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THE SHAPE OF THINGS TO COME: WHAT WE CAN LEARN FROM PATENT CLAIM LENGTH

Kristen Osenga[*]

ABSTRACT:

There is no question that technology is always changing. Patent law, too, is ever evolving, as the courts, and now even Congress, continue to make significant changes to this area of law. But what about patents themselves? Some studies have looked at how patent specifications have changed over time, but no one has looked specifically at the most important aspect of a patent: its claims. Given the changes in technology and law, one would anticipate patent claims too to have evolved. Other factors would also be expected to affect the shape of patent claims. Have patent claims gotten longer over time to describe new technology or to keep up with the law? Do patent claims look different across different technology areas? Are patent claims longer in crowded art fields or if the patent takes longer to prosecute? Despite the expectations, this paper concludes that patent claim shape is largely unaffected by time, technology, crowded fields, or prosecution time. This paper suggests a possible reason why claim length appears incommensurate with technology and unaffected by other factors. Specifically, patent claims are drafted to "look good," regardless of the underlying technology or any other factor that should figure into claim length.

[*] Associate Professor, University of Richmond School of Law. [Acknowledgements: *Jessica Erickson, Corinna Lain, Cynthia Ho, David Schwartz, participants at IP Colloquium at Loyola/Chicago-Kent*] [research assistance: *Scott Bergeson, Sarah W. Smith, Anthony Holman, Lauren Palmer, Megan Doughty, Kyle Matowyski, William Miller*]

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INTRODUCTION

Imagine patent law as a three-tier pyramid. The bottom, or supporting, level is technology. Technology and the promotion of its advancement is the Constitutional basis for the patent system. The intermediate level of the pyramid is comprised of patents. Patents protect technology which is unique, innovative, and worthy of a government-granted monopoly. At the pyramid's apex are patent claims. Patent claims are the most important part of a patent, carving out the precise scope of the patentee's rights.

Technology is constantly evolving.[1] Patent law too is changing, in part due to the progress of technology and in part due to the constantly shifting landscape of patent law as drawn by Congress and the courts.[2] But what about patent claims – are they also changing?

[1] *See, e.g.,* Joel Achenbach, *Riches and disasters on exploration's far frontier*, Washington Post (9/30/2010 pg. AA01) ("On land, on sea, in the air, in space, in our laboratories, on our farms, we are surrounded by technologies of increasing complexity . . ..); John R. Thomas, *Formalism at the Federal Circuit*, 52 AM. U.L. REV. 771, 799 (2003) ("Technology, industrial, and marketplace conditions change at a dizzying pace in modern life."); John R. Allison & Mark A. Lemley, *The Growing Complexity of the United States Patent System*, 82 B.U.L. REV. 77, 78 (2002) ("[W]e are in an era of astounding productivity attributable to technological innovation . . .") (hereinafter Allison & Lemley, *Complexity*)

[2] *See, e.g.,* Thomas, *supra* note ___ at 803 ("As technology has advanced, [patent] applications increasingly concern inventions of extraordinary complexity."); Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology Specific?*, 17 BERKELEY TECH. L.J. 1155, 1155 (2002) ("Fundamental shifts in technology and in the economic landscape are rapidly

This Article takes a novel look at whether patent claims are changing by examining the shape of patent claims. Measuring the shape of patent claims by word count, this Article looks at patent shape over a span of years, as well as across a range of technologies and other characteristics that may affect the shape of patent claims. It would make sense for the shape of patent claims to change over time, either in response to new technology, changing laws, or differing circumstances. Variability in patent claim shape should be introduced at any number of steps during patent drafting and prosecution. Patent claims drafted by one attorney should be different from those drafted by another. Patent claims directed to one type of technology should be different from those drafted to cover a different technology, especially if the two technologies are quite diverse. Patent claims drafted to take advantage of certain aspects of the law should look different than patent claims drafted with different intent. Patent claims that need to be amended during prosecution to overcome prior art would be expected to vary from those that go through prosecution unscathed. As illogical as it may seem, however, patent claim shapes have been generally consistent over the last 50 years.

It cannot be simply happenstance that patent claims have remained the same length, given the many variables that should affect patent claims. And it is highly unlikely that this particular claim shape is the best, since patent claims are notoriously difficult to understand.[3] There must some other reason. I assert that patent claims are generally of the same shape because patent attorneys are drafting what patent examiners are expecting to see, regardless of whether this is in the best interest of the patent holder or the public. And if that is what is happening, what we need to do is alter claim drafting technique to get back to what is important, the technology and the law.

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making the current system of intellectual property rights unworkable and ineffective."); *Id.* at 1157 ("The changes in an industry over time present significant structural problems for patent law … .").

[3] *See, e.g.*, David Schwartz, *Courting Specialization*, 50 WM & MARY L.REV. 1699, 1706 (2009) ("Although ascertaining the meaning of the phrases and words in patents may appear to be simple, in reality claim construction is perhaps the most difficult aspect of patent litigation."); Jeffrey Lefstin, *The Formal Structure of Patent Law and the Limits of Enablement*, 23 BERKELEY TECH. L.J. 1141, 1160 (2008) ("Claim construction can be a difficult and unpredictable exercise."). *See also*, Haemonetics Corp. v. Baxter Healthcare Corp., 607 F.3d 776, 793 (Fed. Cir. 2010) ([C]laim construction frequently poses difficult questions over which reasonable minds may disagree…").

Part I of this Article describes the design and methodology of an empirical study to consider the shape of patent claims. The results, showing that patent claim shape has remained consistent despite time, technology, and a variety of variables, follow. Part II of this paper considers reasons for this surprising result. In particular, patent claims are being drafted to "look good," where the shape of the patent claim is more important than making the claim commensurate with any other factor. Finally in Part III, this Article suggests a potential improvement to patent claim drafting that brings the focus back to the technology and will hopefully result in shorter, easier to understand patent claims.

I. STUDY DESIGN AND METHODOLOGY

The shape of technology is always changing. From the telegraph, to the rotary telephone, to the cordless phone, to the mobile phone, to the smart phone, some of these changes have been enormous. In all sorts of technology areas, components are smaller but can do more things more quickly and multiple components are linked by increasingly intricate connections.

