Utility linemen routinely climb telephone poles to test the insulators at the top and to determine whether they are faulty. They hold a grounded wand near to the insulator and watch the arc of electricity jump from the insulator to the wand. Conventionally, the linemen had presumed that arcs that jumped a certain length and that made a particular kind of noise indicated a faulty insulator. One particularly insightful lineman, however, pays closer attention and realizes that unexpected ranges of arc-lengths and sound-frequencies are better indicators of a faulty insulator. The insightful lineman may claim the method of testing for faulty insulators comprising the steps of (1) drawing arcs from the insulator and (2) correlating the presence of the unexpected range of arc lengths and sound frequencies with a faulty insulator.⁹⁹
 3. Jane works for a political campaign and calls party members seeking donations for a candidate. She discovers that party members with a particular configuration of personal attributes are most likely to give money, so the calling effort should pay particular attention to reaching them. She may claim the method of efficiently seeking donations comprising the steps of (1) searching a list of potential phone call recipients for a set of people with particular attributes and (2) correlating that set of people with the set that is most likely to give money.

If valid, a claim to a statistical syllogism is a patent-protection cookie cutter that allows a patent applicant to craft a protectible invention out of any technological—or non-technological—field.¹⁰⁰

III. SECTION 101 AND THE PROPERTIZATION OF THOUGHT

The mess that resulted from the Supreme Court proceedings in *Laboratory Corp.* demonstrates that there is no well-established approach for bringing Section 101 and its restriction on the subject matters eligible for patent protection to bear on the propertization of thought. This section sketches two alternative approaches. Building on the Supreme Court's "laws of nature" approach to the patentability under Section 101 that was developed in the context of computer software, the first approach draws a line between unpatentable thought-propertizing claims that describe "laws of nature" in the abstract and patentable claims that describe applications of "laws of nature" to achieve limited and useful ends. The second approach treats all thought-propertizing claims in an identical fashion and places them categorically beyond the realm of patentability. Building on the core disclosure justifications of patent law, it reorients

98. See generally *In re Adams*, 188 F.2d 165, 165–66 (C.C.P.A. 1951) (mental steps case).

99. See generally *Johnson v. Duquesne Light Co.*, 29 F.2d 784 (D. Pa. 1928) (mental steps case).

100. See generally John R. Thomas, *The Patenting of the Liberal Professions*, 40 B. C. L. REV. 1139 (1999) (arguing that patentable subject matter has exceeded the bounds of the technological arts).

the debate over the patentability of thought to focus on the patentee's *quid pro quo* obligation to place the disclosed information *qua* information into the public domain.

A. DISTINGUISHING OTHER SECTION 101 DOCTRINES AND PROPOSALS

To understand the implications of barring some or all thought-propertizing claims from the patent regime, it is first important to recognize that neither existing nor recently proposed Section 101 doctrines address the issue of the propertization of thought. This part briefly considers three well-known proposals for Section 101 and notes how their effects are over- or under-inclusive with respect to a bar on the propertization of thought.

1. *Software is Unpatentable?*

Doubt about the patentability of software lingered for several decades after the advent of the art, and there were many proposals for excluding software from patent protection.¹⁰¹ However, software claims are now well-entrenched in the pantheon of patentable subject matters.¹⁰² Under contemporary Federal Circuit doctrine articulated in *State Street Bank & Trust Co. v. Signature Financial Group*, software is patentable so long as it produces a “useful, concrete and tangible result.”¹⁰³

Even a complete bar on the propertization of thought would not affect the holding in *State Street Bank*. The execution of software commands on a computer is an extra-mental activity; it does not involve the rational, mental processing of information by the human mind.¹⁰⁴ However, a bar on the propertization of thought would restrict the permissible scope of method claims reciting the steps performed by software. Method claims drafted broadly enough to encompass both the software and mental “wetware” performance of the information processing steps impermissibly propertize thought.¹⁰⁵ Software claims limited to extra-mental execution, however, do not.

2. *Inventions Outside the “Useful Arts” are Unpatentable?*

The U.S. Constitution specifies that the patent laws are intended to “promote the Progress of . . . Useful Arts,”¹⁰⁶ and commentators and courts over the years have suggested that this language could be used to

101. See, e.g., Pamela Samuelson, *Benson Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions*, 39 EMORY L. J. 1025, 1103–13 (1990).

102. See Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CAL. L. REV. 1, 4 (2001).

103. 149 F.3d 1368, 1373 (Fed. Cir. 1998).

104. See *supra* note 37 and accompanying text (limiting an act of thinking to processes facilitated by the human mind).

105. Cf. *supra* notes 48–49 and accompanying text (defining an act of thinking); cf. *infra* note 151 (explaining the role that the mental steps doctrine played in early cases addressing the patentability of software).

106. U.S. CONST. art. I, § 8, cl. 8.

restrict patentable subject matter to the useful or technological arts, as opposed to the cultural or liberal arts.¹⁰⁷ The subject matter of some thought-proprietary claims lies beyond the scope of the “Useful Arts,” so the effect of an interpretation of Section 101 inspired by the “Useful Arts” language of the Constitution would overlap with the effect of a bar on thought-proprietary claims.¹⁰⁸ Yet, a technological arts restriction would not invalidate all thought-proprietary claims. Both the oil-prospecting and the utility-lineman hypothetical claims presented above operate in the technological arts.¹⁰⁹ Depending on one’s definition of “technological” and “liberal,” claim 13 of the ’658 patent may or may not be patentable if only technological arts are patentable.¹¹⁰

3. *Methods Not Affecting Tangible Change are Unpatentable?*

Perhaps the most highly pedigreed restriction on the scope of patentable method claims relates to the tangibility of the effect produced by the claimed method. In the latter part of the nineteenth century, the Supreme Court defined a patentable process in *Cochrane v. Deener*: “[a] process . . . is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.”¹¹¹ Although some historical cases interpreted the tangible transformation requirement as a necessary condition for patentability,¹¹² the Federal Circuit has interpreted it as a sufficient condition for patentability and created a patentability safe harbor for method claims affecting a tangible change in the world of extension.¹¹³

A safe harbor for claims affecting that which society conventionally recognizes as tangible change in the world would ensure that at least

107. See, e.g., *In re Musgrave*, 431 F.2d 882, 893 (C.C.P.A. 1970) (creating a “technological arts” test); *Ex parte Lundgren*, No. 2003–2088, 2005 Pat. App. LEXIS 34, at *5–*12 (B.P.A.I., Sept. 28, 2005) (rejecting a “technological arts” test); Robert I. Coulter, *The Field of the Statutory Useful Arts*, 34 J. PATENT OFFICE SOC’Y 417, 417–18 (1952) (distinguishing the cultural and technological arts and arguing that many claims reciting mental steps belong in the technological arts); Thomas, *supra* note 100, at 1163–75 (grappling with an ontological definition of technology). Both the European Patent Convention and the Japanese Patent Act limit patentable subject matter to inventions susceptible to “industrial application.” Thomas, *supra* note 100, at 1178.

