

Draft – 2/6/12

This is still a rough draft. Readers interested in a shorter review of my project may wish to read Section II only.

SOLVING RADER’S PARADOX: PATENT LAW’S QUEST FOR A THEORY OF REFERENCE

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INTRODUCTION

In patent law, we must build our fences with words. Every patent claim is a single sentence that “begins with a capital letter and ends with a period.”¹ We can contrast patent claims to entitlements in real property, where the boundaries are literally marked by fences. In real property, the land provides a “low-cost anchor” for exclusion rights.² Patent law, however, is a ship without an anchor. Despite this radical difference between patent law and real property, the scope of patent rights have long been analogized to rights in land. According to the Supreme Court, patent claims “mark where the progress claimed by the patent begins and where it ends [and] have been aptly likened to the description in a deed, which sets the bounds to the grant which it contains.”³ But while a survey stake can be driven into the ground, words connect with the world through a far more mysterious mechanism: the relationship of *reference*. The concept of reference is thus central to patent law. Yet reference has received surprisingly little scholarly attention.

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¹ U.S. PATENT & TRADEMARK OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE § 608.01(m) (8th ed. rev. 2010) [hereinafter MPEP].

² Henry Smith, *The Language of Property: Form, Context, and Audience*, 55 STANFORD L. REV. 1105, 1116 (2003).

³ *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 510 (1917).

In modern philosophy of language, there are two main theories of reference: descriptivist and causal theories. The descriptivist theory assumes that competent speakers associate a reference-fixing description with every term. This description specifies a set of properties. An object is then the referent of a term if and only if it satisfies the description associated with it.⁴ The causal theory denies that reference is fixed through descriptions. Under the causal theory, reference is determined primarily by the causal history of how terms are introduced into, and subsequently used by, linguistic communities. Philosophers such as Saul Kripke have argued that causal and historical factors provide a better account of reference for proper names (such as ‘Albert Einstein’) and, more importantly, natural kind⁵ terms (such as ‘water’).⁶

This paper will consider the implicit theories of reference adopted by some of patent law’s key doctrines. I will argue that some patent doctrines—most prominently the claim construction regime of *Markman v. Westview Instruments, Inc.*⁷ and the written description doctrine of *Regents of the University of California v. Eli Lilly*⁸—assume a very strong version of the descriptivist theory of reference. At the same time, other patent doctrines—including the doctrine of equivalents, the reverse doctrine of equivalents, and cases allowing description by physical deposit—reject descriptivism and seem to apply a causal theory. I suggest that tensions between these legal doctrines can be traced to their different approaches to meaning and reference.

In Part I, I begin this paper with a discussion of the written description doctrine. I focus on Judge Rader’s forceful criticism of the Federal Circuit’s written description requirement and his claim that that it is inconsistent with the court’s claim construction jurisprudence. Indeed, Judge Rader has argued that the Federal Circuit’s written description and claim construction doctrines present “an undeniable conflict of monumental proportions.”⁹ According to Judge Rader, once an original patent claim is properly construed, then the claim will *itself* provide a description of the invention.¹⁰ Thus, original claims cannot possibly fail the written description

⁴ See Bertrand Russell, *On Denoting*, 14 MIND 479 (1905).

⁵ A natural kind is a natural, as opposed to artificial, grouping. The existence of natural kind presupposes scientific realism. See, e.g., “natural kind” SIMON BLACKBURN, THE OXFORD DICTIONARY OF PHILOSOPHY (2008). A metaphor for natural kinds—dating back to Plato’s *Phaedrus*—is that successful scientific theories “carve nature at its joints.” See history of philosophy cite.

⁶ See Saul Kripke, NAMING AND NECESSITY (1980).

⁷ *Markman v. Westview Instruments, Inc.*, 517 US 370 (1996).

⁸ *Regents of the University of California v. Eli Lilly*, 119 F.3d 1559 (Fed. Cir. 1997).

⁹ *Ariad Pharmaceuticals, Inc. v. Eli Lilly*, 598 F.3d 1336, 1364 (Fed. Cir. 2010) (en banc) (Rader, J., dissenting).

¹⁰ *University of Rochester v. GD Searle & Co., Inc.*, 375 F. 3d 1303, 1309 (Fed. Cir. 2004) (Rader, J., dissenting from denial of rehearing *en banc*).

requirement. By holding otherwise, the Federal Circuit has created a dangerous paradoxical entity—the patent claim that can be construed and yet fails to describe.

In my view, this paradox can only be resolved through careful analysis of the relationship between descriptions and reference. Accordingly, in Part II, I provide detailed outlines of the descriptivist and causal theories of reference. I argue that both *Markman* and the written description requirement assume a strong version of descriptivism. Indeed, I contend that the Federal Circuit’s claim construction and written description doctrines are an attempt to *enforce* the descriptivist theory of reference.

In Part III, using this philosophical framework, I attempt to resolve Rader’s paradox. I argue that Rader’s paradox can be resolved by considering a central insight of the causal theory of reference: that speakers can sometimes use terms to refer to the world even though they are unsure (or even mistaken) about the correct reference-fixing descriptions associated with those terms. If patent claims contain terms that refer using causal, rather than descriptive, mechanisms, then it is possible for the inventor to make claims over technology that he or she has failed to describe. This is most likely to occur when natural kind terms appear in patent claims. This explains why written description is most relevant to biotechnology.

Ultimately, philosophers and linguists do not agree on what the correct account of reference should be, so it is too much to ask patent law to strike the perfect balance between descriptive and causal theories. Nevertheless, patent law can benefit greatly from the insight that there is a balance to be struck here at all. In other words, having staked out an extreme descriptivist position in many of its central doctrines, patent law suffers from some of the problems and contradictions inherent in that theory. By allowing that causal/historical factors—and not just descriptions—might fix reference, patent law could become more flexible and far more consistent with how scientific language actually relates to things in the world. In doing so, it might finally resolve some of its most “unruly” doctrinal problems.¹¹

I THE WRITTEN DESCRIPTION DOCTRINE AND RADER’S PARADOX.

In this Part, I will outline the Federal Circuit’s recent written description jurisprudence. I will then explain Judge Rader’s forceful objections to this jurisprudence, with particular emphasis on his claim that it is logically inconsistent with the court’s rules regarding claim construction and after-invented technology.

¹¹ See Mark D. Janis, *On Courts Herding Cats: Contending with the “Written Description” Requirement (and Other Unruly Patent Disclosure Doctrines)*, 2 WASH. U. J.L. & POL’Y 55, 106 (2000) (claiming that the written description requirement “is at worst indecipherable, and at best unruly, even when considered in isolation”).

Section 112 of the Patent Act provides that:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same

The Federal Circuit battled for over a decade over whether this language imposes a written description requirement that is distinct from the enablement requirement.¹² In addition, members of the court have disputed whether a written description requirement should be applied to originally-filed claims.

To understand this dispute, we should review the basic details of a patent application. A patent application contains two main parts: the specification and the claims. The specification should consist of a detailed description of the invention, typically using both text and diagrams.¹³ The application must then “conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.”¹⁴ It is the claims that define the patentee’s property right.

Before turning to the Federal Circuit’s dispute over written description, we should also be familiar with the distinction between: 1) original claims; and 2) amended claims or later-added claims. The claims filed with the original application are known, unsurprisingly, as the original claims. After the application is filed, the applicant can amend existing claims or add entirely new claims.¹⁵ An inventor may even do this while being entitled to keep the original filing date as the priority date.¹⁶ But an applicant cannot add “new matter” to the specification if he or she wishes to claim priority back to the original application.¹⁷ Without this prohibition,

¹² See *Regents of the University of California v. Eli Lilly*, 119 F.3d 1559 (Fed. Cir. 1997); *University of Rochester v. GD Searle & Co., Inc.*, 375 F. 3d 1303, 1309 (Fed. Cir. 2004) (Rader, J., dissenting from denial of rehearing *en banc*); *Ariad Ariad Pharmaceuticals, Inc. v. Eli Lilly*, 598 F.3d 1336 (Fed. Cir. 2010).

¹³ 35 U.S.C. § 112 (2011).

¹⁴ *Id.*

¹⁵ See MPEP § 714 (allowing an applicant to amend a patent application prior to issuance); MPEP § 201.07 (allowing an applicant to file a new “continuation application” that claims priority back to the original application’s filing date).

¹⁶ This feature of patent law is a controversial. See Tun-Jen Chiang, *Fixing Patent Boundaries*, 108 MICH. L. REV. 523 (2010) (arguing that post-filing amendments enable applicants to improperly capture innovation that occurs after the original filing date).

¹⁷ See MPEP § 714(f) (“No amendment may introduce new matter into the disclosure of an application.”); MPEP § 201.07 (“the continuation should not include anything which would constitute new matter if inserted in the original application”).

“applicants could add new matter to their disclosures and date them back to their original filing date, thus defeating an accurate accounting of the priority of invention.”¹⁸ Importantly, the restriction on adding new matter to the specification also operates (at least in theory) to prevent applicants from adding new matter to the claims themselves. This is because claims must be supported by the specification.¹⁹ This is where the written description and enablement requirements come in to play: both doctrines concern the relationship between the specification and the claims.

Consider the following example: a inventor files a patent application where the specification describes a chariot, yet the claims are directed to an airplane. Faced with an application like this, we would easily conclude that the inventor has overreached. The specification teaches us nothing about airplanes. Indeed, the specification does not even suggest that the inventor had any knowledge regarding airplanes. Accordingly, this patent application fails to satisfy the fundamental *quid pro quo* of the patent system: that an inventor must fully reveal his or her invention to the public in exchange for the limited monopoly granted by a patent. The written description and enablement doctrines are intended to enforce this *quid pro quo* by ensuring that the specification discloses and teaches the invention.

Although the Federal Circuit has struggled with the precise formulations of the written description and enablement standards,²⁰ we can look to the court’s canonical statements for a general outline of the doctrines. To satisfy the enablement requirement, the inventor must provide a specification that enables one of ordinary skill in the art to practice the claimed invention without “*undue experimentation*.”²¹ Enablement is a question of law with underlying questions of fact regarding undue experimentation.²² The court should look to a variety of factors—often called the *Wands* factors—to determine whether undue experimentation is needed to practice the claimed invention.²³

¹⁸ *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1255 (Fed. Cir. 2004).

¹⁹ *See, e.g., Pennwalt Corp. v. Akzona Inc.*, 740 F.2d 1573, 1578 n.11 (Fed. Cir. 1984) (“Claims which are amended with limitations unsupported by the original disclosure are rejected under 35 U.S.C. § 112 (first paragraph) as lacking support in the specification, while such amendments to the abstract, specification, and drawings are objected to as being drawn to new matter.”).

²⁰ *See* T.J. Chiang, *The Levels of Abstraction Problem in Patent Law*, — NORTHWESTERN UNIV. L. REV. —, *21-23 of pdf (2011) (noting that the Federal Circuit’s has offered inconsistent formulations of the enablement requirement); Jeffrey A. Lefstin, *The Formal Structure of Patent Law and the Limits of Enablement*, 23 BERKELEY TECH. L.J. 1141, 1169 (2008) (criticizing the Federal Circuit’s formulation of the written description doctrine).