Patent law, too, is always changing shape. Modern patent law was codified in the Patent Act 1952 and since that time has undergone a number of amendments.[4] The courts that interpret patent law have become increasingly more active, adding nuance to the law even where the statutes remain the same.[5] There are a growing number of patents issued and patent litigations filed have been steadily on the increase.[6] Not only is the law

[4] *See, e.g.*, Liza Vertinsky, *Comparing Alternative Institutional Paths to Patent Reform*, 61 ALA. L. REV. 501, 549 (2010) ("[T]here have been a number of amendments and codifications to the patent system in its more than 200-year-old history, including many since 1952 when the basic structure of the current Patent Act was adopted. . . .").

[5] *See, e.g.*, R. Polk Wagner, *Symposium: The Two Federal Circuits*, 43 LOY. L.A. L. REV. 785, 790 n.18 (2010) (noting the Supreme Court's more active role in reviewing patent cases); Doug Lichtman & Mark A. Lemley, *Rethinking Patent Law's Presumption of Validity*, 60 STAN. L.REV. 45, 61 (2007) (same). *See also*, Jeffrey A. Lefstin, *Symposium: The Constitution of Patent Law: The Court of Customs & Patent Appeals and the Shape of the Federal Circuit's Jurisprudence*, 43 LOY. L.A. L. REV. 843, 871-79 (discussing areas where the Federal Circuit is more active or less active).

[6] In 2009, the Patent Office issued 167,439 patents, compared to 153,485 in 1999 and 95,537 in 1989. *See* Table of Annual U.S. Patent Activity since 1790, *available at* http://www.uspto.gov/web/offices/ac/ido/oeip/taf/h_counts.htm (*last visited* Feb. 11, 2011). Patent litigation filings were up over 230% over the last 20 years. *See* David

itself changing, but various constituencies are having more opportunities to mold and contour the law.

What do these changes mean for patent claims? Does changing technology or evolving patent law alter the shape of patent claims? Perhaps more words are required to describe innovative technology. Or more words may need to be included in patent claims to keep pace with patent law's changes. Or maybe, as technology fields get more crowded, more words are needed to distinguish the claimed invention from the prior art. Before looking at how the shape of patent claims has (or has not) changed, it is important to understand why the number of words in a patent claim is relevant.

A. Why Words Matter

There are a number of easily measured metrics in a patent. All patents necessarily include a specification, or prose description of the invention. The specification can be measured by word, sentence, paragraph, or column length. All patents must include at least one claim, but may include as many as desired. Each claim is comprised of one sentence, so claim metrics include the number of claims in a patent or the length of each patent claim in words. Although other scholars have analyzed specification length and number of claims, no one has considered the shape of patent claims themselves.

Specification attributes, while easily measured, do not necessarily have any relationship to patent claims—the true heart of the patent.[7] Dennis Crouch studied changes in the number of words in patent specifications between 1977 and 2007. He found that from 1977 to 1987 there was essentially no change in specification length; from 1987 to 2007, there is a noticeable upward trend in the number of words in patent specifications.[8]

DiGiammarino, *The Increase of Patent Litigation*, March 19, 2010, *available at* http://info.articleonepartners.com/blog/bid/36672/The-Increase-of-Patent-Litigation, (*last visited* Feb. 11, 2011).

[7] It is patent claims, not specifications, which are interpreted by the courts. *See* Sri Int'l v. Matsushita Elec. Corp., 775 F.2d 1107, 1121 n.14 (Fed. Cir. 1985) (en banc) ("Specifications teach. Claims claim."); Phillips v. AWH Corp., 415 F.3d 1303, 1321 (Fed. Cir. 2005) (en banc) (summarizing the role of the specification in claim construction as the "single best guide" to claim meaning).

[8] *See* Dennis Crouch, *Does Size Matter? Counting Words in Patent Specifications*, PATENTLY-O (Dec. 20, 2007), *available at* http://www.patentlyo.com/patent/2007/12/does-

Crouch notes, and I agree, that his research indicates nothing other than patent specifications are increasing in length.[9] Regardless of how specification length is changing, this metric provides little information about patent claim shape. First, the claims and the specification look completely different. The claims are each one unwieldy sentence long; the specification, on the other hand, is written in prose.[10] Second, the claims and the specification serve different purposes. The specification is supposed to provide a backdrop against which to understand patent claims.[11] The specification is also supposed to sufficiently disclose the invention to the public, while the claims delineate the patentee's exclusive territory.[12] Third, the specification, even more so than the claims, is likely to be increasing in length as the patentee's hedge against contemporaneous changes in patent law.[13] The specification is essentially set at the time of filing, whereas the claims can be amended during patent prosecution.[14] However, all claim amendments must be supported by the specification, so a more fulsome specification may allow for a greater range of amendments. Thus, while interesting, the length of patent specifications, whether measured by word, sentence, paragraph, or column, does not tell us anything about the patent claims.

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size-matte.html (*last visited Feb. 11, 2011).*

[9] *See id*.

[10] *See, e.g.*, Tun-Jen Chiang, *The Rules and Standards of Patentable Subject Matter*, 2010 WIS. L.REV. 1353, 1365-66 (explaining features of patent specifications and claims).

[11] *See, e.g.*, Markman v. Westview Instruments, 52 F.3d 967, 979-80 (Fed. Cir. 1995) (en banc) (noting that the specification "may act as a sort of dictionary, which explains the invention and may define terms used in the claims").

[12] *See, e.g.*, Phillips v. AWH Corp., 415 F.3d 1303, 1312, 1323 (Fed. Cir. 2005) (en banc) (stating that the purpose of claims is to define the right of exclusion and "the purposes of the specification are to teach and enable those of skill in the art to make and use the invention and to provide a best mode for doing so").

[13] *See, e.g.*, Mark R. Hull, *Note: Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.: A Fog Between the Bars*, 37 AKRON L. REV. 339, 371 (2004) (stating that, as a result of the *Festo* case, "patent lawyers must consider drafting narrow claims [and] drafting longer claims"); John M. Romary & Arie M. Michaelson, *Patent Claim Interpretation After Markman: How the Federal Circuit Interprets Claims*, 46 AM. U.L. REV. 1887, 1933 (1997) (discussing that, to ensure effective claim drafting, it is critical to know how U.S. courts interpret claims).

[14] Some modifications can be made, to the extent the amendments are already supported by the specification, but no new matter can be added.