108. A claim beyond traditional definitions of the technological arts that propriety thought was recently sanctioned by the PTO. *Ex Parte Lundgren*, 2005 Pat. App. LEXIS 34, at *1–*3 (reciting a claim to a “method of compensating a manager”).

109. See *supra* notes 98–99 and accompanying text.

110. Compare Coulter, *supra* note 107, at 733 (stating that medicine is not a technological art), with Thomas, *supra* note 100, at 1178–85 (offering a definition of the technological that likely would include medicine).

111. 94 U.S. 780, 788 (1876).

112. See Donald S. Chisum, *The Patentability of Algorithms*, 47 U. PITT. L. REV. 959, 967 & n.30 (1986).

113. *AT&T Corp. v. Excel Commc’ns, Inc.*, 172 F.3d 1352, 1358–59 (Fed. Cir. 1999) (stating that physical transformation “is not an invariable requirement, but merely one example of how a [law of nature] may bring about a useful application”). Cf. *MANUAL OF PATENT EXAMINING PROCEDURE* § 2106, at 2100–11 (8th ed., rev. 2006) [hereinafter *MPEP*] (“If [the claim] provides a transformation or reduction of an article to a different state or thing . . . USPTO personnel shall . . . find that the claim meets the statutory requirement of 35 U.S.C. § 101.”).

some thought-propertizing claims are patentable.¹¹⁴ Any tangible transformation produced by the extra-mental steps of a thought-propertizing claim would automatically usher the claim into the realm of patentability. The line drawn by such a safe harbor, however, makes no sense with respect to the patentability of a thought-propertizing claim. Whether the prior art, data-gathering steps in a claim that propertizes thought require tangible transformation (for example, “scratching the surface” to observe the effect), permit tangible transformation (for example, “assaying” for homocysteine), or do not recite tangible transformation (for example, “observing” John’s height) should not influence whether the claim recites patentable subject matter.¹¹⁵

B. FILTERING OUT CLAIMS TO “LAWS OF NATURE” IN THE ABSTRACT

This part examines the possibility of using the Supreme Court’s software-oriented, “law of nature” jurisprudence as a model to craft a Section 101 doctrine for thought-propertizing claims.¹¹⁶ It argues that this approach leads to the conclusion that some thought-propertizing claims should be unpatentable, but arguably not claims to statistical syllogisms like claim 13 of the ’658 patent. This part proceeds in two steps. First, it describes how the Supreme Court applied Section 101 in the software cases. Second, it translates this approach to address the patentability of thought-propertizing claims.

1. “Laws of Nature” in Software Claims

In the 1970s and 1980s, the Supreme Court decided three cases in which it addressed the patentability of computer software under Section

114. What constitutes a lack of tangible effect is a socially constructed convention intended to achieve a policy goal, not a self-structuring natural law. Writing makes marks on paper, speech alters the density of air, and neurons fire in our brains. *Cf. Martin v. Reynolds Metals Co.*, 342 P.2d 790, 793–94 (Or. 1960) (en banc) (breaking down the tangibility requirement that traditionally limited the scope of common law trespass).

115. *Cf. Lab. Corp. v. Metabolite Labs.*, 126 S. Ct. 2921, 2927 (2006) (Breyer, J., dissenting) (“Why should it matter if the [homocysteine] test results were obtained through an unpatented procedure that involved the transformation of blood?”).

116. There are at least two other branches of the Court’s Section 101 jurisprudence on subject matter patentability that are not used as models here. First, in *O’Reilly v. Morse*, the Court invalidated a claim because it was defined only by function. 56 U.S. 62, 113 (1853). *Cf. Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 133–35 (1948) (Frankfurter, J., concurring) (founding a Section 101 argument on overbreadth). Although *O’Reilly* is still commonly cited today as a Section 101 case, its actual holding arguably does not reflect contemporary Section 101 doctrine. *See* Dan L. Burk & Mark A. Lemley, *Inherency*, 47 WM. & MARY L. REV. 371, 404 n.161 (2005) (arguing that *O’Reilly* should be interpreted as an enablement case). Second, the “product of nature” branch of Section 101 prevents patent applicants from claiming newly discovered, but pre-existing, natural substances, such as plants or minerals merely brought to society’s attention by the patent applicant. *See Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980). *But see infra* note 123 (framing the Supreme Court’s “laws of nature” approach to the patentability of software as an extension of the principle that discoveries of pre-existing things are not patentable).

101: *Gottschalk v. Benson*,¹¹⁷ *Parker v. Flook*,¹¹⁸ and *Diamond v. Diehr*.¹¹⁹ These cases remain the Court's most recent and most relevant body of Section 101 case law.¹²⁰ In these cases, the Supreme Court established a rule that sounds deceptively simple: claims reciting "laws of nature" in the abstract are unpatentable, but claims reciting applications of "laws of nature" are patentable.¹²¹ To explain this rule so that lower courts could apply it (or at least entertain any hope of applying it), the Court had to perform two tasks, each of which is elaborated below.

The first—identifying a law of nature—the Court did quickly and decisively. In *Benson*, the Court identified a mathematical algorithm as an unpatentable "law of nature."¹²² Mathematical operations and relationships, the Court reasoned, "are not patentable, as they are the basic tools of scientific and technological work."¹²³ The raw, generic mathematical steps that are required to take advantage of Einstein's theory of relativity and Newton's law of gravity are unpatentable.¹²⁴

The second—offering criteria to distinguish claims to "laws of nature" in the abstract from those that recite applications—the Court did awkwardly and contradictorily. Clearly, the Court did not seek to exclude only the purest of abstract claims to a mathematical algorithm from patentable subject matter. Rather, the Court sought to exclude a cluster of claims. To ensure its bar on a claim to a mathematical algorithm would not be reduced to a mere formality, the Court sought to invalidate not only claims that literally recited the steps of a mathematical algorithm and nothing more, but also claims that approached this level of abstrac-

117. 409 U.S. 63 (1972).

118. 437 U.S. 584 (1978).

119. 450 U.S. 175 (1981).

120. *But cf.* *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124, 127 (2001) (concluding that plants are patentable subject matter under Section 101 without addressing the "laws of nature" doctrine).

121. *Diehr*, 450 U.S. at 187–88.

122. When stating its conclusion, the *Benson* Court actually described a mathematical algorithm as an "idea." 409 U.S. at 71–72. Later cases, however, described a mathematical algorithm as a "law of nature." See *Flook*, 437 U.S. at 589 (ascribing to *Benson* the characterization of mathematical algorithms as "laws of nature").