²¹ *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988) (emphasis added).

²² *See, e.g., National Recovery Technologies, Inc. v. Magnetic Separation Systems, Inc.*, 166 F.3d 1190, 1194 (Fed. Cir. 1999).

²³ *In re Wands*, 858 F.2d at 737 (listing the following factors: “(1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3)

To satisfy the written description requirement, the applicant must “convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention.”²⁴ In other words, the specification must “clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed.”²⁵ Compliance with the written description requirement is a question of fact.²⁶

The enablement and written description requirements are closely related. This is because a disclosure that teaches a person of skill in the art how to practice the invention is also likely to demonstrate that the inventor did in fact invent what is claimed.²⁷ The judges on the Federal Circuit generally agree that the two requirements are closely related in this sense. But the court has vigorously disputed whether the enablement and written description requirements establish two *separate* tests.

The Federal Circuit’s written description battle began with *Regents of the University of California v. Eli Lilly*.²⁸ In *Eli Lilly*, the patent related to recombinant DNA technology. The patent claimed human insulin-encoding cDNA.²⁹ Eli Lilly argued that, while the patentee may have provided an adequate description of rat insulin cDNA, it had not described human insulin cDNA.³⁰ The specification did include a general method for obtaining human cDNA, but the court found that this was not sufficient. The court wrote:

While the example provides a process for obtaining human insulin-encoding cDNA, there is no further information in the patent pertaining to that cDNA’s relevant structural or physical characteristics; in other words, it

the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims”).

²⁴ *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991).

²⁵ *Id.* at 1563 (citing *In re Gosteli*, 872 F.2d 1008, 1012 (Fed. Cir. 1989)).

²⁶ *ICU Med., Inc. v. Alaris Med. Sys., Inc.*, 558 F.3d 1368, 1376 (Fed. Cir. 2009).

²⁷ *See LizardTech, Inc. v. Earth Res. Mapping*, 424 F.3d 1336, 1344-45 (Fed. Cir. 2005) (noting that enablement and written description “usually rise and fall together”).

²⁸ *Regents of the University of California v. Eli Lilly*, 119 F.3d 1559 (Fed. Cir. 1997).

²⁹ *See* 119 F.3d at 1567. More specifically, claim 5 of the patent claims: “a nucleotide sequence having the structure of the reverse transcript of an mRNA of a [human], which mRNA encodes insulin.” *Id.* This nucleotide sequence enables the production of human insulin-encoding cDNA. *See* William J. Thieman & Michael A. Palladino, *INTRODUCTION TO BIOTECHNOLOGY* 69 (2009) (reverse transcriptase is used to convert RNA into cDNA).

³⁰ *Id.* at 1566.

thus does not describe human insulin cDNA. Describing a method of preparing a cDNA or even describing the protein that the cDNA encodes, as the example does, does not necessarily describe the cDNA itself.³¹

Accordingly, the court held the claim to human insulin cDNA invalid under the written description doctrine.

Lilly was especially notable because it struck down an *original* claim under the written description doctrine. Prior to *Lilly*, the written description doctrine was generally applied to police priority.³² In other words, the test was only applied to amended or latter added claims. By extending the written description requirement to original claims, the Federal Circuit created a new hurdle for every patent application.

Eli Lilly was promptly met with protest from both the biotechnology sector and parts of the academy.³³ Over the next decade, the Federal Circuit debated whether a separate written description requirement should be applied to original claims. Judges Rader, Linn, and Gajarsa, repeatedly urged the court to hear the issue en banc and overrule *Ely Lilly*.³⁴ The dissenters argued that a separate written description requirement was unnecessary and destabilizing.³⁵

The Federal Circuit did not settle this battle until its *en banc* decision in *Ariad Pharmaceuticals, Inc. v. Eli Lilly*, 598 F.3d 1336 (Fed. Cir. 2010). Like most decisions relating to the written description requirement, *Ariad* involved biotechnology. The patentee asserted broad claims to methods for reducing NK-κB activity (NK-κB is a particular kind of protein, known as a transcription factor, that controls the transcription of genetic information from DNA to mRNA).³⁶ The patent's specification "hypothesize[d] three classes of molecules potentially capable of reducing NF-κB activity: specific inhibitors, dominantly interfering molecules,

³¹ *Id.* at 1657.

³² See, e.g., *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1562 (Fed. Cir. 1991) ("the 'written description' requirement . . . insures that subject matter presented in the form of a claim *subsequent* to the filing date of the application was sufficiently disclosed at the time of filing so that the prima facie date of invention can fairly be held to be the filing date of the application") (emphasis added).

³³ See *University of Rochester v. GD Searle & Co., Inc.*, 375 F. 3d 1303, 1309 (Fed. Cir. 2004) (Rader, J., dissenting from denial of rehearing *en banc*) (noting that, in the aftermath of the *Eli Lilly* decision, over 30 academic articles were published criticizing the ruling).

³⁴ See *University of Rochester v. GD Searle & Co., Inc.*, 375 F. 3d 1303, 1307-1327 (Fed. Cir. 2004) (Rader, J., dissenting from denial of rehearing *en banc*); *Enzo Biochem, Inc. v. Gen-Probe Inc.*, 323 F. 3d 956, 976-989 (Fed. Cir. 2002) (Rader, J., dissenting from denial of rehearing *en banc*).

³⁵ See *id.*

³⁶ See 598 F.3d at 1340-41, 1354-58.

and decoy molecules.”³⁷ The original panel found that the specification disclosed “no working or even prophetic examples” of these molecules.³⁸ Thus, the panel concluded that the specification amounted to little more than a “wish” or “plan” for future research and held the claims invalid under the written description requirement.³⁹

The Federal Circuit granted Ariad’s petition to hear the case en banc to consider “whether § 112, first paragraph, contains a written description requirement separate from the enablement requirement and, if so, the scope and purpose of that requirement.”⁴⁰ After over a decade of uncertainty, the proponents of a separate written description requirement won decisively: the court upheld *Eli Lilly* in a vote of 9 to 2.⁴¹

While much of the debate over written description had focused on whether or not imposing such a requirement was good policy, the majority opinion in *Ariad* largely skirted the policy question. Instead, the majority focused heavily on the statutory language of section 112.⁴² Applying the rule of statutory construction that assumes no part of a statute is surplusage, the majority reasoned that the statute’s language and grammar established written description and enablement as two separate tests.⁴³ Further, the majority noted that nothing in the language of section 112 limits the written description requirement to priority determinations. Thus, the court concluded that “although the issue [of adequacy of written description] arises primarily in cases involving priority, Congress has not so limited the statute, and neither will we.”⁴⁴ Having affirmed the existence of a separate written description requirement, the majority found the patent invalid for the same reasons as the original panel.⁴⁵

In her concurrence, Judge Newman did not shy away from the policy debate. Arguing that “the real issue of this case is too important to be submerged in rhetoric,” Judge Newman lamented that the “en banc court [was] diverted into a scholarly debate about the punctuation in the first paragraph of Section 112.”⁴⁶ Accordingly, she issued a full-throated defense of a separate written description requirement. Judge Newman argued that “the overriding policy of patent systems requires both written description and enablement” to ensure that the scope of the patentee’s

³⁷ *Ariad Pharmaceuticals, Inc. v. Eli Lilly and Co.*, 560 F.3d 1366, 1374 (Fed. Cir. 2009).

³⁸ *Id.* at 1376.

³⁹ *Id.* at 1375.

⁴⁰ 598 F.3d at 1340.

⁴¹ Even Judge Gajarsa switched sides and voted with the majority. *See* 598 F.3d at 1360-61 (Gajarsa, J., concurring).

⁴² *See* 598 F.3d at 1343-45.

⁴³ *Id.* at 1344-45.

⁴⁴ *Id.* at 1349.

⁴⁵ *See id.* at 1354.

⁴⁶ *Id.* at 1358 (Newman, J., concurring).

exclusionary right is “commensurate” with the patentee’s disclosure.⁴⁷ For Judge Newman, this “is not a question of grammatical nuance of the placement of commas in Section 112; it is a question of the principle and policy of patent systems.”⁴⁸

In his *Ariad* dissent, Judge Rader also addressed the policy question, arguing that the majority’s decision was fundamentally inconsistent with the court’s other doctrines.⁴⁹ He identified two points of purported inconsistency. I shall describe each in detail below.

A Rader’s first paradox: How can an intelligible patent claim fail to describe the invention?

Rader’s first paradox identifies a conflict between the written description doctrine and the Federal Circuit’s claim construction jurisprudence. Given that claim construction is generally considered the most important part of patent litigation,⁵⁰ a conflict with the basic doctrines of claim construction is a serious problem. Indeed, Judge Rader claims that the *Ariad* decision raises an “undeniable conflict of *monumental* proportions.”⁵¹

To fully understand Rader’s objection, we must briefly review claim construction jurisprudence. In essence, claim construction is the process of interpreting the language of the patent claims. This process assumed its now central role in patent litigation after the Supreme Court’s decision in *Markman v. Westview Instruments, Inc.*⁵² In *Markman*, the Supreme Court held that claim construction should be “exclusively within the province of the court.”⁵³ As a result, every patent case includes a so-called *Markman* hearing where the judge attempts to determine the meaning of the claim terms. Since the claims are supposed to establish the scope of the invention, the court’s construction often settles the outcome of a patent suit.⁵⁴

It is important to note that claim construction is backwards-looking in the sense that courts are to give claim terms “the ordinary and customary meaning . . . that the term would have to a person of ordinary skill in the art in question *at the time of the*

⁴⁷ *Id.* at 1359-60.

⁴⁸ *Id.* at 1360.

⁴⁹ *Id.* at 1361 (Rader, J., dissenting).

⁵⁰ See, e.g., Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1753-54 (2009) (noting that the *Markman* hearing “has remarkably quickly become the heart of almost every patent lawsuit”).

⁵¹ *Id.* at 1364 (emphasis added).

⁵² 517 US 370 (1996).

⁵³ *Id.* at 372.

⁵⁴ See 1999 ABA Section of Intellectual Property Law, 1999 *Markman* Survey, 18 A.B.A. Sec. Pub. I.P.L. 3 (2000) (reporting that almost a third of patent cases settle after the court concludes claim construction).

*invention.*⁵⁵ In making this determination, courts look to a variety of sources, including “the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.”⁵⁶ The Federal Circuit has cautioned that while extrinsic evidence such as dictionaries or expert testimony “may be useful to the court” this evidence “is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence” such as the specification.⁵⁷ Thus, claims must be carefully read “in view of the specification” to determine their meaning.⁵⁸ Although courts are permitted to consider extrinsic evidence such as expert testimony, the Federal Circuit has held that claim construction is a question of law, and *not* a question of fact.⁵⁹

Sometimes it might not be possible to construe a claim because the claim language is so unclear that no reasonable construction can be found. In those circumstances, the claim is said to be invalid for indefiniteness.⁶⁰ A claim will not be found indefinite so long as *some* meaning is discernable, even if reasonable people might disagree about the appropriate construction.⁶¹ This sets a very high bar for indefiniteness (or, put another way, the court has set a very low bar for definiteness). Thus, in practice, very few patent claims are struck down as indefinite.⁶² Indefiniteness is

⁵⁵ *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (emphasis added).