The number of patent claims, while closer to the heart of the matter, still does not look at the features of individual claims. John Allison and Mark Lemley studied the number of claims in a patent as a proxy for either complexity of technology or importance of the patent to the company or individual that is obtaining the patent.[15] Using claim count as one metric (among others), they found that patents from the 1990s are more complex than patents from the 1970s.[16] Specifically, they determined that patents issued in the 1990s have 50% more claims than those issued in the 1970s, raising from an average of 9.94 claims to 14.87 (with a median 1 independent claim in the 1970s and a median 2 independent claims in the 1990s).[17] As even Allison & Lemley admit, the number of claims in a patent, and whether those claims are independent or dependent, vary for many reasons.[18] Cost is one of the most important factors; the filing fee for a patent application permits the inclusion of up to three independent claims and as many as twenty claims total; extra claims incur additional fees.[19] Cost also factors into the number of patent claims because attorney fees are generally correlated to the length of the patent application and number of claims.[20] The number of claims may reflect the financial wherewithal of the patentee or, as Allison & Lemley note, the presumptive worth of the patent.[21]

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[15] *See* Allison & Lemley, *Who's Patenting What?*, *supra* note ___ at 2132 ("The number of claims filed is directly related to the cost of prosecution, and can serve as a proxy for either the complexity of subject matter or for the importance of the patent to the applicant."); *see also* Moore, *Worthless Patents*, *supra* note ___ at 1531 (noting that patents with fewer claims are more likely to expire, demonstrating their low worth).

[16] *See* Lemley & Allison, *The Growing Complexity of the United States Patent System*, 82 B.U.L. REV. 77, 79 (2002).

[17] *See* Lemley & Allison, *Growing Complexity*, *supra* note ___ at 103.

[18] *See* John R. Allison, et al., *Valuable Patents*, 92 GEO. L.J. 435, 449 n.58 (2004).

[19] The basic fee for filing a patent application is $330 which includes three independent and twenty total claims. Additional independent claims cost $220 per claim. Claims in excess of twenty incur a fee of $52 each. *See* 37 CFR 1.16.

[20] *See* John R. Allison & Emerson H. Tiller, *The Business Patent Myth*, 18 BERKELEY TECH. L.J. 987, 1055 (2003) ("[A]ttorney fees increase with the additional time necessary for drafting and prosecuting more claims."); Kimberly A. Moore, *Xenophobia in American Courts*, 97 NW. U. L.REV. 1497, 1544-45 (2003) ("The PTO fees are . . . pennies compared to the attorney expenses associated with patent drafting and prosecution. . . . The bulk of [these] expenses are spent drafting and prosecuting the claims, so more claims will raise prosecution fees.").

[21] *See* Allison & Lemley, *Who's Patenting What?*, supra note ___ at 2132.

The remaining potential metric, word count per patent claim, is the one most closely tied to patent scope and is therefore the study variable used in this Article. It is not just by default, however, that I chose word count of patent claims. Rather, there are at least two reasons why the shape of patent claims is relevant. First, the number of words is tied to comprehension, and understanding patent claims is a well-known problem. Second, the number of words in a patent claim may provide some insight about the claim drafting process.

First, the shape of a patent claim is likely related to how easily comprehended the claim is. As an initial pass, it makes common sense. The longer the story, or the paragraph, or the sentence, the more likely it becomes complicated; the more complicated the writing, the less likely it is comprehensible.[22] More scientifically, other scholars have used word length as a measure of complexity or difficulty in understanding legal writings. For example, David Law and David Zaring measured word count of statutes, using the length both as a variable itself and as an input to a readability equation.[23] A political science study similarly used statute word length as a proxy for detail, equating more detail with more complexity.[24] These studies, and others like it, are based on the principle of readability.[25] Word count often forms the basis of readability, or the success with which a group of readers understands a document, reads at an optimal speed, and

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[22] To be sure, there are simple sentences that are complex in meaning and long sentences that are really quite easily comprehended. I make this claim that longer is more complex as a starting point for the discussion.

[23] *See generally,* David S. Law & David Zaring, *Law vs. Ideology: The Supreme Court and the Use of Legislative History*, 51 WM. & MARY L. REV. 1653 (2010).

[24] *See* Kirk A. Randazzo, Richard W. Waterman & Jeffrey A. Fine, *Checking the Federal Courts: The Impact of Congressional Statutes on Judicial Behavior*, 68 J. POL'Y 1006, 1009 (2006).

[25] *See, e.g.*, Kirk A. Randazzo, *Statutory Constraint on the Seventh Circuit: Examining Congressional Influence*, 32 S. ILL. U. L. J. 683, 688 (2008) ("It is apparent that statutes with higher word counts contained more detailed language pertaining to its legal implications."); Ryan C. Black & James F. Spriggs II, *An Empirical Analysis of the Length of U.S. Supreme Court Opinions*, 45 HOUS. L. REV. 621, 626 (2008) (using word count to measure length of judicial opinions, because length may embody "an opinion's clarity, scope, and amount of dicta"); Thomas E. Baker, *Essay: Tyrannous Lex*, 82 IOWA L.REV. 689, 697, 700 (1997) (using the word count length of state constitutions to show the substantial number of amendments and lawyerly gibberish).

finds interesting.[26] For example, calculation of the Flesch Reading Ease score includes the average sentence length (number of words divided by number of sentences) and average word length (number of syllables divided by number of words).[27] The more widely used Flesch-Kincaid Grade Level score uses the same indicators in its formula, but yields a "grade level" associated with the reading difficulty.[28] These tests are used for a wide range of applications, from the military for judging the reading difficulty of technical manuals, to insurance companies, who by regulation must provide policies written in a sufficiently simple manner, to textbook authors and editors.[29] Legal commentators have used the Flesch-Kincaid Grade Level test as a measure of statutory complexity.[30] Unfortunately, because patent claims are single sentences, it is not possible to apply the Flesch-Kincaid or Flesch tests in a meaningful way.

Second, the shape of patent claims may provide some insight into the very nature of patent claims and how they are drafted. Unfortunately, patent claims are peculiar manifestations of the English language, so odd that to assert claims are indeed written in English requires some explanation.[31] Thus, this point requires a few more details.

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[26] *See* Dale Edgar & Jeanne S. Chall, *The Concept of Readability*, ELEMENTARY ENGLISH 26:23 (1949).