123. *Benson*, 409 U.S. at 67. A second justification for excluding "laws of nature" from patentability rests on a metaphysical plane and relies on the philosophical distinction between a patentable "invention" and an unpatentable "discovery" that merely uncovers what has always existed. See *Flook*, 437 U.S. at 593 n.15; Samuelson, *supra* note 101, at 1055 n.99 & 1097 n.204. A definition of a "law of nature" that relies on the natural-versus-artificial or pre-existing-versus-man-made dichotomy is difficult to reconcile with a Section 101 doctrine that is attuned to the propertization of thought. For example, what if the statistical generalization that links homocysteine and B vitamins were the result of an unhealthy American diet full of non-natural foods? If the newly discovered statistical generalization reveals information about a human invention into the natural environment, is there less of a reason to argue that claim 13 is an unpatentable "law of nature"? Cf. *supra* Section II, Example 3 and note 100 (considering a claim to a statistical syllogism that is based on a statistical generalization about culture, not nature). Quotes are used around the phrase "law of nature" to emphasize that its use here is not intended to be limited to natural phenomena or to exclude cultural abstractions.

124. *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980).

tion and that served as proxies for the perfectly abstract claim.¹²⁵ The language in which the Court couched this proxy principle shifted over the course of the software trilogy, but the principle throughout is clearly concerned with claim scope.¹²⁶ The *Benson* opinion employed the language of preemption: the Court reasoned that a computer software claim impermissibly privatized a “law of nature” when it recited the steps of a mathematical algorithm because the algorithm had “no [unclaimed] substantial practical application.”¹²⁷ By implication, had the claim been narrower, and had it left a number of substantial practical applications of the mathematical algorithm beyond its reach, then the claim would have been at least closer to the realm of patentability. In *Diehr*, the final case of the software trilogy, the Court shifted from the language of preemption to the language of abstraction versus application. The more “applied” the claim and the more restricted the use of a mathematical algorithm in computer software is to addressing a particular real-world task, the more patentable the subject matter.¹²⁸

The dividing line between unpatentable, abstract claims and patentable, applied claims is notoriously difficult to draw, but the important point to be made here is only that it exists. On the issue of how applied is applied enough to be patentable, *Flook* and *Diehr* are difficult to reconcile. *Flook* held a method of using a computer to establish an alarm limit in a catalytic conversion system to be an unpatentable abstraction,¹²⁹ while *Diehr* held a method of using a computer to determine the optimal length of time for a rubber curing process to be patentable.¹³⁰ In large

125. The Court reasoned that “[t]o hold otherwise”—namely, to hold that only claims to “laws of nature” in their most abstract forms were unpatentable—“would allow a competent draftsman to evade the recognized limitations on the type of subject matter eligible for patent protection.” *Diehr*, 450 U.S. at 192. See also *id.* at 191–92 (noting that neither limiting a claim to a particular technological environment nor appending insignificant post-solution activity would transform an unpatentable abstract claim into a patentable applied one).

126. The Federal Circuit recently stated that “[t]he scope of claims is not relevant to subject matter eligibility.” *SmithKline Beecham Corp. v. Apotex Corp.*, 365 F.3d 1306, 1316 (Fed. Cir. 2004), *vacated by* 403 F.3d 1328 (Fed. Cir. 2005). Although this statement may accurately describe the Federal Circuit’s contemporary treatment of software under *State Street Bank & Trust Co. v. Signature Financial Group*, 149 F.3d 1368, 1373 (Fed. Cir. 1998), it is an inaccurate description of the Supreme Court’s Section 101 “laws of nature” software jurisprudence. Cf. *infra* note 131 (arguing that the *State Street* standard is an oversimplification of Supreme Court precedent on the patentability of computer software).

127. 409 U.S. at 71–72. Interestingly, the Court concluded that thinking through the steps of the algorithm was not within the scope of the claim, but reasoned that the free availability of mental use of the algorithm was insufficient to avoid effective preemption. “The mathematical [algorithm] involved here has no substantial practical application except in connection with a digital computer, which means that if [the claim is patentable, it] would wholly pre-empt the mathematical [algorithm] and in practical effect would be a patent on the algorithm itself.” *Id.*

128. *Diehr*, 450 U.S. at 187–88 (“It is now commonplace that an application of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.”).

129. *Parker v. Flook*, 437 U.S. 584, 586 (1978) (describing claim); *id.* at 594–95 (explaining holding).

130. *Diehr*, 450 U.S. at 192–93.

part because *Diehr* came after *Flook*, a default presumption of a method being applied rather than abstract has evolved over the last twenty-five years in the Federal Circuit Court of Appeals.¹³¹ Regardless of the presumption, however, the spectrum on which the Supreme Court had hoped to measure patentability is clear. The more abstract the context in which the claim recites the computer-executed mathematical algorithm and, thus, the broader the scope of the claim, the more likely the claim is to recite unpatentable subject matter under the proxy principle. Inversely, the more applied the context and, thus, the narrower the scope of the claim, the more likely the claim is to recite patentable subject matter.

2. "Laws of Nature" in Thought-Propertizing Claims

To the extent that the Supreme Court's software trilogy can be employed as a model, a court's treatment of thought-propertizing claims under Section 101 must, first, identify the relevant "laws of nature" that cannot be claimed in the abstract and, second, draw the difficult line around the cluster of claims that are unpatentable proxies for the "laws of nature" in the abstract. These two tasks are addressed in the two subsections below.

a. Identifying the Relevant "Laws of Nature"

There are two obvious candidates for the "laws of nature" designation in methods of reasoning: generic logical arguments¹³² and objects of thought.¹³³ That a claim to a novel and nonobvious logical argument in its generic form should be an unpatentable claim to a "law of nature" is a simple corollary of the Court's holding in *Benson*. There is no reason to treat logical and mathematical algorithms differently. That a claim to an object of thought in the abstract should be unpatentable subject matter is a logical corollary of both the historical printed matter doctrine¹³⁴ and the PTO's extension of the printed matter doctrine into the area of computer software in the guise of the nonfunctional descriptive material doctrine.¹³⁵

Under the printed matter doctrine, courts have long rejected claims to printed matter when the allegedly patentable invention resides only in an inscription of semantic content—whether in the form of concepts, facts, or beliefs—onto a tangible medium.¹³⁶ At its core, the doctrine stands

131. By holding in *State Street Bank & Trust Co. v. Signature Financial Group* that a software method claim is patentable whenever the method that it recites achieves a "useful, concrete and tangible" result, the Federal Circuit effectively abandoned its efforts to administer the proxy principle and made all software claims patentable except the purest of the abstract claims. 149 F.3d at 1373.

132. See *supra* text accompanying note 83.

133. See *supra* text accompanying notes 81–82.

134. See generally 1 CHISUM, *supra* note 45, § 1.02[4].

135. See MPEP, *supra* note 113, § 2106.01, at 2100–17 to –18.

136. *In re Russel*, 48 F.2d 688, 669 (C.C.P.A. 1931) ("The mere arrangement of printed matter on a sheet or sheets of paper . . . does not constitute 'any new and useful art, machine, manufacture or composition of matter' . . .").

for the principle that “substance, language or meaning of [printed matter] whether generally accepted or arbitrary . . . cannot serve to impart patentability.”¹³⁷ To the extent that the invention is merely printing that allows a reader to “derive some information” from the matter, the printed matter is not within the bounds of Section 101.¹³⁸ Given that the representation of novel semantic content, facts, and meaning cannot make an extra-mental medium patentable under the printed matter doctrine, it is reasonable to conclude that the representation of the same content, facts, and meaning is not patentable when it occurs in our gray matter either.