⁵⁶ *Id.* at 1314 (quoting *Innova/Pure Water v. Safari Water Filtration*, 381 F. 3d 1111, 1116 (Fed. Cir. 2004)).

⁵⁷ *Id.* at 1319. The Federal Circuit’s en banc decision in *Phillips* largely restated and summarized existing claim construction principles. The case is significant, however, for its emphasis on intrinsic evidence (*i.e.* evidence concerning the patent and the application) over extrinsic evidence (*i.e.* evidence external to the patent application, such as dictionary definitions or expert testimony). *Phillips* effectively overruled a line of cases following from *Texas Digital Systems, Inc. v. Telegenix, Inc.*, 308 F.3d 1193 (Fed. Cir. 2002), that had heavily emphasized dictionary definitions as the key to claim construction. After *Phillips*, lower courts are directed to first look to the specification and prosecution history when determining claim meaning.

⁵⁸ *Phillips*, 598 F.3d at 1315 (quoting *Markman v. Westview Instruments, Inc.*, 52 F. 3d 967, 979 (Fed. Cir. 1995) (en banc))

⁵⁹ *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1456 (Fed. Cir. 1998).

⁶⁰ *See Aero Prods. Int’l, Inc. v. Intex Recreation Corp.*, 466 F.3d 1000, 1016 (Fed. Cir. 2006).

⁶¹ *See Exxon Res. & Eng’g Co. v. United States*, 265 F.3d 1371, 1375 (Fed. Cir. 2001).

⁶² *See, e.g., Donald S. Chisum, Weeds and Seeds in the Supreme Court’s Business Method Patents Decision: New Directions for Regulating Patent Scope*, 15 LEWIS & CLARK L. REV. 11, 23 (2010) (noting that “the Federal Circuit has tended to reject indefiniteness charges, applying its extraordinarily lenient standard”).

considered to be a part of claim construction and is thus an question of law for the court.⁶³

It is crucial to distinguish claim construction from the question of infringement. In claim construction, the court provides the meaning of the claims *in words*. The jury is then given the task of deciding whether “the properly construed claim reads on the accused device.”⁶⁴ Put another way, the jury is asked whether the claim, as construed by the court, *describes* the accused device. It is the jury’s task to match the words to things.

With that background, we can turn to the ‘monumental’ contradiction identified by Rader. Under the majority’s ruling in *Ariad*, it is possible for an original claim to be invalid under the written description doctrine. What does this entail? Well, we should first assume that the claim was at least *capable* of construction. Otherwise, the claim would be invalid as indefinite.⁶⁵ Thus, prior to striking the claim down as invalid under the written description requirement, the trial court must have held a *Markman* hearing to construe the claim. Moreover, the trial court must interpret the claims “in light of the specification.”⁶⁶ According to Judge Rader, this means that the “claims would never have a scope that exceeds the disclosure in the rest of the specification.”⁶⁷ Put another way, a construction that “lacks support” in the specification would be an incorrect interpretation of the claims. Judge Rader concludes that the “court’s new written description doctrine only has meaning if this court ignores its own claim construction rules.”⁶⁸

In some earlier dissents, Judge Rader made the same point in even simpler terms: original claims “*constitute their own description*.”⁶⁹ Original claims are considered part of the initial application.⁷⁰ Thus, the claim itself can “constitute[] a description in the original disclosure equivalent in scope and identical in language to the total subject matter . . . being claimed.”⁷¹ Indeed, how can a claim fail to describe the invention? If a claim can be construed, then presumably the claim provides a

⁶³ See *Praxair, Inc. v. Atmi, Inc.*, 543 F. 3d 1306, 1319 (Fed. Cir. 2008).

⁶⁴ *Strattec Sec. Corp. v. General Automotive Specialty Co., Inc.*, 126 F.3d 1411, 1418 (Fed. Cir. 1997).

⁶⁵ Judge Rader does not explicitly mention the indefiniteness doctrine when presenting his case. Nevertheless, I believe it is an important implicit premise in his argument.

⁶⁶ *Ariad*, 598 F. 3d at 1365 (Rader, J., dissenting) (quoting *Markman*, 52 F.3d at 979).

⁶⁷ *Id.*

⁶⁸ *Id.*

⁶⁹ *University of Rochester v. G.D. Searle & Co., Inc.*, 375 F.3d 1303, 1308 n.2 (Fed. Cir. 2004) (Rader, J., dissenting from denial of rehearing en banc) (quoting *In re Koller*, 613 F.2d 819, 823 (CCPA 1980)) (emphasis added).

⁷⁰ See *id.*

⁷¹ *Application of Gardner*, 475 F. 2d 1389, 1391 (CCPA 1973)

description of the invention sufficiently intelligible for the jury to determine infringement. How can this claim also be invalid under the written description doctrine? Judge Rader had identified a genuine paradox in patent law.

B Rader's second paradox: How can a patent describe technology that has not been invented?

As if one fundamental contradiction within patent law were not enough, Judge Rader explains that the majority's decision in *Ariad* is also inconsistent with established rules regarding blocking patents and after-invented technology.⁷² According to Judge Rader, if the majority's decision in *Ariad* were followed faithfully, then blocking patents would never be possible.

A patent is known as a blocking patent when its scope covers subsequent improvements made to an earlier invention. It is well established that, in at least some circumstances, a patent can cover after-invented technology.⁷³ This is most easily explained using an example. Suppose a patent is granted to a mechanical engineer for inventing the bicycle. Shortly after this patent is issued, a materials engineer invents carbon fiber. This second engineer also discovers that her new material makes for an excellent bicycle frame and applies for a patent for a bicycle with a carbon fiber frame. In this circumstance, the second patent would likely be a valid *improvement patent*. The first patent, however, would act as a *blocking patent* with respect to the second patent. This is because the second inventor cannot practice her invention—the carbon fiber bicycle—without a license to practice the original bicycle patent. At the same time, the first inventor cannot make a carbon fiber bicycle without a license to the second patent. It is generally hoped that, since neither can practice the improvement without a license, the two inventors will be motivated to cross-license their inventions so that the public will benefit from the improvement patent.⁷⁴

It is difficult to combine this long-accepted framework with the majority's ruling in *Ariad*. By definition, improvement patents must be a non-obvious variation of the original invention.⁷⁵ This means that the original inventor cannot have described the improvement, because that would render the improvement obvious. But if the inventor did not describe the improvement, then he or she did not 'possess' the full scope of his or her invention.⁷⁶ So, under a strict reading of the written description doctrine, an improvement patent renders the original patent invalid.

⁷² *Ariad*, 598 F. 3d at 1365-66 (Rader, J., dissenting).

⁷³ See, e.g., *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1340 (Fed. Cir. 2003) ("Improvement and selection inventions are ubiquitous in patent law.").

⁷⁴ See Robert P. Merges & Richard R. Nelson, *On The Complex Economics of Patent Scope*, 90 Colum. L. Rev. 839, 865 (1990) ("An economic rationale for improvement patents would stress their tendency to encourage bargaining between improvers and original patentees.").

⁷⁵ See, e.g., *In re Emert*, 124 F.3d 1458, 1462 (Fed. Cir. 1997).

⁷⁶ See *Ariad*, 598 F. 3d at 1365 (Rader, J., dissenting).

As Judge Rader explains, this problem is most acute for genus and species claims. In *Integra Lifesciences I, Ltd. v. Merck KGaA*, the Federal Circuit held that “genus patents do not estop the applicant from later filing an improvement patent, such as the ‘517, to claim species with particularly useful properties.”⁷⁷ But it is very difficult to see how the original genus patent could be valid under *Ariad* without describing the species.⁷⁸ Either the original genus patent will be invalid under the written description doctrine, or the later species patent will be invalid as obvious. In other words, “[u]nder the new regime, mere improvements will likely invalidate genus patents.”⁷⁹

In formal logic, a contradiction can be used to prove *anything*.⁸⁰ So if patent law is truly contradictory, as Judge Rader urges, then it is logically ‘explosive’ in that its doctrines will allow judges to reach any result they want. Indeed, this is precisely what Judge Rader argues:

This court essentially claims unfettered power to err twice—both in construing the claims so broad as to exceed the scope of the rest of the specification and then to invalidate those claims because it reads the specification as failing to ‘support’ this court’s own broad conception of the claimed subject matter.⁸¹

This is a serious accusation. Does the written description doctrine really create contradictions that give the court unfettered power to err? To answer this question, we will have to consider the fundamental logical and linguistic relationships at the heart of written description and claim construction. This means we must take a detour into philosophy.

⁷⁷ *Integra Lifesciences I, Ltd. v. Merck KGaA*, 331 F.3d 860, 869 (Fed.Cir.2003), vacated on other grounds, 545 U.S. 193 (2005).

⁷⁸ In the wake of *Eli Lilly*, the PTO issued written description guidelines stating that the “written description requirement for a claimed genus may be satisfied through sufficient description of a representative number of species . . . or by disclosure of relevant, identifying characteristics . . . sufficient to show the applicant was in possession of the claimed genus.” *Guidelines for Examination of Patent Applications Under the 35 U.S.C. 112*, ¶ 1, “Written Description” Requirement, 66 Fed. Reg. 1099, 1106 (Jan. 5, 2001). A disclosure satisfying these requirements would seem to render any claim to a species within the genus obvious.

⁷⁹ See *Ariad*, 598 F. 3d at 1366 (Rader, J., dissenting).

⁸⁰ This is called the principal of explosion. See Walter Carnielli, Marcelo E. Coniglio, & João Marcos, *Logics of Formal Inconsistency*, 14 Handbook of Philosophical Logic, 2d ed. 1, 1 (2007) (in traditional logic, “explosiveness” means that “everything is derivable” from a contradiction).

⁸¹ *Ariad*, 598 F. 3d at 1365 (Rader, J., dissenting).

II MEANING AND REFERENCE

The two paradoxes identified by Judge Rader reveal fundamental tensions within patent law. In both cases, the paradox plays on the puzzling relationship between the description of the invention and the objects in the world that are actually described, *i.e.* the relationship between words and things. In linguistics and philosophy, this relationship—*reference*—has received considerable study.⁸² Despite its importance to patent law, few scholars have considered whether theories of reference might shed light on patent law.⁸³

In this Part, I shall discuss philosophical theories of reference. I shall focus on two major theories: *descriptivist* theories and *causal* theories.⁸⁴ In Part III, *infra*, I will explain how these theories shed light on the puzzles identified by Judge Rader. My

⁸² See cite.