[27] *See* Law & Zaring, *supra* note ___ at 1691-1692, 1692 n.30.

[28] *See id.*

[29] *See id.*

[30] *See* David S. Law & David Zaring, *Law vs. Ideology: The Supreme Court and the Use of Legislative History*, 51 WM. & MARY L. REV. 1653, 1691-1692 (2010). Zaring and Law cite as examples the federal habeus corpus statute as simple (reading level of 9.7, or within the comprehension of a high-school sophomore) and the Robinson-Patman Act, an anti-price discrimination act) as unbearably complex (reading level of 43.11). For comparison, a typical JD has an education level of 19 years. *See also* Mich le M. Asprey, PLAIN LANGUAGE FOR LAWYERS 297-99 (2003).

[31] *See, e.g.*, John M. Golden, *Construing Patent Claims According to their "Interpretive Community": A Call for an Attorney-plus-Artisan Perspective*, 21 HARV. J. LAW & TECH. 321, 369-70 (2008) (claiming that the "*lingua franca* [of the patent system] is likely to be 'patent claim English,' that peculiar dialect that has resulted from practice, precedent, and USPTO rules"); Arti K. Rai, *Engaging Facts and Policy: A Multi-Institutional Approach to Patent System Reform*, 103 COLUM. L. REV. 1035, 1046 (2003) (noting that "patent claims are not directed at the ordinary speaker of English").

Every patent concludes with one or more claims that particularly point out and distinctly claim what has been invented.[32] Each patent must have at least one independent claim; this type of claim stands on its own and does not refer to any other claim. Dependent claims, on the other hand, are additions or refinements to independent (or other dependent) claims; each dependent claim refers back to the claim from which it depends.[33] A patent may include no dependent claims or any number of dependent claims.[34]

One strategy would be to file a single, very broad independent claim followed by a number of dependent claims. After all, if the one broad independent claim is patentable, the claims that depend there from are patentable as well.[35] The broader the independent claim, the broader the

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[32] 35 U.S.C. § 112(2).

[33] 35 U.S.C. § 112(4). The law specifically notes that dependent claims "specify a further limitation of the subject matter claimed." *Id.* I use the "refining" and "adding" terminology to draw attention to the effective action of the dependent claim on the claim from which it depends.

[34] An overly simplistic example set of patent claims is provided below:

> 1. A chair comprising:
> a seat, having a top and a bottom; and
> a plurality of leg members, extending downwards from and connected to the bottom of the seat.
> [Independent claim]
>
> 2. The chair of claim 1, where the seat is made of walnut wood. [Dependent claim, refining the independent claim]
>
> 3. The chair of claim 1, wherein the seat has multiple edges, and further comprising a back, connected to an edge of the top of the seat. [Dependent claim, adding an additional limitation]
>
> 6. A chair wherein the seat has multiple edges, and further comprising:
> a seat, having a top and a bottom;
> four leg members, extending downwards from and connected to the bottom of the seat;
> a cushion attached to the top of the seat; and
> a back, connected to an edge of the top of the seat.
> [Independent claim]

[35] Because dependent claims do not add to the breadth of the patentee's claim scope, these generally only act as a hedge against a finding of invalidity of the independent claim from which the dependent claims depend. *See* Allison, et al., *supra* note ___ at 452 n.68.

A dependent claim may also serve as a "picture claim." *See* Jeffrey G. Sheldon,

swath of exclusionary territory and thus the more likely a competitor's activity will fall within the patent's scope. Unfortunately, it is not this simple.

Consider a new technology area, such as nanotechnology.[36] The first inventors in nanotechnology are approaching the patent world with a wide open slate.[37] (See Fig. 1). There are very few, or maybe even no, other inventions in the field.

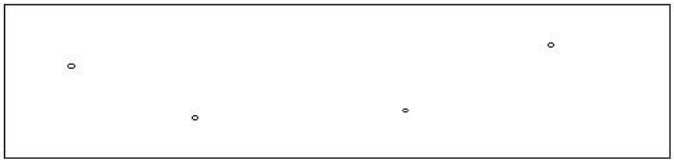

Fig. 1: The world of nanotechnology in the beginning

An inventor seeking to patent in this space has significant flexibility to claim what he has invented. In fact, subject to other patentability requirements, he can claim an area as large as what he has invented – for simplicity, imagine a circle.[38] (See Fig. 2). What is contained within the circle is the exclusive territory of the patentee;[39] areas outside the circle, to

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Practicing Law Institute: How to Write a Patent Application § 6.5.2 (24th ed. 2009) ("[A] 'picture claim . . . describes in detail all the features of a drawing or model of a specific embodiments of the invention. *See also* Michael Abramowicz & John F. Duffy, *Intellectual Property for Market Experimentation*, 83 N.Y.U. L.REV. 337, 405 n.232 (2008) ("The conventional wisdom is that a lawyer should seek to advance a range of claims, from the very broad to a 'picture claim,' i.e., the narrowest claim that still has some commercial significance.").

[36] *See, e.g.*, Jeanne Fromer, *Claiming Intellectual Property*, 76 U. CHI. L.REV. 719, 780 (2009) (differentiating "nascent technologies, such as nanotechnology" from mature industries where "the field is crowded with incremental inventions).

[37] *See id.* (noting that new industries often lack substantial prior art). Fromer notes, however, that this is a problem and suggests an alternative claiming scheme, central claiming, to avoid the problem of "pioneering" patents being too broad in scope. *See id.*

[38] This is the problem identified by Fromer. *See id.* The patentee is constrained by the ability to enable and describe his invention. 35 U.S.C. § 112, para. 1.

[39] Throughout this Article, I make reference to inventor, applicant, and patentee interchangeably. In more accurate nomenclature, however, the inventor is the person who creates the invention. The applicant is the person who applies for a patent, which in current United States practice is the inventor. The patentee is the person or entity able to exercise the patent's exclusive right. The patentee is often an assignee who receives rights from the inventor. The assignee may step into the shoes of the applicant for all intents and purposes,

the extent they are known, belong either to the public or to some other patentee.