The patentability of software at least partially undermines the printed matter doctrine, especially because the Federal Circuit has implicitly sanctioned claims to computer software that describe a tangible storage medium with a program inscribed thereon.¹³⁹ The printed matter doctrine continues to have relevance to the patentability of software only in the form of the PTO’s nonfunctional descriptive material doctrine. If, rather than describing a software program, the claimed invention is merely the digital inscription of “music, literature, art, photographs, and arrangements or compilations of facts or data” onto a storage medium, then the claim does not recite patentable subject matter.¹⁴⁰ In essence, the nonfunctional descriptive matter doctrine prevents patentees from obtaining claims to digital representations of objects of thought, just like

137. *Ex parte Gwinn*, 112 U.S.P.Q. (BNA) 439, 447 (B.O.P.A. 1955). This explanation only addresses the core of the printed matter doctrine. The scope of the printed matter doctrine has never been clearly articulated, and there are some printed matter cases that do not reflect concerns about the patentability of semantic content.

138. *In re Jones*, 373 F.2d 1007, 1013 (C.C.P.A. 1967). An exception to the printed matter doctrine is almost as long-standing as the doctrine itself. If the invention lies in part in the functionality of the structure of the substrate on which the matter is printed, then a claim to the printed matter is patentable even if the functionality is to some degree dependent upon, or related to, the configuration of the printed matter on the substrate. *See, e.g.*, *Cincinnati Traction Co. v. Pope*, 210 F. 443, 446–47 (6th Cir. 1913) (holding a new form of transfer ticket for street railways with a detachable transfer coupon to be a patentable “manufacture”).

139. *In re Beauregard*, 53 F.3d 1583, 1583 (Fed. Cir. 1995) (noting the PTO’s deferral to the position “that computer programs embodied in tangible medium, such as floppy diskettes, are patentable”).

140. MPEP, *supra* note 113, § 2106.01, at 2100–18. In contrast, functional descriptive material consists of “data structures and computer programs which impart functionality when employed as a computer component,” and it is patentable. *Id.* The PTO’s doctrinal explanation of the patentability of functional descriptive matter harkens back to the functional-substrate exception to the traditional printed matter doctrine. *Cf. supra* note 138 (explaining this exception). Logically, however, this explanation makes no sense. From the perspective of the computer that “reads” the encoded digital information, the representations of the data in the compilation and the computer program that accesses and manipulates the data are both “functional” strings of 1s and 0s that cause the computer to enter a specific state of being. Nonetheless, the PTO’s nonfunctional descriptive matter doctrine is designed to achieve a normatively important end, even if the doctrinal logic used to achieve this end is faulty. When data trigger a computer state which is nonobvious and useful only because it represents inventive semantic content to a user, the data should be unpatentable subject matter. *See* Kevin Emerson Collins, *Patentable and Unpatentable Information* (work in progress).

the printed matter doctrine prevents patentees from obtaining claims to printed representations of objects of thought.

In sum, thought-property claims describing both generic logical arguments and objects of thought in the abstract should be unpatentable claims to “laws of nature” under a software-inspired approach to Section 101. The act of thinking in claim 13 of the ’658 patent, however, describes neither type of “law of nature” in the abstract. The Federal Circuit interpreted claim 13 so that it encompasses only the use of two specified premises (including the newly discovered statistical generalization) in a specified form of logical argument (a statistical syllogism) to verify the truthfulness of a specified conclusion about an individual. The only remaining hurdle to the patentability of claim 13 under a software-inspired approach to Section 101 is therefore whether the claim should be considered an unpatentable proxy for a claim to a “law of nature” in the abstract.

b. Distinguishing Abstract and Applied Acts of Thinking

The attributes of an act of thinking that make it relatively more applied and less abstract are readily identifiable, even if the exact point at which an impermissible proxy becomes a permissible application is not. Consider the following list of hypothetical variants on the second step of claim 13. (“The B Vitamin correlation” is shorthand for the statistical generalizations discovered by the patentees.¹⁴¹)

- 13a “thinking about the B Vitamin correlation”
- 13b “diagnosing a patient using the B Vitamin correlation”
- 13 “correlating the presence (or absence) of an elevated homocysteine level in an individual patient with the existence (or absence) of a B Vitamin deficiency in the same patient” [actual claim 13]
- 13c “correlating the presence of an elevated homocysteine level in an individual patient with the existence of a B Vitamin deficiency”

The further down the list one moves, the more applied the act of thinking becomes and the less likely the act of thinking is to be labeled as a “law of nature” in the abstract.¹⁴² The restriction in claim scope that transforms the abstract claim into a more applied one occurs along two dimensions. First, the number of different forms of logical argument that are included within the scope of the description decreases. The mental steps 13a and 13b are not limited to the act of reasoning through a statistical syllogism, whereas steps 13 and 13c are. Second, the level of generality of the object of thought used as a premise in the acts of reasoning may be decreased, or the number of different possible conclusions may be reduced. The

141. *See supra* note 20.

142. If a marginal shift on this spectrum seems irrelevant to the issue of patentability, then the “law of nature” approach to Section 101 is likely not appropriate for determining the patentability of thought-property claims.

more restricted the set of objects of thought that can be used as premises and conclusions, the more the claim resembles a patentable application of a “law of nature.” Steps 13a, 13b, and 13 all employ the same object of thought as a premise—the statistical generalizations actually invented by the patentees. Steps 13a and 13b, however, may use an unspecified set of additional objects of thought as premises. In contrast, step 13c uses a statistical generalization as a premise that is more limited and precise than the premises that the other steps use.

Whether the act of thinking recited in the actual claim 13 describes an unpatentable “law of nature” in the abstract or a patentable application of a “law of nature” is unclear. What is clear, however, is that the argument in favor of the patentability of claim 13 has some merit. The act of thinking recited in claim 13 is restricted to the performance of a well-defined act of syllogistic reasoning; it does not encompass multiple forms of logical reasoning. The objects of thought used in the statistical syllogism too are relatively well-defined. The newly discovered statistical generalization is employed as a premise, along with a fact about a patient’s homocysteine level, in an act of reasoning that confirms the truthfulness *vel non* of a specified statement about that patient’s B vitamin level. Phrased in terms of a preemption analysis as suggested in *Benson*,¹⁴³ the argument in favor of the patentability of claim 13 has merit because the correlating step leaves a great deal of thinking about statistical generalization beyond the scope of the patentee’s control. Anyone may turn the B vitamin correlation over in his mind and wonder about its implications, provided that he does not have access to the results of an individual’s homocysteine test. The scientifically inclined public may freely use the statistical generalization as a premise in inductive reasoning; it may generate hypotheses about other correlations or about the nature of the biochemical pathways that produce the correlation.¹⁴⁴ Claim 13 does not even reach all diagnostic and syllogistic reasoning about the statistical generalization. The correlating step describes the syllogistic reasoning that results in the verification of the truthfulness of a conclusion about a patient’s B vitamin deficiency *vel non*. It does not, however, encompass the syllogistic reasoning that results in an assessment of the validity of a statement about a patient’s *homocysteine* level based on observation of a patient’s B vitamin level:

143. See *supra* text accompanying note 127.

144. Cf. *supra* note 95 (noting that inductive reasoning is common in scientific thinking). Consider a biochemically naïve example: if a scientist realizes that because there is a correlation between homocysteine and vitamin B, there is also likely to be a correlation between homocysteine and vitamin C, the scientist has employed the statistical generalization in an act of thinking, yet she has not infringed claim 13.