⁸³ Collins has suggested that the distinction between sense and reference might explain how patent scope can grow to include after-invented technology. See Kevin Emerson Collins, *The Reach of Literal Claim Scope into After-Arising Technology: On Thing Construction and the Meaning of Meaning*, 41 CONN. L. REV. 49, ___ (2008). I will discuss Collin’s thesis in more detail at Part ___ *infra*. Other scholars have tended to focus more the distinction between atomistic and holistic theories of meaning. See Kristen Osenga, *Linguistics and Patent Claim Construction*, 38 RUTGERS L.J. 61, ___ (2006) (arguing that patent law should adopt formal rules of interpretation modelled on linguistics); Margaret Jane Radin, *The Linguistic Turn in Patent Law* (2005) (draft on file with author) (arguing that the Federal Circuit has implicitly adopted an atomistic theory of language where meaning “is not an empirical matter,” “meaning attaches to individual language units,” and “there is one objective correct meaning to be found”); Craig Allen Nard, *A Theory of Claim Interpretation*, 14 Harv. J.L. & Tech. 1, ___ (2000) (arguing against “hypertextualist” theories of claim construction).

⁸⁴ Some readers might wonder why, given my interest in the relationship between words and things, I am not also discussing Saussurean semiotics and its analysis of ‘sign’ and ‘signified.’ A full answer to this question would require a paper in itself. In summary, Saussurean theory is most concerned with the relationships between signs and concepts, not the relationship between signs and mundane objects found in the world. See Barton Beebe, *The Semiotic Analysis of Trademark Law*, 51 UCLA L. REV. 621, 634 (2004) (noting that “the actual physical object” is “missing from the Saussurean dyad” of signifier and signified); see also PAUL COBLEY, *THE ROUTLEDGE COMPANION TO SEMIOTICS AND LINGUISTICS* 248 (2001) (distinguishing Saussure’s “signified” from a term’s referent in the world). For this reason, while Saussurean theory might be highly illuminating to trademark law (where the associations between words and concepts are central) it unlikely to be very helpful to patent law (which is ultimately concerned with whether the words in patent claims refer to the accused devices in the world).

hope is that these ideas can “travel” outside of analytic philosophy to clarify some of the central problems in patent law.⁸⁵

Before I discuss theories of reference, I will briefly address skepticism about whether theories of reference can be relevant to legal questions. Some scholars have argued that theories of reference have little application to law. For example, Brian Bix has argued that theories of reference are unlikely to cast light on legal problems because, “in matters of legal interpretation, there are (political) choices to be made by a society regarding how it wants to govern itself in and through law.”⁸⁶ Bix is correct that, in many legal contexts, political or policy considerations influence the rules of interpretation (for example, the rule of lenity is a legal rule of interpretation grounded in political considerations⁸⁷). Nevertheless, I believe that analytic philosophy of meaning is more likely to be relevant to patent law. This is because the terms in patent claims are supposed to be given the meaning they would have to a person of ordinary skill in the art.⁸⁸ In other words, the project of patent law is to give scientific terms the same meaning that those terms have to scientists.⁸⁹ Therefore, with limited exceptions,⁹⁰ the project of interpretation in patent law is the same as the project of interpretation for a philosopher of language.

To the extent patent law truly seeks to give claim terms the meaning that they would have to persons of skill in the art (*i.e.* scientists), then patent law, like philosophy, is searching for the best semantic theory of scientific terms. As Bix notes,

⁸⁵ Stanley Fish has claimed that “the conclusions reached in philosophical disquisitions do not travel” outside of philosophy. See Stanley Fish, *Does Philosophy Matter?*, New York Times (Aug. 1, 2011) available at <http://opinionator.blogs.nytimes.com/2011/08/01/does-philosophy-matter/?hp>. I hope this paper provides a counter-example.

⁸⁶ Brian H. Bix, *Can Theories of Meaning and Reference Solve the Problem of Legal Determinacy?*, 16 *RATIO JURIS* 281, 290 (2003). As the title of his paper suggests, Bix was investigating whether theories of reference could answer the problem of legal determinacy. But his point here applies to issues with legal interpretation in general.

⁸⁷ See, e.g., *United States v. Stoner*, 927 F.2d 45, 47 (1st Cir. 1991) (the rule of lenity “is based both on fairness to individuals in providing adequate notice and the belief that legislatures and not courts are the appropriate bodies for defining criminal activity”).

⁸⁸ See *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc).

⁸⁹ Cf. Kimberly Kessler Ferzan, *A Planet By Any Other Name*, 108 *MICH. L. REV.* 1011, 1029 (2010) (the “struggle, to find and/or create meaning in the world, is as central to the practice of science as it is to the practice of law”).

⁹⁰ For example, the words “comprising” and “consisting of” are given a specific meaning as terms of art in patent law. See *Vehicular Techs. Corp. v. Titan Wheel Int'l*, 212 F.3d 1377, 1382 (Fed. Cir. 2000) (“The phrase ‘consisting of’ is a term of art in patent law signifying restriction and exclusion, while, in contrast, the term ‘comprising’ indicates an open-ended construction.”).

“[o]utside of law, there may be one best theory for determining the meaning of terms (generally—or different best semantic theories for different categories of terms).”⁹¹ So we can at least hope that philosophical theories of meaning and reference will shed light on patent law. I should note, however, that I will not attempt to find the ‘best’ or ‘correct’ theory of reference and then apply that theory to patent law.⁹² Rather, I will discuss the strengths and weaknesses of the descriptivist and causal theories and show how the same problems reappear in patent law. I believe that descriptivist and causal theories of reference are especially illuminating to patent law because different patent doctrines implicitly adopt one or the other of these theories of reference.⁹³ For example, I believe that the written description doctrine of *Eli Lilly* and *Ariad* implicitly adopts the descriptivist theory.⁹⁴ Thus, weaknesses and contradictions found in the descriptivist theory will show up in patent law. I now turn to the two major theories of reference.

A The descriptivist theory of reference

As the name suggests, the descriptivist theory sees descriptions as playing the central role in determining reference. The theory has a venerable history, dating back to Bertrand Russell’s 1905 article *On Denoting*.⁹⁵ Descriptivist theories can be contrasted with the Millian theory which claims that the meaning of a term is simply the name’s referent (for example, the meaning of a proper name such as ‘Mark Twain’ is the actual person who bears that name).⁹⁶

Millian theories fell out of favor because they fail to provide a good account of sentences such as “Samuel Clemens is Mark Twain.”⁹⁷ If the meaning of a name is simply its referent, then sentence “Samuel Clemens is Mark Twain” is equivalent to the sentence “Mark Twain is Mark Twain.” But most people do not see these sentences as equivalent. This is because the first sentence seems to teach us something while the second sentence announces a trivial necessary truth.

Descriptivist theories offer a solution to this problem by drawing a distinction between the descriptions we associate with a term and the referent of the term.⁹⁸

⁹¹ Bix, *supra* at note __, at 290.

⁹² In any event, my view is that neither the descriptivist or causal theory can provide a complete account of reference. See Part __ *infra*. Thus, any patent law doctrine that assume a strong version of *either* semantic theory will be beset by contradictions. A consistent patent law will needs to be flexible in its treatment of meaning.

⁹³ See Part __ *infra*.

⁹⁴ See Part __ *infra*.

⁹⁵ Bertrand Russell, *On Denoting*, 14 MIND 479 (1905); .

⁹⁶ See Peter J. Graham, *Defending Millianism*, 108 MIND 555 (1999).

⁹⁷ See MICHAEL DEVITT & KIM STERELNY, LANGUAGE AND REALITY: AN INTRODUCTION TO THE PHILOSOPHY OF LANGUAGE 47 (2d ed. 1999).

⁹⁸ This distinction is similar to, and clearly influenced by, Frege’s distinction between *sense* and *reference*. See Gottlob Frege, *Über Sinn und Bedeutung*, in (eds) TRANSLATIONS FROM THE PHILOSOPHICAL WRITINGS OF GOTTLLOB FREGE __-__ (Peter

Further, the descriptivist claims that the description we associate with a term *determines* the referent of the term. Descriptivist theories generally involve two claims:

1. Competent speakers associate a description with a term. This description specifies a set of properties.
2. An object is the referent of a term if and only if it uniquely or best satisfies the description associated with it.⁹⁹

With these assumption, we can explain why the sentence “Samuel Clemens is Mark Twain” is different from the sentence “Mark Twain is Mark Twain.” Even though Samuel Clemens and Mark Twain have the same referent, we might associate different descriptions with the two names (or, in Fregean terms, the names have different *senses*). The sentence “Samuel Clemens is Mark Twain” therefore teaches us that the same person (i.e. the same referent) satisfies the different descriptions associated with the two names.

In addition to names, the descriptivist theory can be applied to other categories of terms. We can apply the theory to natural kind terms (such a “water”) or artifactual terms (such as “sloop”). Descriptivism seems to provide a good account of the meaning of artifactual terms. For me to correctly use the term “sloop,” I should know that a is a particular kind of sail boat with a particular kind of mast.¹⁰⁰ In other words, I should associate a description with “sloop” such that, if a boat satisfies that description, the term “sloop” refers to the boat. If I am not familiar with this description, then arguably I cannot competently use the term.

It is important to observe that descriptivism imposes a high standard of competency on speakers: to correctly use a term they must associate the appropriate description with that term (this is premise 1 above). This has been referred to as the “Cartesian assumption.”¹⁰¹ The Cartesian assumption is the view that for a person to be compe-

Geach and Max Black, eds., 1952). The subtle differences between sense theories of meaning and descriptivist theories need not concern us. *See, e.g.*, David Chalmers, *The Foundations of Two-Dimensional Semantics* in MANUEL GARCA-CARPINTERO AND JOSEP MACIÀ (eds), TWO-DIMENSIONAL SEMANTICS 55-140, 55 (2006) (“Frege’s notion of sense is somewhat obscure”). For our purposes, the central thesis of both theories is the same: meaning has both a conceptual/descriptive component and a referential/denotational component.

⁹⁹ This summary of the descriptivist theory is adapted from Edouard Machery, Ron Mallon, Shaun Nichols & Stephen P. Stich, *Semantics Cross-Cultural Style*, 92 COGNITION B1, B2 (2004).

¹⁰⁰ *See* Devitt & Sterelny, *supra* at note __, at 98.

¹⁰¹ Devitt & Sterelny, *supra* at note __, at 31, 50, 308. The label “Cartesian” alludes to the radical internalism (i.e. reliance on factors internal to the thinker) of Descartes’ epistemology and philosophy of mind. *See* René Descartes, *Meditations on First Philosophy*, in DESCARTES: SELECTED PHILOSOPHICAL WRITINGS Vol. 2 12-62

tent “with an expression is for her to tacitly know about its meaning.”¹⁰² Since the descriptivist sees meaning as a reference-fixing description, the Cartesian assumption will entail that the competent speaker knows this description.