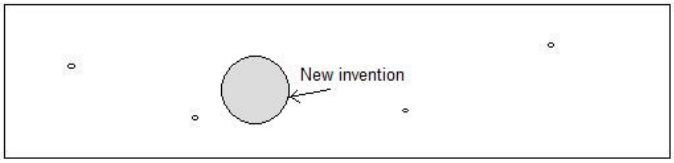

Fig. 2: The world of nanotechnology with new invention

After a while, though, the world of nanotechnology is getting filled with patents covering territory allotted to various inventors.[40] (See Fig. 3). Because each circle represents the scope of a patent and the scope of the patent is exclusive, there can be no overlap.

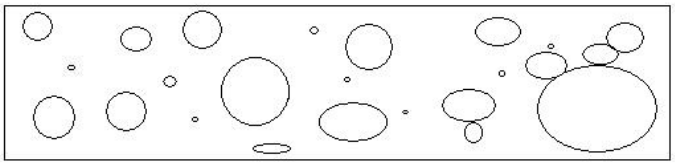

Fig. 3: The world of nanotechnology - a few years in

Confronted with a field that is not brand new and that has multiple areas of exclusive territory already allotted for a number of inventors, it becomes more difficult for an inventor to claim space for his invention. In this case, the territory covered no longer looks like a circle, but rather like some irregular shape. (See Fig. 4).

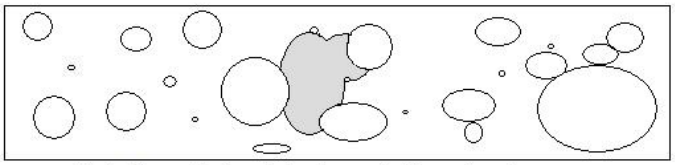

Fig. 4: The world of nanotechnology - patenting our invention

directing prosecution of the patent application.

[40] This figure is not exactly accurate, because there is no box constraining inventive activity. New inventions may also arise outside of the box.

During prosecution, the applicant is attempting to walk a fine line between achieving the greatest possible claim scope while avoiding the prior art. An increased amount of prior art requires the patentee to wend their way around, defining a territory that encompasses as much of their invention as possible (to capture the greatest territory), without overlapping the prior art.[41] In real life, then, the patentee's exclusive territory looks nothing like a circle, but rather the branch of a tree or a piece of Swiss cheese or some other erose or irregular shape. (See Fig. 5).

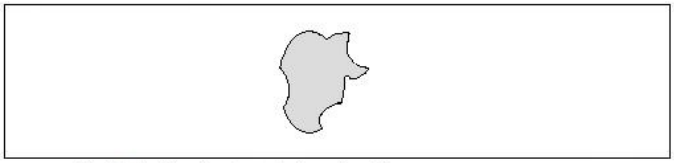

Fig. 5: Defining the bounds of our invention

Consider how these ideas might affect word count.[42] If we were drafting a claim to cover the new invention in Fig. 2, it might be as simple as: "I claim a circle." But to cover the invention in Fig. 5, it would be much more difficult. For example, "I claim a vertical oval, with a crescent moon attached at the two-o'clock position, a small divot at the five-o'clock position, and a large divot at the eight-o'clock position." In this example, the word count of the claim covering Fig. 2 is four words; the word count for Fig. 5 is twenty-nine words. Surely there are other ways to draft a claim to cover the area in Fig. 5, but it is almost certain the claim will be significantly longer than the one required for Fig. 2.

B. The Data Sets

This section describes the methodology of the study. First, I describe how the patents included in my data set were chosen. Second, I describe the study parameters, including the myriad variables that can be used to identify and differentiate patents when considering patent claim shape.

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[41] *See, e.g.*, Greg R. Vetter, *What If the Free Software Foundation's General Public License Had Be Patented*?, 2008 MICH. ST. L.REV. 279, 294 (noting that "adding more elements/limitations decreases the probability that a prior art reference anticipates"); F. Russell Denton, *Plumb Lines Instead of a Wrecking Ball*, 16 J. INTELL. PROP. L. 1, 21 n.76 (2008) ("[G]iven the amount of prior art, newer claims necessarily claim a narrower range . . . or recite more limitations.").

[42] This example is deceivingly simplistic, but is adequate to make the point.

My primary data set includes 4500 patents, representing 150 patents for each year included in the study. The Patent Office identifies which patents are issued each year by listing a starting patent number and a finishing patent number.[43] For example, the patents issued in year 2008 started at patent number 7,313,829 and ended at 7,472,427. Within the range for each study year, 150 patents were chosen using a random number generator.[44] Patents are included from the years 1958, 1968, and 1978 (to provide historical data) and then every year from 1982 until 2008. Why these years? At the beginning point, 1952 marks the beginning of the "current" patent era, with the enactment of the Patent Act of 1952. When initially gathering data, I chose to only look at patents from every ten years. Because 2008 was the last year for which starting and ending patent numbers were available on the Patent Office website, I went backwards by decade from 2008 until 1958. After the initial data run, I decided to gather data on a yearly basis, using 1982 as a starting period for annual study because 1982 marks the first year the Court of Appeals for the Federal Circuit was in existence.

My secondary data set includes 150 patents, issued in 2008, that have been involved in litigation. All of the patents issued in 2008 that have had a notice of litigation filed were identified; from this set, 150 were chosen via random sampling. The purpose of this data set is to allow comparison between patents that have been litigated and patents that have not been.

Although this method of data selection is not subject to coder discretion, there remain a few limitations of this data and a study based upon it. Particularly, some 400,000 patent applications are currently filed per year and around 200,000 patents issued.[45] A sample size of 150 patents per year is unlikely to be an ideal generalization of that year's patent base.[46] Further, patents were selected for inclusion in the database based on the year of

[43] *See* http://www.uspto.gov/patents/process/search/issuyear.jsp.

[44] The random numbers were generated using the random number generator from Stat Trek, *available at* http://stattrek.com/Tables/Random.aspx, with the input parameters of 150 numbers, beginning patent number for the year in question, end patent number, and prohibiting duplicate numbers.

[45] *See* U.S. Patent Statistics Chart, Calendar Years 1963-2010, http://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.htm (*last visited* Feb. 4, 2011).