- Premise 1: An individual X has a B vitamin deficiency.
- Premise 2: Individuals with B vitamin deficiencies are very likely to have elevated homocysteine levels.
- Conclusion: It is very likely that individual X has an elevated homocysteine level.¹⁴⁵

Claim 13 does not affect the public's right to measure a patient's B vitamin level and use the correlation between homocysteine and B vitamins to diagnose a patient with an elevated or a normal homocysteine level.¹⁴⁶ In sum, the act of thinking recited in claim 13 can be reasonably characterized as applied and patentable rather than as abstract and unpatentable under an approach to Section 101 that is modeled on the Supreme Court's software-oriented, "law of nature" jurisprudence.¹⁴⁷

C. BARRING THE PROPERTIZATION OF THOUGHT

Leaving the "law of nature" doctrine behind, this part articulates a simple and administrable approach to determining the patentability of thought-property claims under Section 101: all thought-property claims are categorically beyond the realm of patentable subject matter. It presents two doctrinal grounds for reorienting contemporary Section 101 to bar the propertization of thought. The first resuscitates and clarifies the historical mental steps doctrine. The second offers a new, structural

145. Technically, the statistical generalization in Premise 2 of this statistical syllogism is the contrapositive of the statistical generalization in Premise 2 of the statistical syllogism recited in *supra* note 91. The following statistical syllogism contains the statistical generalization that is the contrapositive of the statistical generalization used in the statistical syllogism recited in the text accompanying note 91:

- Premise 1: Individual X does not have a B vitamin deficiency.
- Premise 2: Individuals without B vitamin deficiencies are very likely not to have elevated homocysteine levels.
- Conclusion: It is very likely that individual X does not have an elevated homocysteine level.

These two additional statistical generalizations are implicit in the statistical generalizations employed in the reasoning of the correlating step of claim 13 because universal affirmative categorical statements and their contrapositives have the same truth conditions. "All A are B" has the same truth conditions as "All not B are not A." CARTER, *supra* note 79, at 133-34.

146. A diagnostic test that requires testing for Vitamin B to determine homocysteine levels may not have much economic value, but a Section 101 determination that turns on the current economic value of a practical application is troublesome because economic value may change over time.

147. One counterargument is that the abstract "law of nature" status should apply at several descending levels of generality. Objects of thought and generic logical arguments may be "laws of nature," but perhaps the more specific act of thinking recited in claim 13 is also a "law of nature" in the abstract. If this argument is followed to its logical conclusion, however, the "law of nature" approach to Section 101 doctrine devolves into a complete bar on the propertization of thought, or at least a bar on the propertization of reasoning. If the act of reasoning recited in claim 13 recites a "law of nature" in the abstract, then every mental act of reasoning is also a "law of nature" in the abstract. It is difficult to imagine an act of mental reasoning that is significantly less abstract than the statistical syllogism recited in claim 13.

approach to Section 101 that builds on the core disclosure principles of patent law.

1. *Resuscitating the Mental Steps Doctrine*

Beginning in the 1950s, or even earlier, courts interpreted Section 101 to bar from patentability some claims that included mental steps.¹⁴⁸ From its initial creation, however, this doctrine suffered from an unstable footing. It has always been notoriously under-theorized and ill-defined. Its policy justification was never adequately plumbed. The best the courts could do was state that “[i]t is self-evident that thought is not patentable.”¹⁴⁹ What constituted a mental step and the circumstances under which the recital of a mental step in a claim was fatal to patentability varied markedly from case-to-case, year-to-year, and decade-to-decade.¹⁵⁰

In the early 1970s, courts eventually abandoned the mental steps doctrine, in part because of its vagueness, but, more directly, because it was the wrong tool for the job then at hand: using Section 101 doctrine to determine the patentability of computer software.¹⁵¹ Today, the mental steps doctrine is widely presumed defunct. Precedent binding individual panels of the Federal Circuit holds that the presence of mental steps in a claim is not determinative of patentability.¹⁵² The PTO has recently reaf-

148. See generally 1 CHISUM, *supra* note 45, § 1.03[6]; Katharine P. Ambrose, *The Mental Steps Doctrine*, 48 TENN. L. REV. 903, 903 (1980); Warren T. Jessup, *Patentability of Mental Processes*, 40 J. PAT. OFF. SOC'Y 482, 482 (1958); McClaskey, *supra* note 73, at 1193. European Union law currently bars “methods for performing mental acts” from patentability. European Patent Convention, art. 52(2)(c) (2002), available at http://db1.european-patent-office.org/www3/dwid/epc/epc_2002_v1.pdf.

149. *In re Abrams*, 188 F.2d 165, 168 (C.C.P.A. 1951). See also Samuelson, *supra* note 101, at 1036 n.34 (noting the “lack of explanation” for the mental steps doctrine).

150. See 1 CHISUM, *supra* note 45, § 1.03[6] (arguing that the mental steps doctrine is “a vague and troublesome family of related rules” and that at least three distinct notions are required to understand how it has been used).

151. Early software cases in the Court of Customs and Patent Appeals (“CCPA”) upheld software-related apparatus claims and method claims that were limited in scope to machine implementation. See *In re Mahony*, 421 F.2d 742, 743 (C.C.P.A. 1970); *In re Bernhart*, 417 F.2d 1395, 1396–1400 (C.C.P.A. 1969). Conversely, the court rejected method claims reciting the logical or mathematical steps that the software was to perform if those steps could also be performed by the human mind aided by pencil and paper. See *In re Prater*, 415 F.2d 1393, 1403–04 (C.C.P.A. 1969). *But cf. In re Prater*, 415 F.2d 1378, 1389 (C.C.P.A. 1968), *modified on rehearing*, 415 F.2d 1393, 1404 (C.C.P.A. 1969) (suggesting that the mental steps doctrine applied only when there was no possible machine implementation of the claimed process). Eventually, however, this distinction began to seem like a trivial and formalistic one, given the impossibly labor-intensive effort that would be required for the human mind to perform the complex calculations that were being executed in the claimed computer software. See, e.g., *In re Benson*, 441 F.2d 682, 688 (C.C.P.A. 1971) (noting that it was possible, but “improbable” that anyone would infringe a software claim with mental thought). The CCPA rejected the mental steps doctrine and issued software claims, even if they were drafted in a form that was broad enough to read on human thought. *In re Foster*, 438 F.2d 1011, 1015 (C.C.P.A. 1971); *In re Musgrave*, 431 F.2d 882, 888–89 (C.C.P.A. 1970).