B Descriptivism in patent law

The parallels between descriptivism and certain patent law doctrines are obvious. Most prominently, the Supreme Court’s decision in *Markman* outlines a straightforward descriptivist framework. Under *Markman*, determining infringement is a two-step process.¹⁰³ First, “the court determines the scope and meaning of the patent claims asserted.”¹⁰⁴ This involves breaking the claim down into elements, and providing a construction (*i.e.* a description in words) of each element.¹⁰⁵ The end result of claim construction is an overall description of the invention along the following lines: the invention “*x*” of claim *y* is “a device comprising elements E_1 , E_2 , E_3 , ... E_n .” Once this step is completed, “the properly construed claims are compared to the allegedly infringing device.”¹⁰⁶ In this second step, the jury determines whether the accused device satisfies the description provided by the court. These two steps of *Markman* correspond perfectly to premises 1 and 2 of the descriptivist theory of reference.¹⁰⁷

Does the same analysis apply to the doctrine of equivalents? Not quite. The doctrine of equivalents allows for a patentee to argue that the accused device infringes a patent claim even though the claim does not literally read on the device.¹⁰⁸ The idea is to prevent an infringer from making extremely minor changes that allow it to avoid literally falling within the scope of a patent’s claims while still benefiting from the patentee’s invention. To prove infringement under the doctrine of equivalents, the patentee must show that “the accused product or process contains elements identical or *equivalent* to each claimed element of the patented invention.”¹⁰⁹ The jury is given the task of determining whether an accused device infringes under the doctrine of equivalents.¹¹⁰

(John Cottingham et al. trans., 1988) (1641). Descriptivism is internalist in a similar sense because a competent speaker is assumed to have knowledge of the appropriate reference-fixing description.

¹⁰² See Devitt & Sterelny, *supra* at note __, at 308.

¹⁰³ *Markman*, *supra* note __, at 388-90.

¹⁰⁴ *Cybor Corp. v. FAS Technologies, Inc.*, 138 F.3d 1448, 1454 (Fed. Cir. 1998) (en banc).

¹⁰⁵ See Dan L. Burk & Mark A. Lemley, *Quantum Patent Mechanics*, 9 LEWIS & CLARK L. REV. 29, 30-31 (2005).

¹⁰⁶ *Cybor*, *supra* at note __, at 1454.

¹⁰⁷ Premises 1 and 2 are outline at page __ *supra*.

¹⁰⁸ See *Warner-Jenkinson v. Hilton Davis Chemical Co.*, 520 U.S. 17, 21 (1997)

¹⁰⁹ *Id.* at 40 (emphasis added).

¹¹⁰ See, *e.g.*, *Bai v. L & L Wings, Inc.*, 160 F.3d 1350, 1353 (Fed.Cir.1998).

The doctrine of equivalents is in tension with the descriptivism inherent in *Markman*. Under *Markman*, the definition of an invention is given as a description such as “a device comprising elements E₁, E₂, E₃, ... E_n.” The doctrine of equivalents would allow this description to refer to an accused device even though the device does not literally satisfy the description. For example, the doctrine would allow a device that does not include E₂ (so long as the device included a mechanism sufficiently similar to E₂). In this picture, the description still plays the key role in fixing reference, but it is a less formal role. The claim can now refer to something that *closely* or *nearly* fits the description. Thus, the doctrine of equivalents applies a heavily diluted version of the rigidly formal descriptivism inherent in *Markman*.

The doctrine of equivalents most closely resembles what is known as the “cluster” theory of reference. Under the cluster theory, a cluster of concepts or descriptions is associated with a term “by some much weaker relation than definition.”¹¹¹ The term will then refer to an object when there is a sufficiently close, though not necessarily perfect, fit between the cluster of descriptions and the object. The main challenge for cluster theories is developing an account of what counts as ‘good enough’ fit between the cluster of descriptions and the object referred to.¹¹² This philosophical problem mirrors the problem in patent law of coming up with an account of what counts as “equivalent” for infringement under the doctrine of equivalents.¹¹³

Since it dilutes the formal descriptivism of *Markman*, it is not surprising that the doctrine of equivalents has fallen into marked decline since the *Markman* decision.¹¹⁴ Empirical research has revealed that, after *Markman*, infringement claims relying on the doctrine of equivalents became far less successful.¹¹⁵ This change appears to be mostly the result of plaintiffs losing their case at summary judgment.¹¹⁶ Why would judges be deciding doctrine of equivalents cases on summary judgment at high rates when the doctrine of equivalents, unlike claim construction, is a question of fact? The answer may be one of institutional control: judges simply

¹¹¹ JOHN R. SEARLE, INTENTIONALITY: AN ESSAY IN THE PHILOSOPHY OF MIND 255 (1983).

¹¹² See, e.g., SAUL KRIPKE, NAMING AND NECESSITY 71-77 (1980) (criticizing the cluster theory).

¹¹³ Philosophy cite on difficulty on defining fit and patent case on different definitions of equivalence (perhaps Warner-Jenkinson at p 39-40)

¹¹⁴ John R. Allison & Mark A. Lemley, *The (Unnoticed) Demise of the Doctrine of Equivalents*, 59 STAN. L. REV. 955, 958 (2007) (“The doctrine of equivalents was alive and well before *Markman*, but has been in decline ever since.”).

¹¹⁵ Allison & Lemley, *supra* at note __, at 976-78 (finding that, before *Markman*, patentees won approximately 40% of cases under the doctrine of equivalents but that, once *Markman* was decided, this win-rate plummeted to less than 25%).

¹¹⁶ *Id.*

want to keep weak cases away from the jury.¹¹⁷ But I think a significant part of the story is the disconnect between the cluster theory of reference implicit in the doctrine of equivalents and the rigidly formal descriptivism implicit in *Markman*. If claim construction really defines the invention as a matter of law, and establishes the metes and bounds of each claim, it makes little sense to let the jury move the fence posts. This is why, after *Markman*, questions of claim scope under the doctrine of equivalents seem more appropriate for resolution by the judge.

Given the striking similarity between the names of the patent doctrine and the philosophical theory, it should come as little surprise that the written description doctrine also assumes the descriptivist theory of reference. This is because the written description doctrine requires patentees to prove that they are competent users of the terms found in their patent claims by producing reference-fixing descriptions associated with those terms. As the court put it in *Eli Lilly*, it is not enough for the inventor to use a term merely as a “*name*.”¹¹⁸ Rather, the inventor must show “possession” by “produc[ing] *records* documenting a written description of a claimed invention.”¹¹⁹

This is a clear statement of the Cartesian assumption—the view that a competent speaker must know the reference-fixing descriptions associated with a term. Indeed, the written description doctrine can be seen as *enforcing* the Cartesian assumption. Of course, since judges cannot read minds, the patentee must produce ‘records’ documenting the relevant descriptions. In effect, the written description doctrine enforces the Cartesian assumption with one major change: the patent specification is substituted for the inventor’s mind.

C The causal theory of reference

Patent law’s key doctrines of claim construction and written description line up perfectly with the descriptivist theory of reference. But, unfortunately for patent law, the descriptivist theory is not the only game in town. In the 1970s, philosophers Saul Kripke¹²⁰ and Hillary Putnam¹²¹ published highly influential articles

¹¹⁷ This is the explanation suggested by Allison and Lemley. *See id.*

¹¹⁸ *Eli Lilly*, *supra* at note __, at 1568-69 (“a cDNA is not defined or described by the *mere name* ‘cDNA’ . . . but requires a kind of specificity usually achieved by means of the recitation of the sequence of nucleotides that make up the cDNA.”) (emphasis added).

¹¹⁹ *Ariad*, *supra* at note __, at 1351 (emphasis added).

¹²⁰ SAUL KRIPKE, NAMING AND NECESSITY (1980). Although published as a stand-alone book in 1980, *Naming and Necessity* was first delivered in a series of influential lectures at Princeton in 1970. *See* SCOTT SOAMES, 2 PHILOSOPHICAL ANALYSIS IN THE TWENTIETH CENTURY 333 (2003) (“[i]n the philosophy of language, *Naming and Necessity* is among the most important works ever”).

criticizing the descriptive theory. In its place, they proposed an alternative causal theory of reference.¹²²

Kripke and Putnam deployed thought experiments that, in their view, contradict descriptivism. Specifically, they presented examples that, in their view, show that a speaker can use a term to successfully pick out a referent even when the speaker associates an incomplete or incorrect description with the term. For example, Kripke offers a thought experiment involving the logician Kurt Gödel.¹²³ Gödel is perhaps most famous for proving the incompleteness of arithmetic. Suppose, however, that Gödel had stolen this theory from his graduate student Schmidt. Now suppose someone uses the name ‘Gödel’ and this person’s only belief about Gödel is that he discovered the incompleteness theorem. Under the description theory, this person would, unwittingly, be referring to Schmidt. But this seems wrong.

Putnam’s deploys an even more complex argument: his famous twin-earth thought experiment.¹²⁴ This argument is highly technical (and is the subject of a vast philosophical literature), but I will attempt to outline it briefly here because it suggests that the descriptivist theory might not offer a complete account of natural kind terms. Since natural kind terms (such as “light” and “water”) are foundational to science, they are also very important to patent law.

In his famous thought experiment, Putnam asks us to imagine another world—twin earth. Twin Earth is an exact duplicate of our earth, except that, instead of H₂O, the lakes and rivers are filled with a different liquid whose chemical formula we can abbreviate as XYZ.¹²⁵ In all other respects, twin earth is identical with our earth (the inhabitants even speak English). Putnam asks us to imagine our thought experiment taking place in 1750 (before the residents of earth or twin-earth knew that what they called water were composed of H₂O and XYZ respectively). At this time, the experience of people on Earth with water, and that of those on Twin Earth with XYZ would be the same. Residents of the different worlds would both use the term “water” but they would refer to different things. If we consider Oscar₁ on Earth and his twin Oscar₂ on Twin-Earth, both “would be in the same psychological state” with respect to ‘water’ even though that term refers to different thing in each

¹²¹ HILLARY PUTNAM, *The Meaning of “Meaning”*, in 2 MIND LANGUAGE AND REALITY: PHILOSOPHICAL PAPERS 215-71 (1975).

¹²² The causal theory is sometimes called the causal-historical theory. See, e.g., Devitt & Sterelny, *supra* at note __, at 66. This is because the theory locates meaning in causal factors relating to the history of a term’s introduction into a language community.

¹²³ Kripke, *supra* at note __, at 83-92.

¹²⁴ Putnam, *supra* at note __, at 223-27.

¹²⁵ *Id.* at 223.

world.¹²⁶ Indeed, Oscar₁ and Oscar₂ will refer to different things by ‘water’ even though *all* of their internal states and beliefs would be identical.¹²⁷

The intended point of the twin-earth experiment is this: “‘meanings’ just ain’t in the *head!*”¹²⁸ Even though earthlings and twin-earthlings have identical mental states, they refer to different things with the term ‘water.’ This view of meaning is called semantic externalism—it is the view that meaning is determined, at least in part, by factors external to the speaker.¹²⁹ Importantly, semantic externalism rejects the Cartesian assumption at the heart of descriptivism.

If these thought experiments seem fanciful,¹³⁰ perhaps Putnam’s discussion of the terms “elm” and “beech” provides a more straightforward argument. Putnam asks us “to suppose you are like me and cannot tell an elm from a beech tree.”¹³¹ In that case, your concept of an elm and your concept of a beech are identical (in other words, you associate the same descriptions with each term). But you can still use the terms “elm” and “beech” to successfully refer to different kinds of tree. Thus, the descriptions you associate with these terms is not determining reference. It is difficult for descriptivism to account for these intuitions.