[46] The results of this study have encouraged a forthcoming study including a much greater number of patents, with data gathering currently in progress.

issuance. The process of examination, which precedes the grant of a patent, can last anywhere from one year to over ten years. During the intervening time between filing and issuance, it is possible (or even likely) that the law and/or technology changed. Also, different technology areas are subject to different lengths of prosecution, and within technological arenas, prosecution time is also quite variable. These issues necessarily complicate extrapolations of the data. Finally, because the number of patents issued each year varies, in some cases to great extent, the selection represents varying percentages of the whole. Despite these limitations, the study is sufficiently suitable that the results prove to be of value.[47]

For each patent included in the data set, I collected information about the patent claims, including: number of claims in the patent, number of words in all of the claims combined, the number of independent claims, the number of words in the first independent claim, the number of words in the first dependent claim, and the number of words in the last dependent claim. From this data, I calculated the average number of words per independent claim, the number of dependent claims, and the average number of words per dependent claim. For each of these patents, I also collected other distinguishing data: the date the patent was applied for, the date the patent issued, United States and international technology classifications, nationality (US, non-US, or both) of inventorship, nationality (US, non-US, or both) of first filing (based on claimed priority), nationality of assignment (US, non-US, or both) of the patent rights at time of issue, and indication of legal representation.[48] I also collected the number of words in the entire patent, the number of patent references cited, the number of non-patent references cited, and whether the patent was a continuation or divisional of another patent application. From this data, I calculated the number of words in the specification, the total number of references cited, and the time the patent spent in prosecution in days.

Most of the distinguishing data is available from the face of the patent (via LEXIS or the Patent Office website in the few instances the patent was unavailable on LEXIS). For some variables, the coder was required to

[47] Despite the relatively small number of patents included in the data set, the results are so consistent that it is unlikely a greater number of patents per year would demonstrate any significant trend.

[48] All nationality variables are coded as a two-digit binary, with the first digit representing a United States response (1 0) and the second digit representing a non-US response (0 1). In cases where parties from both the United States and a foreign country are listed for a particular variable, both variables are positive (1 1).

count, such as the number of patent references or the number of independent claims. To determine the various word count variables, portions of the patent (e.g., the entire patent or the claims) were pasted into a blank Microsoft Word document. The relevant portion, such as the first independent claim, was then highlighted and the number of words was obtained using Word's word count function. The data are subject to virtually no interpretive intervention, rendering less possibility of error. However, the data was subject to inter-coder reliability checks.

C. The Results

To determine whether patent claims are changing shape as technology evolves, it first helps to consider the increasingly complicated nature of technology. This results in two hypotheses about the length of words per patent claim. First, because technology today is more complicated than technology of last year (and so going back), then it would make sense for word count of patent claims to be gradually increasing as time goes forward.[49] Second, some technologies are generally considered more complex or harder than other technologies; for example, innovations in nanotechnology are considered more complicated than improvements on a mousetrap (or other simple mechanical device). For this reason, it would make sense that, regardless of time span, some technologies should have a regularly greater number of words per patent claim than other technologies.

Other hypotheses can be drawn based on the nature of patent prosecution. It would make sense if foreign patents (those having either foreign inventors or foreign priority) are less complex, that is contain less words per claim, than those patents that have no foreign inventors or priority. This is due to differences in prosecution of foreign patents that should lead claims to be less complicated; patents filed by foreign entities or filed first in a foreign country should reflect this decreased complexity. It would also make sense for patents in crowded fields to have more words per patent claim, since it is more difficult to wend through the prior art as discussed above. Crowded fields can be inferred from the number of prior art references cited on the patent or from the length of time a patent spent in prosecution.[50]

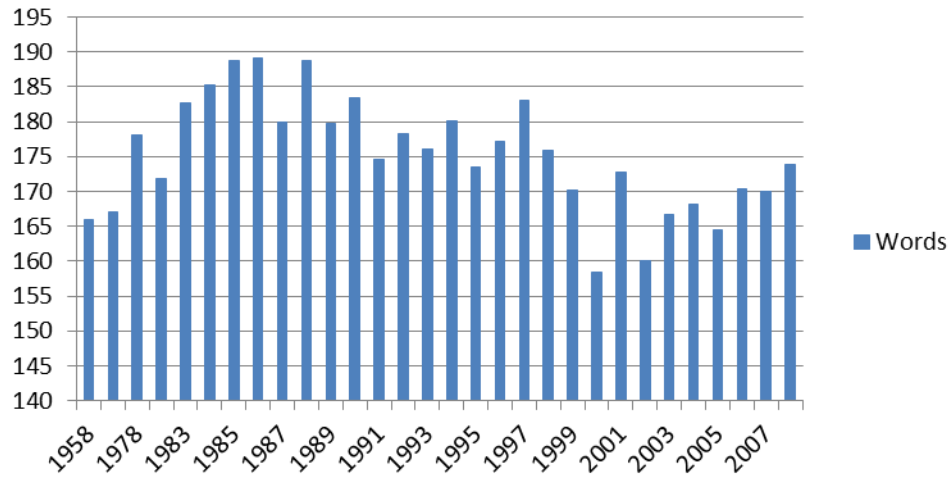
[49] One pushback on this point is that the technology of any given year was the most complicated technology to date and so an increase in word count over time would not be expected. However, the more patents that are granted (and in force), the more words that should be necessary to draft claims that avoid existing prior art.

[50] Neither of these is a perfect measure for crowdedness; prior art cited on the patent

1. Time

If patent claims are becoming more complex over time to keep pace with evolving technology, then the number of words per patent claim should trend upwards. Considering each claim on equal footing, however, is not an accurate depiction of how patent claims work. Independent claims do not make reference to any other claim – that is, they are self-contained – and are therefore more likely to include more words. Dependent claims, on the other hand, refer to either an independent claim or an earlier dependent claim, and thus generally include fewer words. A simple graph showing the average number of words per independent claim, by year, illustrates that the number of words per claim is not increasing.[51] (See Fig. 6).

Fig. 6 Average Words per Independent Claim



A similar graph of average number of words per dependent claim shows the similar lack of upward trend.[52] (See Fig. 7).