152. *In re Musgrave*, 431 F.2d at 888–89. *Cf. Alco Standard Corp. v. Tenn. Valley Auth.*, 808 F.2d 1490, 1496 (Fed. Cir. 1987) (“The inclusion in a patent of a process that may be performed by a person . . . is not fatal to patentability.”).

firmed its rejection of the doctrine.¹⁵³

However, neither the birth nor the death of the mental steps doctrine was ever addressed by the United States Supreme Court. In *Gottschalk v. Benson*, one of the Court's trilogy of software cases addressing Section 101 doctrine, the arguments in the PTO and in the lower courts directly addressed the viability of the mental steps doctrine and the propertizing effect of the claim on mental processes.¹⁵⁴ Yet by the time the Court wrote its opinion, a different doctrinal approach had prevailed. The Court analyzed the case in terms of property in disembodied mathematical algorithms—"laws of nature"—rather than property in acts of thought.¹⁵⁵ Although the Court's *Benson* opinion included "mental processes" in its list of unpatentable subject matter,¹⁵⁶ no majority opinion since *Benson* has done so.¹⁵⁷ The mental steps doctrine may therefore be resuscitated by either the Supreme Court or the Federal Circuit acting *en banc*. To avoid the vagueness that has plagued it in the past, a revived mental steps doctrine should adopt the definition of a thought-propertizing claim offered in this article.¹⁵⁸

The only difficulty of reviving the mental steps doctrine is the claim-as-a-whole approach to Section 101 that the Supreme Court articulated in *Diamond v. Diehr*.¹⁵⁹ In *Diehr*, the Court stated that a claim that included software employing a mathematical algorithm must be "considered as a whole" in a Section 101 analysis,¹⁶⁰ and it rejected a "point of novelty" test that looked more narrowly at whether the steps which differentiate a claimed invention from prior art recite patentable subject matter.¹⁶¹ The Court's rejection of a "point of novelty" test conflicts with the Section 101 test that prohibits the propertization of thought, because the identification of a thought-propertizing claim requires an inquiry into

153. See *Interim Guidelines for Examination of Patentable Applications for Patent Subject Matter Eligibility*, USPTO Official Gazette Notices, 22 November 2005, Annex III (interpreting Federal Circuit case law and listing the mental step test as in improper test for subject matter eligibility) [hereinafter *Interim PTO Section 101 Guidelines*]. But see *Ex parte Lundgren*, No. 2003-2088, 2005 Pat. App. LEXIS 34, at *134-*143 (B.P.A.I. Sept. 28, 2005) (Barrett, A.P.J., dissenting) (making a mental steps argument); *Ex parte Bilski*, Appeal No. 2002-2257, Application 08/933/892, at *11 (B.P.A.I. Sept. 26, 2006) (Informative Opinion) (incorporating the dissent in *Ex parte Lundgren* into a majority opinion).

154. See *In re Benson*, 441 F.2d at 687 (noting the Solicitor's argument that "a computer is merely a 'tool of the mind' and the method is basically 'mental' in character . . . because the 'workstuff' of the method is numbers which are mathematical abstractions"); Samuelson, *supra* note 101, at 1050-51 (noting that the PTO rejected the claim because it violated the mental steps doctrine).

155. 409 U.S. 63, 67 (1972); Samuelson, *supra* note 101, at 1043 & n.59, 1054 n.96.

156. 409 U.S. at 67.

157. But cf. *Diamond v. Diehr*, 450 U.S. 175, 194-205 (1981) (Stevens, J., dissenting) (discussing the mental steps doctrine at length); *Lab. Corp. v. Metabolite Labs.*, 126 S. Ct. 2921, 2923 (2006) (Breyer, J., dissenting) (listing "mental processes" as a category of unpatentable subject matter).

158. See *supra* notes 37-63 (defining a thought-propertizing claim).

159. 450 U.S. 175, 175-81 (1981).

160. *Id.* at 192.

161. *Id.* at 188-89 ("The 'novelty' of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter.").

whether the acts of thinking are necessary for the patentability of the claim. A claim propertizes thought if and only if the acts of thinking are the “point of novelty,” nonobviousness, and utility.¹⁶² However, the Court’s claim-as-a-whole holding in *Diamond v. Diehr* can be reconciled with a Section 101 bar on the propertization of thought by assuming that the “considered as a whole” language in *Diehr* applies to claims to software but not claims to human thought. In fact, given that the “point of novelty” approach survived in the printed matter doctrine even after *Diehr*,¹⁶³ it is perfectly reasonable to assume that the “point of novelty” approach survived in the mental steps doctrine as well.¹⁶⁴

2. *The Quid Pro Quo of Patent Disclosure*

The mental steps doctrine does not provide a narrative that speaks convincingly to how the line it draws between patentable and unpatentable subject matter fits into the broader logic of the patent regime. The remainder of this section sketches a structural approach to Section 101 that draws on the disclosure-oriented *quid pro quo* of patent law and that offers such a narrative. The structural approach suggests that the public does not receive its fair shake if a claim propertizes thought. It suggests that an inventor who discloses the information about his invention to the public but who fails to release all of that information *qua* information into a public domain has not fulfilled his disclosure obligations.

The disclosure theory of patent law portrays a patent as a bargain be-

162. See *supra* notes 50–57 and accompanying text.

163. *In re Ngai*, 367 F.3d 1336, 1337–38 (Fed. Cir. 2004) (invalidating a claim as anticipated when the only difference between the claimed invention and the prior art resided in the printed matter). Cf. *Lawman Armor Corp. v. Winner Int’l, LLC.*, 437 F.3d 1383, 1384–85 (Fed. Cir. 2006) (employing a point of novelty approach in design patent doctrine).