Having rejected descriptivism, Kripke and Putnam propose an alternative account of reference: the causal theory. Under the causal theory, reference is fixed by an initial ‘baptism’ or ‘dubbing’ when the term is first introduced into the linguistic community.¹³² This is easiest to imagine in the case of a proper name where a child is literally baptized and given his/her name. Subsequent users of the name are causally linked through historical and social factors to this initial baptism. It is these causal links and our participation in a language community—and not our internal mental states—that make us competent users of a term. This makes the

¹²⁶ *Id.* at 224.

¹²⁷ *Id.* at 224-25. As Putnam presents it, his thought experiment asks us to ignore the fact that we happen to have water in our brains. But we could create a different science fiction example with a substance that doesn’t happen to be in our bodies.

¹²⁸ Putnam, *supra* at note __, at 227 (emphasis in original).

¹²⁹ Cite for overview of semantic externalism.

¹³⁰ Empirically minded philosophers such as Steve Stich have expressed skepticism about the value of the “intuition-mongering” of these intricate and bizarre thought experiments. See Steven P. Stich, *Reply to Devitt and Jackson*, in STICH AND HIS CRITICS 190-202, 192 (Dominic Murphy and Michael Bishop, eds., 2009); see also STEPHEN P. STICH, FROM FOLK PSYCHOLOGY TO COGNITIVE SCIENCE: THE CASE AGAINST BELIEF 62 (1983) (“nonphilosophers often find such cases so outlandish that they have no clear intuitions about them”). I hope that Putnam’s famous experiment at least raises questions for the reader about descriptivism with respect to natural kind terms.

¹³¹ Putnam, *supra* at note __, at 226.

¹³² See Devitt & Sterelny, *supra* at note __, at 66-69; Kripke, *supra* at note __, at 91-93.

causal theory externalist because it invokes social and historical factors outside of the language user and her beliefs.

The causal theory of reference generally involves the following two claims:

1. A term is introduced into a linguistic community for the purpose of referring to an individual, object, or type of thing. It continues to refer to that thing as long as its uses are linked to the individual via a causal chain of successive users.
2. Speakers may associate descriptions with terms. After a term is introduced, the associated description does not play any (or the only) role in the fixation of the referent. The referent may entirely fail to satisfy the description.¹³³

Causal theories introduce the important concept of *reference borrowing*.¹³⁴ People who were not present when a term was introduced into a linguistic community (*i.e.* those not present at the baptism) can acquire the ability to use the term by being causally linked to that event. We might learn a name from someone who was present at the baptism (*e.g.* learning the name of your new nephew), or we might learn a name as the result of a centuries-long causal chain (*e.g.* learning Aristotle's name). In both cases, our ability to use the name comes from being causally linked to the original dubbing.

We can also see reference borrowing playing a role with more complex terms. Recall the elm/beechn example above. According to the causal theory, my ability to use the term "elm" comes from the fact that my use of the term is causally linked to the introduction of the term into the English language community. In essence, when I use the term "elm," I borrow the ability of botanists to tell elms and beeches apart.¹³⁵

D The causal theory in patent law

I suggested above that the claim construction rules of *Markman* and the written description doctrine of *Ariad* (which together are perhaps the most important doctrinal developments in patent law of the last 20 years) both implicitly adopt a descriptivist theory of reference. Are there any doctrines in patent law that implicitly adopt the causal theory of reference? I believe at least two doctrines apply the

¹³³ This summary of the causal theory is adapted from Machery et. al., *supra* at note __, at B2-B3.

¹³⁴ See Devitt & Sterelny, *supra* at note __, at 66-67, 98.

¹³⁵ By appealing to experts here, I am arguably appealing to a hybrid of the causal and descriptivist theories. See *id.* at __. This is because perhaps the expert's use of the term is best explained by a descriptivist theory.

causal theory: the reverse doctrine of equivalents and decisions allowing for written description to be satisfied by a physical deposit. Given that the descriptivist and causal theories give very different accounts of reference, doctrines applying these different theories are likely to be in tension, if not outright contradiction.

The doctrine of equivalent's poor cousin—the *reverse* doctrine of equivalents—provides a good example of a patent doctrine that implicitly adopts the causal theory of reference. This doctrine allows an accused infringer to argue that, even though a device falls within the literal scope of a patent claim, the device is nonetheless so different from the original invention that it should not be found to infringe. The Supreme Court approved this rule in *Graver Tank & Manufacturing Co. v. Linde Air Products Co.*, writing that if “a device is so far changed in principle from a patented article that it performs the same or similar function in a substantially different way, but nevertheless falls within the literal words of the claim, the doctrine of equivalents may be used to restrict the claim and defeat the patentee’s action for infringement.”¹³⁶ *Graver Tank* remains good law and has never been overruled by the Supreme Court or by statute.

Notably, the reverse doctrine of equivalents assumes the truth of the second premise of the causal theory of reference—that an object may satisfy the description associated with a term yet *not* be referred to by that term. (This is the premise supposedly proven by Kripke’s example of the student Schmitd, who satisfied the description associated with ‘Gödel’ but was not referred to by that name.) In the patent context, the claim, as elaborated by claim construction, is supposed to be the description of the invention.¹³⁷ Returning to my earlier example, a court might construe, the invention “x” found in claim y as “a device comprising elements E₁, E₂, E₃, ... E_n.” The reverse doctrine of equivalents allows for a device to literally satisfy that description yet still not be an example of invention “x”.

By adopting a key premise of the causal theory of reference, the reverse doctrine of equivalents contradicts cases, such as *Markman* and *Ariad*, that apply a descriptivist approach. Consider, for example, the tension between the reverse doctrine of equivalents and the written description doctrine. If a device can fit the inventor’s description of the invention, yet still not infringe, how can that description really demonstrate ‘possession’ of the invention? Any description that includes non-infringing devices is overbroad.

In light of this tension, it is not surprisingly that the reverse doctrine of equivalents is disfavored. In fact, the reverse doctrine of equivalents is moribund. It has recently been described as a “horrible creature upon whom we dare not gaze.”¹³⁸

¹³⁶ *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608-09 (1950).

¹³⁷ See *supra* notes __-__ and accompanying text.

¹³⁸ Jay Sandvos, *The Reverse Doctrine of Equivalents*, IP Frontline (June 19, 2007) available at <http://www.ipfrontline.com/depts/article.aspx?id=15381&deptid=4>

Despite the fact that *Graver Tank* remains good law, the Federal Circuit has “*never* upheld a finding of non-infringement under the reverse doctrine of equivalents.”¹³⁹ So a patent lawyer would be very brave to rely on it in litigation. I submit that the death of the reverse doctrine of equivalents—and why it is seen as a ‘horrible creature’—is, in large part, attributable to the fact that it applies a theory of reference entirely inconsistent with the dominant doctrines of modern patent law.

The reverse doctrine of equivalents is dead. But the causal theory of reference also shows up in a live patent law doctrine: the view that the written description requirement can be satisfied, at least in part, by the deposit of an actual physical sample of the invention.¹⁴⁰ Description by deposit is a surprisingly pure application of the causal theory of reference. Recall that the causal theory sees the act of baptism or dubbing as the key to determining the referent of a term. Physical deposit brings this act of baptism right into the patent process itself. In effect, the inventor is allowed to say, “I have invented ‘*x*’ where *x* is *that* sample” (much like Oscar₂ pointing to XYZ on twin-earth and saying “*that* is water”). It is difficult to think of something further from the formal descriptivism inherent in the written description doctrine announced in *Eli Lilly*.

So how can *Eli Lilly* and description by deposit co-exist?¹⁴¹ This was the issue in *Enzo Biochem, Inc. v. Gen-Probe Inc.* (“*Enzo I*”).¹⁴² In that case, the patentee had invented three chromosomal DNA probes for detecting gonorrhea.¹⁴³ The patentee deposited an example of each of these three probes as a recombinant DNA molecule within an *E. coli* host at the American Type Culture Collection (ATCC).¹⁴⁴ The patent’s specification and some of the claims referred directly to these samples. In the district court, the defendant successfully argued these patent claims were invalid under the written description requirement. The district court “rejected Enzo’s

(last visited January 16, 2011) (also writing that patent lawyers “run screaming out of the room” at the mere mention of the “strange beast”).

¹³⁹ See *Roche Palo Alto LLC v. Apotex, Inc.*, 531 F.3d 1372, 1378 (Fed. Cir. 2008) (emphasis added).

¹⁴⁰ See MPEP § 2404(a) (“Where an invention is, or relies on, a biological material, the disclosure may include reference to a deposit of such biological material.”)

¹⁴¹ When *Eli Lilly* was decided in 1997, PTO regulations were already in place that allowed applicants to show reduction to practice, and satisfy the written description requirement, through physical deposit. See *Deposit of Biological Materials for Patent Purposes, Final Rule*, 54 FR 34,864, 34,876 (August 22, 1989) (“The requirement for a specific identification is consistent with the description requirement of the first paragraph of 35 U.S.C. 112, and to provide an antecedent basis for the biological material which either has been or will be deposited before the patent is granted.”).

¹⁴² *Enzo Biochem, Inc. v. Gen-Probe Inc.*, 285 F.3d 956 (Fed. Cir. 2002) (*vacated* 323 F.3d 956).

¹⁴³ *Id.* at 1015-17.

¹⁴⁴ *Id.* at 1016.

argument that the reference in the specification to the deposits of biological materials in a public depository inherently disclosed that the inventors were in possession of the claimed sequences.”¹⁴⁵

On appeal, at least at first, the Federal Circuit agreed. The court wrote that physical “possession” of the invention “does not contribute to its description in the patent specification.”¹⁴⁶ The court reasoned that merely pointing to a physical sample, “does not allow one skilled in the art to visualize or recognize the identity of the claimed subject matter.”¹⁴⁷ Under my analysis of the written description requirement, this is clearly the right result. The Cartesian assumption requires the patentee to demonstrate his or her knowledge of the meaning of a term by providing a description that fixes the reference of the term. (And by sharing this description, the patentee can then teach the meaning of the term to other persons of skill in the art.) If the Cartesian assumption is true, then it is impossible to demonstrate knowledge of meaning by pointing to an *external* sample. Furthermore, pointing to an external sample cannot teach meaning. This explains the conclusion in *Enzo I* that a description is needed both for “proper examination” of a patent application and, ultimately, for “resolution of questions of infringement.”¹⁴⁸

The court’s decision in *Enzo I* was controversial. The decision threatened the validity of many existing biotechnology patents that had been prosecuted before *Eli Lilly* under PTO rules that allowed for deposit.¹⁴⁹ In a very rare act of appellate reflection, the original panel vacated its decision and issued a new brand new opinion: *Enzo II*.¹⁵⁰ In this second opinion, the panel decided that physical deposit is consistent with the written description doctrine after all. The court wrote:

In light of the history of biological deposits for patent purposes, the goals of the patent law, and the practical difficulties of describing unique biological materials in a written description, we hold that reference in the specification to a deposit in a public depository, which makes its contents accessible to the public when it is not otherwise available in written form, constitutes an adequate description of the deposited material sufficient to comply with the written description requirement of § 112, ¶ 1.¹⁵¹

¹⁴⁵ *Id.*

¹⁴⁶ *Id.* at 1021.