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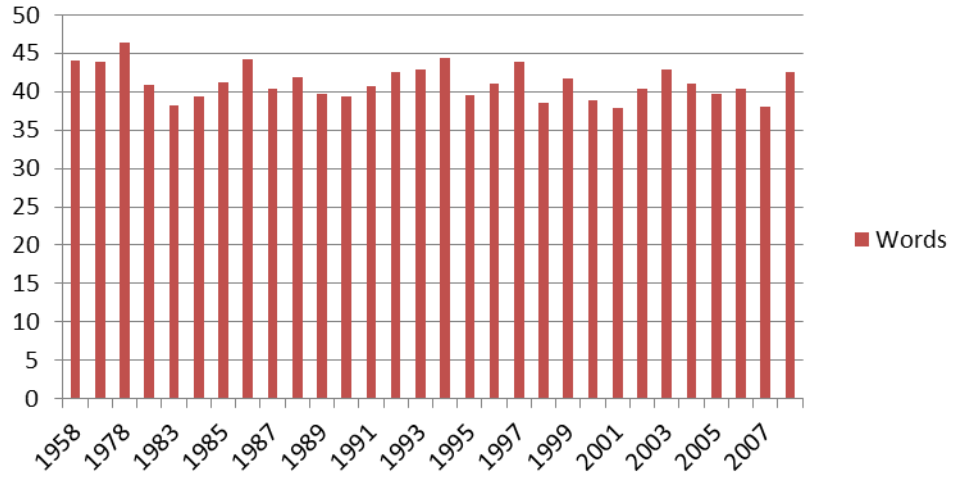
could have little to do with the field and time spent in prosecution could be related to a host of other factors. However, both of these factors could be implicated by a crowded field.

[51] The average number of words per independent claim, per year, is 175.1253 words, with a standard deviation of 8.1437. The median number of words per independent claim, per year, is 175.3066. Viewing each patent in the data set individually, the average number of words per independent claim is 176.526 words (standard deviation of 99.0393, minimum number of words = 2, maximum number of words = 1177).

[52] The average number of words per dependent claim, per year, is 41.22297 words, with a standard deviation of 2.17834. The median number of words per dependent claim, per year, is 40.92147. Viewing each patent in the data set individually, the average number

Fig. 7 Average Words per Dependent Claim



There may also be great variation across independent claims within a single patent or across dependent claims of a single patent. Each patent must include at least one independent claim, and by convention, this claim is generally the broadest claim.[53] Thus, the first independent claim in each patent should include the least limitations and, theoretically, the least number of words of all of the independent claims of that particular patent. For the same reason, the first dependent claim of each patent may include, generally, the least number of words and the last dependent claim may include the most number of words.[54] Analyses performed on the first

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of words per independent claim is 40.78806 words (standard deviation of 23.74, minimum number of words = 2, maximum number of words = 262.83).

[53] *See* Robert C. Faber, FABER ON MECHANICS OF CLAIM DRAFTING (6th ed. Practising Law Institute 2010) Sect. 2:3 ("The usual practice is to begin with the broadest claim and proceed to the narrowest. . . . "); MANUAL OF PATENT EXAMINING PROCEDURE Sect. 608.01 (m) ("Claims should preferably be arranged in order of scope so that the first claim presented is the broadest."). This is, of course, convention; some practitioners file detailed first independent claims.

[54] This point is more complicated by the fact that a dependent claim can depend from another dependent claim, such that while the last dependent claim has multiple additional limitations, the claim itself may only be adding the ultimate limitation and thus not contain a large number of words.

independent claim, the first dependent claim, and the last dependent claim of each patent yielded similar no significant upward trend.[55]

2. Technology

Although the overall length of patent claims is not increasing over time, see above, viewing technologies independently may expose results that are not evident in the overall analysis. It would be expected, as individual technology areas increase in complexity, the number of words per claim within that particular category would increase, in a way not apparent when viewing the data set as a whole. As a first pass, the patents in the data set were simply coded using the International Patent Classification (IPC) Section categories.[56] (See Table 1).

Table 1 - IPC Classification Categories

Category	Included Subject Matter
A	Human Necessities
B	Performing Operations; Transporting
C	Chemistry; Metallurgy
D	Textiles; Paper
E	Fixed Constructions
F	Mechanical Engineering; Lighting; Heating; Weapons; Blasting
G	Physics
H	Electricity

Admittedly, these categories are very coarsely defined. Even the finer classifications that descend from the IPC Main categories were not developed for the purpose of identifying any particular field of technology.[57] However, as a basis for simple comparison, this information

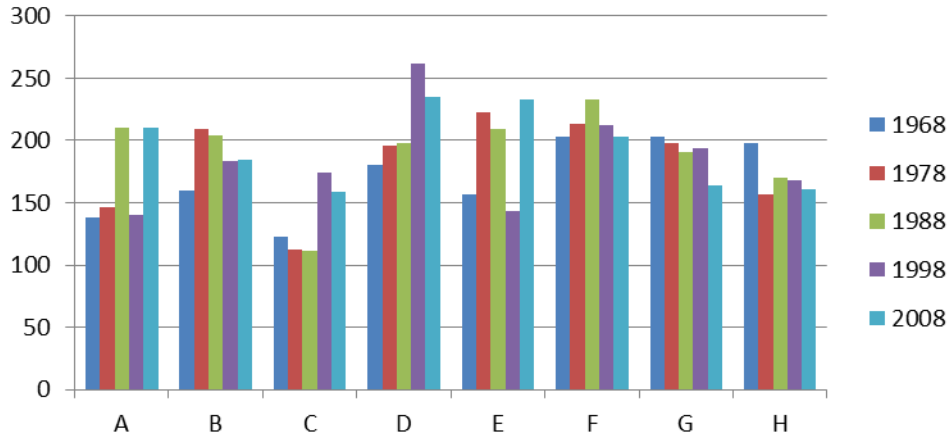
[55] The average number of words per first independent claim is 172.907; the average number of words per first dependent claim is 39.634; and the average number of words per last dependent claim is 39.398.

[56] *See* http://www.wipo.int/classifications/ipc/en/ (*last visited* Feb. 2, 2011). The patents in the data set were also coded by United States PTO Main Class categorization, as listed on the face of each patent. The basic level US PTO classification system is more complex, and more controversial, than the IPC Main Classification scheme. *See* http://www.uspto.gov/patents/resources/classification/classescombined.pdf (*last visited* Mar. 15, 2011).

[57] *See* John R. Allison & Starling D. Hunter, *On the Feasibility of Improving Patent Quality One Technology at a Time: The Case of Business Methods*, 21 BERKELEY TECH.

demonstrates no significant variation across any given technology over time. While there appears to be wide variance within each of the IPC Categories across the decade data, there is no technology area that illustrates a general upwards trend over time.[58] (See Fig. 9).