164. A second way to reconcile, at least partially, a bar on the propertization of thought with *Diehr* is to argue that *Diehr* applies to some, but not all, thought-propertizing claims. In *Diehr*, the fact that one step of the claimed method recited a mathematical algorithm was irrelevant to the Section 101 analysis because the method claim “considered as a whole” was directed at curing rubber, “a function which the patent laws were designed to protect.” *Diehr*, 450 U.S. at 192. The majority opinion in *Diehr* emphasized repeatedly that the claim was directed at curing rubber—a process effecting tangible change at a molecular level. See *id.* at 184 (describing the claim as “a physical and chemical process of molding rubber products”); *id.* at 192 (describing the claim as “an industrial process for the molding of rubber products”). If the claim-as-a-whole approach in *Diehr* applies to the propertization of thought, a hypothetical, thought-propertizing variant on the claim in *Diehr* should be a patentable claim. If a human rather than a computer performs the calculations and determines when to end the rubber curing process, the claim “considered as a whole” should still be a claim reciting a “function which the patent laws were designed to protect.” However, it is still possible that other thought-propertizing claims that, like claim 13 of the ’658 patent, only describe the deriving of information in the mind of the practitioner, do not describe “a function which the patent laws were designed to protect” and are therefore not invalid under the claim-as-a-whole approach to Section 101. Cf. 1 CHISUM, *supra* note 45, § 1.03[4] (quoting *Ex parte Turner*, 1894 Comm’n Dec. 35 (1894), for the proposition that a claim that produces “no physical effect but only a state of mind in a [person]” does not recite patentable subject matter).

tween an inventor and the public.¹⁶⁵ The public, through the agency of the state, gives to inventors a bundle of limited rights to exclude others from using the embodiments of an invention, and the disclosure of information about the invention that the inventor could have kept secret but, instead, gives to the public is “the *quid pro quo* of the right to exclude.”¹⁶⁶ An inventor’s obligation to release his inventive information to the public unquestionably reduces the incentive to innovate,¹⁶⁷ but the social benefit of allowing the public access to and use of the inventive information presumptively outweighs this cost of reduced incentives.

More specifically, the disclosure of inventive information is intended to increase the pace of innovation during the term of the patent.¹⁶⁸ “On issuance the patent immediately increases the storehouse of public information available for further research and innovation.”¹⁶⁹ A patentee’s competitors are hopefully lured by further patent rights to use this information to design around the claimed technology or to invent improvements thereon and file blocking patents before the term of the underlying patent expires.¹⁷⁰ Even before the expiration of a patent, the inventor is not permitted to control how the public uses his disclosed information. The disclosed information is placed in a public domain. The public is free to read it, mull it over, and use it to create further progress.¹⁷¹ The benefits that flow from these public uses of disclosed information are spil-

165. See *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 63 (1998); *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 150–51 (1989).

166. *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int’l, Inc.*, 534 U.S. 124, 142 (2001) (quoting *Kewanee Oil Col. v. Bicon Corp.*, 416 U.S. 470, 484 (1974)). The disclosure provisions of Section 112 codify the inventor’s disclosure obligations. See 35 U.S.C. § 112 ¶ 1 (2000). More specifically, Section 112, Paragraph 1 imposes the enablement, written description, and best mode requirements. See *Univ. of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 921 (2004). Although in this article it is used only in reference to the patentee’s disclosure obligations, the concept of the *quid pro quo* has been used to describe other aspects of the patent regime as well. See, e.g., *Brenner v. Manson*, 383 U.S. 519, 529 (1996) (stating that the *quid pro quo* for granting a patent is “an invention with substantial utility”).

167. *Eldred v. Ashcroft*, 537 U.S. 186, 216 (2003) (“[I]mmediate disclosure is not the objective of, but is *exacted from*, the patentee. It is the price paid for the exclusivity secured.”) (citing *J.E.M. Ag Supply*, 534 U.S. at 142).

168. The disclosed information also allows the public to practice the invention after the expiration of the patent term. *Bonito Boats*, 489 U.S. at 152. (“[A]fter the expiration of a federal patent, the subject matter of the patent passes to the free use of the public as a matter of federal law.”).

169. 1 CHISUM, *supra* note 45, at § 7.01. In most instances today, the “storehouse of public information” is supplemented upon publication of the patent application eighteen months after filing. See 35 U.S.C. § 122(b) (2007).

170. See Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989, 1005–13 (1996) (explaining the treatment of improvements on patented technology and blocking patents).

171. Information disclosed in a patent application is not free for the public’s appropriation in any manner it pleases. The claims of a patent prevent the public from using the information as a claimed method or object. Nonetheless, it is reasonable to speak of the disclosed information being within a bounded public domain. The information is free for the public’s appropriation so long as it is used as information *qua* information. Cf. Pamela Samuelson, *Challenges in Mapping the Public Domain, in THE FUTURE OF THE PUBLIC DOMAIN: IDENTIFYING THE COMMONS IN INFORMATION LAW*, *supra* note 1, at 13–17 (discussing a variety of conceptions of the public domain).

lovers, or positive externalities, and they are intentionally designed into the structure of the patent regime.¹⁷² Unlike the mythical Blackstonian property owner, the patentee has never been permitted to achieve the status of the perfect internalizer.¹⁷³ The value generated by the public's use rights in the information that the patentee is required to put into the public domain cannot be appropriated by the patentee.

In sum, the argument against the propertization of thought based on the *quid pro quo* that lies at the heart of patent policy is simple. The information disclosed in a patent's specification is free for all to use during the term of the patent, provided it is used only as information *qua* information. The public's right to use this disclosed information *qua* information is contingent, *inter alia*, on being able to think about it, meaning that patentees cannot propertize the mere act of thinking about information disclosed in the specification.¹⁷⁴

The concept of an "invention" is ambiguous in patent law. Sometimes it refers to inventive information itself, and sometimes it refers to the claimed objects and actions that embody the inventive information in the spatial world of extension.¹⁷⁵ Likewise, the concept of "Progress" that the drafters of the Constitution expected patent law to promote is ambiguous, referring both to an increase in knowledge and to an ever-mounting number of tangible goods embodying that new knowledge.¹⁷⁶ The *quid*

172. See Mark A. Lemley, *Property, Intellectual Property and Free Riding*, 83 TEX. L. REV. 1031 (2005) (arguing that positive externalities are a fundamental, defining characteristic of intellectual property); Mark A. Lemley, *Patenting Nanotechnology*, 58 STAN. L. REV. 601, 620, n.82 (2005) (citing economic literature supporting the proposition that "positive 'spillovers' from innovation that cannot be appropriated by the innovator actually contribute to further innovation"). Cf. R. Polk Wagner, *Information Wants to Be Free: Intellectual Property and the Mythologies of Control*, 103 COLUM. L. REV. 995, 1010 (2003) (suggesting "that even fully 'propertized' intellectual goods will nonetheless contribute, perhaps significantly, to the growth of open information" because intellectual property does not propertize inventive information).

173. Cf. Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347 (1967) (setting out a cost- and benefit-internalization theory of patent rights).

174. Professor Rebecca Eisenberg makes a similar argument regarding the patentability of a DNA sequence stored on computer-readable media. She argues that a claim to a DNA sequence in a computer-readable media violates the "traditional patent bargain" because it prevents the public from effectively using the information disclosed in a patent. Rebecca S. Eisenberg, *Re-Examining The Role of Patents in Appropriating the Value of DNA Sequences*, 49 EMORY L.J. 783, 794-95 (2000).