¹⁴⁷ *Id.*

¹⁴⁸ *Id.* at 1022.

¹⁴⁹ *See id.* at 1027-29 (Dyk, J. dissenting).

¹⁵⁰ 323 F.3d 959 (Fed. Cir. 2002). It is speculated that the original panel did this to avoid en banc review of the written description doctrine itself. *See, e.g.,* Christopher M. Holman, *Is Lilly Written Description a Paper Tiger?: A Comprehensive Assessment of the Impact of Eli Lilly and Its Progeny in the Courts and PTO*, 17 ALB. L.J. SCI. & TECH. 1, 23 (2007).

¹⁵¹ 323 F.3d at 965.

This is a complete reversal from *Enzo I* in both result and rationale. As Christopher Holman explains: “in *Enzo II* the court finds that the technical obstacles to determining DNA structure from a deposit justify the use of deposit . . ., while in *Enzo I* the court had pointed to those very same technical obstacles as policy justifications for finding deposit inadequate.”¹⁵²

It will come as no surprise that I find *Enzo II* unconvincing, at least in so far as it purports to follow *Eli Lilly*.¹⁵³ Taking the written description requirement seriously requires the patentee to provide a reference-fixing description, not to point to an object in the world. But, as the Federal Circuit recently explained, *Enzo II* means “that depositing an actual sample may meet the written description requirement when *science is not capable* of a complete written description.”¹⁵⁴ In essence, *Enzo II* allows the patentee to baptize his or her invention instead of describing it. This is a strikingly pure application of the causal theory of reference and is entirely inconsistent with the theory of reference implicit in both *Markman* and *Eli Lilly*.

E Should patent law apply a particular theory of reference?

It is well beyond the scope of this paper, and the abilities of its author, to provide *the* correct account of reference. So I will not argue that patent law should be closely modeled on a particular philosophy of language. Indeed, I think the best lesson of the philosophical discussion of reference is that *both* descriptivist and causal mechanisms are at work in our use of language to pick out objects in the world.¹⁵⁵ Recent empirical research has even suggested that there may be cross-cultural differences in intuitions about reference.¹⁵⁶ This suggests that patent doctrines that assume a strong version of either the descriptive or causal theory are likely to be unsatisfactory.¹⁵⁷

¹⁵² *Holman, supra* at note __, at 23-24.

¹⁵³ I am not alone in holding this view. *See id.* at 24 (suggesting that “if *Enzo I* was indeed wrongly decided, as the court implicitly acknowledged in vacating the decision, then logically *Lilly* itself must be wrong”).

¹⁵⁴ *Goeddel v. Sugano*, 617 F.3d 1350, 1356 (Fed. Cir. 2010) (emphasis added).

¹⁵⁵ Many philosophers have attempted to construct hybrid theories of reference that account for both descriptivist and causal intuitions. *See, e.g.*, Devitt & Sterelny, *supra* at note __, at __ (“quote”); John R. Searle, *supra* at note __, at __.

¹⁵⁶ *See* Edouard Machery, Ron Mallon, Shaun Nichols & Stephen P. Stich, *Semantics Cross-Cultural Style*, 92 *COGNITION* B1 (2004) (reporting a study showing that Westerners are more likely than East Asians to report intuitions consistent with the causal theory of reference).

¹⁵⁷ *Cf.* Ron Mallon, Edouard Machery, Shaun Nichols & Stephen Stich, *Against Argument From Reference*, 79 *PHILOSOPHY AND PHENOMENOLOGICAL RESEARCH* 332 (2009) (arguing that, because theories of reference rely on culturally variable

But perhaps patent law can simply *impose* a particular theory of reference, even if that theory cannot provide a fully satisfactory account of reference in natural language. The Federal Circuit currently maintains that claim terms must be given the meaning that the terms would have to a person of ordinary skill in the art (*i.e.* to a scientist unfamiliar with patent law).¹⁵⁸ But patent law could give up this project and simply impose its own rigid interpretive regime. Artificial legal rules of interpretation might encourage consistency and certainty.

I argued in Part II.A. above, that descriptivism is already dominant in patent law. Descriptivism is the theory of reference implicit in *Markman*, which governs the entire structure of determining meaning and reference. So perhaps the Federal Circuit should abandon any doctrines—such as the reverse doctrine of equivalents and *Enzo II*'s description by deposit—that are inconsistent with descriptivism.

I believe this would be a serious mistake. In the next part, I will turn my attention to the paradoxes that originally motivated our journey into theories of reference. I argue that applying the descriptivist theory of reference can resolve these paradoxes. But I do not conclude, however, that we should therefore announce the triumph of descriptivism and of the written description doctrine. Rather, I will argue that not only does the written description requirement (and the descriptivist theory of reference it assumes) get selectively applied, it *must* be selectively applied.

III SOLVING RADER'S PARADOX

Judge Rader outlined two paradoxes raised by the written description doctrine: 1) how can original claims fail to describe the invention; and, 2) how can claims describe after-invented technology?¹⁵⁹ I will argue that both of these paradoxes can be resolved by investigating the complex relationship between words, descriptions, and reference.

A How a patent claim can fail to describe the invention

Kripke and Putnam contend that we sometimes *refer* even when we are unable to correctly *describe*.¹⁶⁰ This theory offers a solution to Rader's first paradox: a patent claim fails to describe the invention when a key claim term refers by virtue of causal factors rather than a reference-fixing description.

intuitions, substantive metaphysical theories should not be based on particular accounts of reference).

¹⁵⁸ See, e.g., *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005).

¹⁵⁹ See *supra* notes __-__ and accompanying text.

¹⁶⁰ See *supra* notes __-__ and accompanying text.

This may be best explained through an illustration. Suppose I file a patent application with the following claim: “A method for topical treatment of lesions by applying a pharmaceutical composition comprising: beech sap and aloe extract.” Suppose also that I stumbled upon this invention by pure luck: I tested a mixture using sap from a beech tree in my front yard and discovered that it was a highly effective treatment. Moreover, this treatment was novel and had not been suggested by any prior art. So my patent application appears to easily satisfy the statutory requirements of 35 U.S.C. §§ 101-103.¹⁶¹

What is the scope of my invention? In particular, how should a court construe the claim term ‘beech’? Under *Phillips*, the court would first look to the specification.¹⁶² But my specification does not provide any helpful information. In fact, like Hillary Putnam, I could not even tell a beech from an elm¹⁶³ (we can assume that my neighbor correctly informed me that the tree in my yard is a beech). Since the specification does not provide any clues on how to construe ‘beech,’ the court would then look to a dictionary.¹⁶⁴ The court can use the dictionary definition in any construction. The jury would then determine whether the court’s construction describes any accused product.

In my example, the court had no trouble construing my patent claim. But there is a very important sense in which I failed to describe my invention. The problem is that I did not provide a reference-fixing description.¹⁶⁵ Following the lessons of Kripke and Putnam, the word ‘beech’ still refers to the genus *fagus* when I used it in my patent. But it only does this because I *borrowed* the expertise of botanists who can tell beech trees from other kinds of trees.¹⁶⁶ I did not provide this information myself.

Why should we care? One reason is that I tested the sap from only one tree while there are at least ten different species in the beech genus *fagus*.¹⁶⁷ It seems unfair

¹⁶¹ I may have no idea why my invention works, but that is no barrier to patentability. See *Newman v. Quigg*, 877 F.2d 1575, 1581-82 (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.”) (citing *Diamond Rubber Co. v. Consolidated Rubber Tire Co.*, 220 U.S. 428, 435-36 (1911)).

¹⁶² *Phillips*, *supra* at note __, at 1315.

¹⁶³ See *supra* notes __ and accompanying text.

¹⁶⁴ *Phillips*, *supra* at note __, at 1322-23 (“so long as the dictionary definition does not contradict any definition found in or ascertained by a reading of the patent documents”)

¹⁶⁵ This means that the Cartesian assumption is *false* with respect to my use of beech.

¹⁶⁶ Note that this reference borrowing is different from me simply not knowing why my invention works. Rather, my ability to use the word ‘beech’ at all is parasitic on other people’s knowledge.

¹⁶⁷ Botany cite.

for me to claim mixtures that use sap from species I did not test.¹⁶⁸ Moreover, it is difficult to determine if I did intend the broader claim. My use of the word ‘beech’ in the specification does not indicate whether I intended to claim the use of sap from all species in the *fagus* genus or just the North American *fagus grandifolia*. This is a problem.

In Part II.B. *supra*, I argued that the written description requirement can be seen as enforcing the Cartesian assumption.¹⁶⁹ In other words, the written description requirement demands that the applicant provide a reference-fixing description for each claim term. This is *exactly* what was lacking in my hypothetical patent application. If I had provided a reference-fixing description, then we should know whether I intended to claim the use of sap from the *fagus* genus or just from *fagus grandifolia*.¹⁷⁰ Notably, this failure to satisfy the written description requirement is my hypothetical patent’s *only* validity problem.¹⁷¹ This suggests that the written description requirement does important work in addition to enablement.

If my hypothetical patent seems contrived, consider the case of *Schering Corp. v. Amgen Inc.*¹⁷² In *Schering*, the patent claimed recombinant DNA molecules encoding types of human interferon.¹⁷³ More specifically, the patent claimed DNA sequences coding for an interferon of the IFN- α type.¹⁷⁴ The key issue in *Schering* was the construction of the claim term ‘IFN- α ’. In pioneering experiments, the inventor in *Schering*, Dr. Charles Weissmann, had succeeded in isolating pieces of DNA coding for the leukocyte interferon polypeptide “now referred to in the scientific community as ‘IFN- α -1.’”¹⁷⁵ In later research, “the scientific community learned that leukocytes produce more than a single inter-

¹⁶⁸ Note that there is no enablement problem with a broad reading of my patent claim. It should be easy to create a mixture using the sap of the other nine species of beech. So any section 112 problems must be entirely based on the written description requirement.

¹⁶⁹ See *supra* notes __ and accompanying text.

¹⁷⁰ See Jeffrey A. Lefstin, *The Formal Structure of Patent Law and the Limits of Enablement*, 23 BERKELEY TECH. L.J. 1141, 1168 (2008) (“The written description requirement anchors claim scope to a particular level within the chain of definition.”).

¹⁷¹ It might be suggested that my patent would be indefinite because it is unclear whether I intended to claim the use of sap from any member of the beech genus or just the North American species. Recall, however, that a claim will not be found indefinite so long as *some* meaning is discernable, even if reasonable people might disagree about the appropriate construction. See *supra* notes __ and accompanying text.

¹⁷² 222 F.3d 1347 (Fed. Cir. 2000).

¹⁷³ *Id.* at 1349.

¹⁷⁴ *Id.* at 1350.

¹⁷⁵ *Id.* at 1349.

feron polypeptide.”¹⁷⁶ Accordingly, the court faced the question of whether the patent should be limited to IFN- α -1 or should include all polypeptides of the IFN- α type.