175. Compare *Pfaff v. Wells Elecs.*, 525 U.S. 55, 60 (1998) (stating that, in the context of the on-sale bar, "[t]he primary meaning of the word 'invention' in the Patent Act unquestionably refers to the inventor's conception rather than to a physical embodiment of an idea"), with 35 U.S.C. § 271(a) (2007) ("[W]hoever without authority makes, uses, offers to sell, or sells any patented invention . . . infringes the patent."). In contrast, copyright law makes a clear distinction between the intangible, creative, and protected "work" which is pure information and the work's "fixed" embodiment in "a copy or phonorecord." Robert P. Merges, Peter S. Menell, & Mark A. Lemley, *INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE* 387-88 (4th ed. 2006) ("[A] 'book' is not a work of authorship, but is a particular kind of 'copy.'").

176. U.S. CONST. art. I, § 8, cl. 8. Compare Edward C. Waltersheid, *To Promote The Progress of Science and Useful Arts*, 43 IDEA 1, 12-13 (2003) ("Promoting the progress of science and promoting the progress of useful arts are facets of the same thing, namely, the advancement of knowledge and learning."), with *Pennock v. Dialogue*, 27 U.S. (2 Pet.) 1, 18 (1829) ("[T]he main object was 'to promote the progress of science and useful arts;' and

pro quo approach to patentable subject matter frames these ambiguities as not inherent problems with or flaws in the patent regime, but as foundational aspects. The ambiguities are built into the system. There are two different types of progress: progress in goods embodying inventive information, and progress in knowledge or inventive information itself. There are also two different property rules that can be used to promote progress: one that grants an inventor a right to exclude from the goods that he creates (so as to generate incentives), and another that ensures the public a privilege of access to those goods (so as to ensure their widespread availability for use as inputs in others' inventive processes). Contemporary patent law applies different property rules to different resources. This understanding of patent law suggests a both/and approach to subject matter patentability. Patent rewards are justified not only because an inventor has produced new and inventive information, but also because he has offered a means of employing this information to produce progress in the goods that exist in the spatial world of extension. Inventors who seek patent rights must contribute to both kinds of progress. Claims that propertize thought are indicative of inventions that are impermissibly one-dimensional or unambiguous. They offer the "act" of thinking about inventive information as their contribution to the material advancement of society when this is actually only a contribution to the progress of knowledge.

CONCLUSION

Because the Supreme Court accepted certiorari in *Laboratory Corp.*, but then dismissed the writ as improvidently granted after oral argument, the possibility of obtaining thought-propertizing claims has been dangled in front of the patent community. An increase in the number of similar applications would not be surprising. Courts, however, have no marching orders. They lack the conceptual tools to dissect a thought-propertizing claim and understand its implications. In fact, the Court's decision to dismiss the writ of certiorari in *Laboratory Corp.* as improvidently granted can easily be read as a direct result of the absence of such tools.

This article reframes the *Laboratory Corp.* debate, brings the propertization of thought into the spotlight, and offers a conceptual framework for addressing the propertization of thought. It locates the propertization of thought at the intersection of the privatizing and publicizing functions of patent law. A claim propertizes thought if it recites merely "the systematic transformation of mental representations of knowledge"¹⁷⁷ that is given to the public in the patent document itself and that has traditionally been given free from the restrictions of property. It offers rules for identifying a bounded set of thought-propertizing claims, drawing a line that can readily be policed by PTO examiners and courts, and two strategies

this could be done best, by giving the public at large a right to make . . . *the thing invented*, at as early a period as possible . . . ") (italics added).

177. Holyoak & Morrison, *supra* note 37, at 2.

for bringing Section 101 to bear on the propertization of thought. The first “law of nature” approach to Section 101 is inspired by a closer look at the Supreme Court’s software cases. It suggests that the scope of a thought-propertizing claim is a salient factor in a determination of the claim’s patentability. Narrow claims that describe applied instances of reasoning should be patentable, whereas broad claims that describe either an object of thought or a generic logical argument in the abstract should not be patentable. Under this approach, a marginal difference in the range of thought described by two claims need not be dispositive, mandating validity for the narrower claim and invalidity for the broader one, but a marginal shift must be a factor that is relevant to the subject matter patentability calculus. In contrast, the second approach to Section 101 builds on the *quid pro quo* of disclosure theory and bars the propertization of thought altogether. Under this approach, the information disclosed to the public in a patent specification must remain free for all to use, so long as it remains in a form that society conventionally recognizes as pure or immaterial knowledge. This approach suggests that a marginal shift in the breadth of a thought-propertizing claim is never relevant to subject matter patentability and that the “law of nature” doctrine, as articulated in the software cases, is a conceptual misfit for thought-propertizing claims.

Armed with these two approaches, we are at last in a position to critique Justice Breyer’s dissent to the dismissal of the writ of certiorari in *Laboratory Corp.*, the only opinion from the Court that we have on the subject of the propertization of thought. Justice Breyer concluded that claim 13 was so unpatentable that it did not even present “a case at the boundary” of patentability under the Court’s extant Section 101 jurisprudence.¹⁷⁸ As explored above, this argument is unsound.¹⁷⁹ However, there are two ways to modify it, and the debate over the propertization of thought should focus on which of these ways best serves the goal of promoting progress.

The first proposed correction retains the extant Supreme Court doctrine on Section 101 and alters Justice Breyer’s conclusion. Maybe claim 13 should be patentable or, at least, near the borderline of patentability. If any thought-propertizing claims at all recite patentable subject matter, then claim 13 and other claims to statistical syllogisms should pass muster. Claim 13 recites neither an object of thought in the abstract, nor a generic form of logical argument. It describes a single instance of a well-defined form of deductive reasoning. It encompasses only the use of three specified objects of thought in a syllogism, and it is limited to the derivation of the truthfulness of a given conclusion. In other words, if the Court’s software jurisprudence is accepted as a model and only claims to “laws of nature” in the abstract and their proxies are unpatentable, *Laboratory Corp.* is arguably the *Diamond v. Diehr* of the propertization of

178. *Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 126 S. Ct. 2921, 2927 (2006).

179. See *supra* Part III.B.2.

thought.¹⁸⁰

The second proposed correction retains Justice Breyer's conclusion but reformulates Section 101 doctrine to reflect more accurately why claim 13 is problematic. If the propertization is categorically barred, then claim 13 cannot present "a case at the boundary" of patentability. Although it is only speculation, there are hints in Justice Breyer's dissent which suggest that Justice Breyer himself might agree with such a reorientation of Section 101 doctrine, if presented with a case that squarely confronts the issue and frames the options. Not only did Justice Breyer list "mental processes" as a category of unpatentable subject matter,¹⁸¹ he also argued that claim 13 should not be held to recite patentable subject matter because Metabolite "cannot avoid the fact that the [claimed] process is no more than an instruction to read some numbers in light of medical knowledge."¹⁸² In other words, Justice Breyer noticed and was troubled by the fact that claim 13 propertized thought.

180. *But cf. supra* note 164 (noting that it may be inappropriate to compare the claims at issue in *Laboratory Corp.* and *Diehr* if the patentability of the *Diehr* claim hinges on the fact that the purpose of the method is to affect tangible change in the world).

181. *Lab. Corp.*, 126 S. Ct. at 2923.

182. *Id.* at 2928.