I believe the *Schering* provides a good example of a claim term that was referring, at least in part, through causal, rather than descriptive, factors. The leukocyte interferon IFN- α is a natural kind. The term was introduced into the scientific community through an explicit act of baptism right around the time that the patent was filed.¹⁷⁷ At the time of this baptism, the scientific community’s knowledge about IFN- α was incomplete.¹⁷⁸ In fact, the scientific community was aware that IFN- α might include as yet undiscovered sub-types.¹⁷⁹ In these circumstances, should the discoverer of a sequence coding for a single subtype be allowed to use the brand new scientific term ‘IFN- α ’ to claim sequences coding for IFN- α sub-types that were discovered later?

The court answered no.¹⁸⁰ This is the right result. To find otherwise would allow the patentee to piggy-back on post-filing scientific advances regarding interferon. The court reached this result through claim construction, rather than by applying the written description doctrine.¹⁸¹ The court held that the patentee had acted as his own lexicographer and had expressly limited the meaning of ‘IFN- α ’ “to define the leukocyte interferon Dr. Weissmann described in his original application.”¹⁸² In my view this is a slightly strained interpretation given that Weissmann was using a term that had been expressly introduced into the scientific community to refer to all leukocyte alpha interferons.¹⁸³ The *Schering* court suggested that the “scientific meaning of ‘IFN- α ’ evolved with new discoveries.”¹⁸⁴ I would quibble with this—it is not the meaning of the term that changed, but our understanding of the protein referred to by the term. In my view, the term *always* referred to all IFN-

¹⁷⁶ *Id.* at 1353.

¹⁷⁷ *See id.* at 1352 (citing *Interferon Nomcematore*, 286 Nature 110 (July 10, 1980)).

¹⁷⁸ We can compare the scientific community in 1980 to Oscar₁ and Oscar₂ from Putnam’s thought experiment—in that example they have both baptized ‘water’ but do not yet know if water is H₂O or XYZ.

¹⁷⁹ *See Interferon Nomcematore*, 286 NATURE 110, 110 (July 10, 1980) (“It is recognized that there may be size, charge, sequence and other heterogeneities within the designated IFN types. Currently, there is insufficient information available about the nature of these differences to allow the designation of specific sub-types.”).

¹⁸⁰ *Schering*, *supra* at note __, at 1352-54.

¹⁸¹ *See id.* Judge Rader wrote the *Schering* opinion.

¹⁸² *Id.* at 1353.

¹⁸³ *See Interferon Nomcematore*, 286 NATURE 110, 110 (July 10, 1980).

¹⁸⁴ *Id.* at 1353.

<<alpha>> subtypes.¹⁸⁵ The court could have reached the same scope-limiting result by applying the written description doctrine. Since Dr. Weissmann only described sequences coding for one IFN-<<alpha>> subtype, the specification cannot support a broader claim.¹⁸⁶

While it is harsh to compare Dr. Weissmann’s pioneering biotechnology research to my trivial beech sap hypothetical, similar factors are at work. In both cases, a natural kind term (“beech” or “IFN-<<alpha>>”) is referring to objects in the world, at least in part, through causal factors. In my case, I relied on the expertise of botanists. In Dr. Weissmann’s case, he relied on future discoveries from other scientists. We both failed to provide a complete reference-fixing description. By requiring that patent applicants provide such a description for key claim terms, the written description requirement prevents this kind of reference borrowing.

B How claims can describe after-invented technology

Rader’s second paradox is easier to resolve—descriptions that capture after-invented technology follow naturally from descriptivism’s two-factor analysis of meaning. *Markman* applies this descriptive theory of reference as follows. The court first construes the claim in words by providing a description. The jury then considers whether this description covers the accused product. By fixing meaning as a description (step 1 of descriptivism), *Markman* allows for the patent to cover anything new that fits the description (step 2 of descriptivism).¹⁸⁷

Recall my hypothetical bicycle patent.¹⁸⁸ We can suppose that a bicycle patent might include a claim element such as ‘a rigid frame onto which two wheels, pedals and a seat can be attached.’ Anything that fits this description will satisfy this claim element. We have no problem including carbon fiber frames within the scope of this claim, even if carbon fiber was not invented until well after the patent issued. Notice how the growth in claim scope in this bicycle example differs from the growth in *Schering*. In the bicycle example, the growth occurs when others invent improvements that fall within the scope of the reference-fixing description

¹⁸⁵ This is similar to Putnam’s example of Oscar, referring to H₂O even when he is unaware of the chemical composition of water.

¹⁸⁶ One consequence of applying the written description doctrine, however, is that it would render the claim *invalid* rather than simply limiting its scope. Given the pioneering nature of Dr. Weissmann’s research, this is very harsh result. This might explain the court’s decision to limit the patent through claim construction instead.

¹⁸⁷ Using slightly different jargon, Collins makes exactly this point. See Collins, *supra* at note __, at 536-552. In Collins’ phrasing, a court provides ‘ideational meaning’ when construing a claim, which allows for the ‘denotational meaning’ to grow to include after-invented technology.

¹⁸⁸ See *supra* notes __-__ and accompanying text.

provided by the original inventor. In the *Schering* case, however, the growth came from our additional knowledge about what IFN- α is. The first kind of growth in claim scope is acceptable to patent law, but the second is not.

It might be objected that these cases are not so different. Isn't the carbon fiber frame an example of a change in the meaning of 'bicycle' in the same way that the discovery of a new interferon subtype is a change in the meaning of 'IFN- α '? I would answer no. In the first case, the meaning of an artifactual term like 'bicycle' is captured well by the descriptive theory of reference. The reference-fixing description does not change just because new objects fit the description. In the second case, scientists had baptized a certain kind of interferon as 'IFN- α ' despite the fact that they were still developing their understanding of it. A complete reference-fixing description was not yet available for this natural kind. Thus, later scientific advances were able to change our fundamental notion of what IFN- α is. In contrast, carbon fiber did not change our understanding of what bicycles are.

C The limits of descriptivism

I have argued that both of Rader's paradoxes can be resolved. I have also suggested that, by requiring patent applicants to provide reference-fixing descriptions for key claim terms, the written description requirement has an important role independent of the enablement requirement.¹⁸⁹ The written description requirement enforces the Cartesian assumption and prevents the patentee from relying on causal factors (such as reference borrowing) to determine the scope of her patent claims.

But I am not willing to declare victory for descriptivism and the written description requirement. The problem is that the written description requirement is far too demanding: we cannot require the patentee to provide a reference fixing-description for *every* claim term. In practice, the written description requirement will be selectively applied. Indeed, many scholars have complained that the written description requirement is selectively applied to biotechnology patents. I will argue that this makes sense, but that the Federal Circuit should be more explicit about the selective application of the written description doctrine.

Let me illustrate this argument with another example. Consider the much maligned U.S. Patent No. 5,443,036: "Method of Exercising a Cat."¹⁹⁰ This patent claimed a method of exercising a cat using a laser pointer. This straightforward, non-technical patent is the very last patent we would expect to have a written description problem. In fact, the mere *title* of this patent tells us pretty much everything we need to know about the invention. But, just like Dr. Weissmann's pioneering bio-

¹⁸⁹ See *supra* notes __-__ and accompanying text.

¹⁹⁰ I will ignore the section 101 or 103 issues presented by this patent (as did the examiner who allowed it to issue).

technology patent in *Schering*, the '036 patent's claims includes a natural kind term: 'cat.'¹⁹¹ Moreover, the inventors have failed to provide any kind of reference-fixing description for this term.

Why isn't this a problem? As it turns out, providing a reference-fixing description for 'cat' is fiendishly difficult.¹⁹² So why shouldn't the inventors of the '036 patent have to provide such a description to help us figure out the scope of their invention? The obvious answer is that cats aren't really part of their invention in the same way that IFN- α was part of Dr. Weissmann's invention. When we consider the '036 patent, we do not care about the fuzzy border between cats and non-cats or whether the inventors were familiar with all cat types. But the same was not true of 'IFN- α 's role in the invention in *Schering*. In that case, Dr. Weissmann's familiarity with only one subtype of IFN- α seemed to undermine his claim to sequences coding for all IFN- α subtypes.

But this superficially easy answer raises difficult questions. Why do we do detailed claim construction, and require supporting written description in the specification, for some claim terms and not others? The '036 patent shows that some claim terms, even natural kind terms, are allowed to go entirely unconstrued and undescribed.¹⁹³ Yet other terms are found to be crucial claim elements and are subject to detailed claim construction and to close scrutiny for compliance with the written description requirement.¹⁹⁴ At some level, this is a policy decision. We make a qualitative determination about what is important about the invention. And this inquiry drives our decisions about which claim terms require detailed construction. As framed by

¹⁹¹ This patent's one independent claim is for 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." U.S. Patent No. 5,443,036 (issued Aug. 22, 1995), col. 2, line 60-col. 3, line 2.

¹⁹² Kripke's *Naming and Necessity* includes a famous discussion of the difficulty of constructing a reference-fixing description for 'tiger.' See Kripke, *supra* at note __, at __-__; see also P. Kyle Stanford and Philip Kitcher, *Refining the Causal Theory of Reference for Natural Kind Terms*, 97 *PHILOSOPHICAL STUDIES* 99, 120-21 (2000) (discussing the difficulty of constructing a correct reference-fixing description for a species using genetic information).

¹⁹³ Imagine a patent for the first waterwheel. We would hardly expect the inventor of the waterwheel to give us a sophisticated reference-fixing description for water.

¹⁹⁴ See Dan L. Burk & Mark A. Lemley, *Quantum Patent Mechanics*, 9 *LEWIS & CLARK L. REV.* 29, 41 (2005) (noting that "it is somewhat surprising that there is no legal standard for deciding what constitutes an element of the invention" and that courts have defined elements "to be as small as a single word and as large as the entire claim").

the Federal Circuit, the written description requirement obscures these patent-by-patent policy decisions.

This analysis shows why the written description doctrine has been so prominent, and so problematic, in biotechnology.¹⁹⁵ It is sometimes suggested that written description plays a bigger role in biotechnology because it is an “unpredictable” art, in contrast to arts, such as mechanical engineering, that are presumed to be more “predictable.”¹⁹⁶ But I think this infelicitous expression hides the real reason biotechnology patents so frequently get caught in the written description thicket. The real reason is that, since they are more likely to emerge out of basic science, biotechnology patents are far more likely to include *natural kind terms* as important claim elements.¹⁹⁷ It is a quirk of our language and how we interact with the world that we can refer to natural kinds without being able to construct good reference-fixing descriptions for them. This is why written description is necessary to police claim scope in biotechnology.

¹⁹⁵ Many critics of the written description doctrine have argued that is a “super-enablement” requirement applied only in the biotechnology sector. Cites.

¹⁹⁶ See, e.g., *Capon v. Eshhar*, 418 F.3d 1349, 1358 (Fed. Cir. 2005) (holding that, when applying the written description requirement, it “is well recognized that in the ‘unpredictable’ fields of science, it is appropriate to recognize the variability in the science in determining the scope of the coverage to which the inventor is entitled”).

¹⁹⁷ Cite examples.