Fig. 9 Average Words per Independent Claim per IPC Main Category over Time



Removing time from the equation, it appears that one technology category, C – Chemistry and Metallurgy, may consistently have claims that are shorter than the other technology areas. (See Figs. 10 and 11). One reason for this is that chemical patents are often claimed via formula, which would look to Microsoft Word's word count feature to be a single word. If those claims were removed from the data set, the claims for IPC Category C would likely be quite similar to those of the remaining technology categories.

L.J. 729, 786 & n.138 (2006) (noting that the classification of the Patent and Trademark Office (PTO) is not suitable for identifying particular technology areas and that, while considered better designed than the PTO system, the IPC system is equally inapt); John R. Allison & Emerson H. Tiller, *The Business Method Patent Myth*, 18 BERKELEY TECH. L.J. 987, 1028 (2003) (same). These classification schemes were instead created to help find prior art during the examination of a patent application.

[58] For ease of viewing, a summary of the number of words, per independent claim, per decade, in each technology is depicted. Analysis of yearly data for each IPC Category reflects similar, non-trending variation.

Fig. 10 Average Words per Independent Claim per IPC Main Category

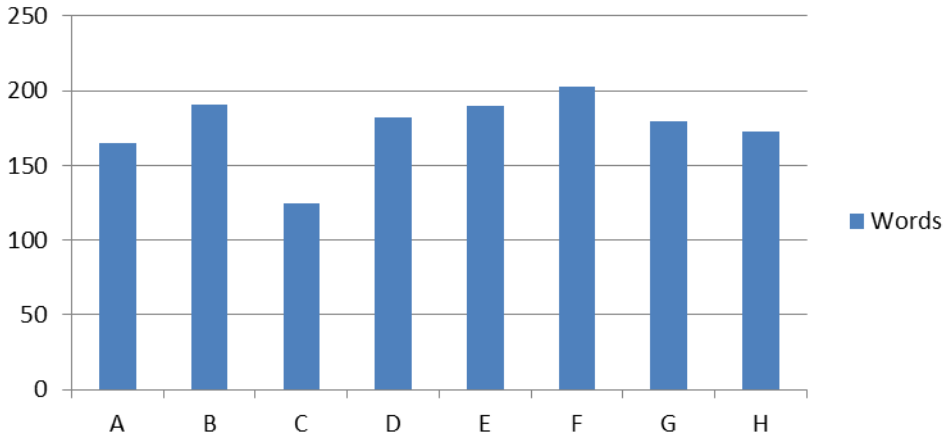
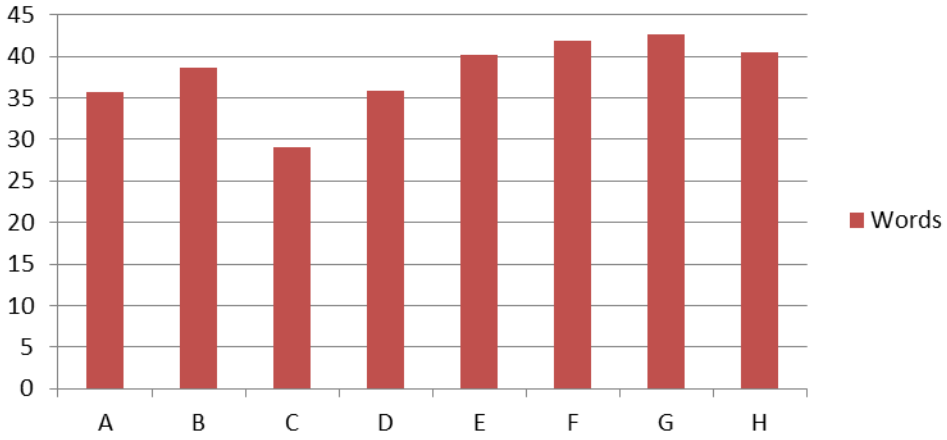


Fig. 11 Average Words per Dependent Claim per IPC Main Category



[*Additional work is being done in this section, including detailed statistical analysis of the IPC Main relationships. Also, US classification data is being added.*]

3. Foreign Actors

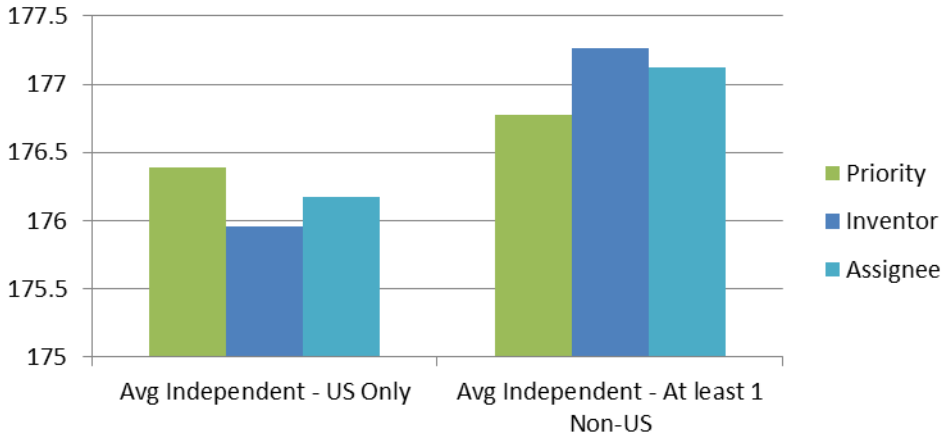
If the evolution of technology over time or the variety of technology itself does not affect patent shape, perhaps there are factors in the process of patent prosecution that do increase the number of words per patent claim. One factor is where, and by whom, the patent was first filed. The reason that these indicators may affect the shape of patent claims is that, while patent law has become increasingly more harmonized, there still remain differences that impact prosecution of patents in various countries. For example, until recently, Japanese patent law only allowed for very narrow patent claims;[59] therefore patent claims filed in Japan would likely have more limitations and more words. If the patent was first filed in Japan and then filed in the United States claiming priority to the patent application filed in Japan, it would likely be filed with lengthier claims. Similarly, the presence of a non-United States inventor or the assignation of the patent rights to a non-United States entity may have a similar effect of increasing the word count of patent claims.

The average number of words per independent claim was analyzed based on the presence of, respectively, at least one non-United States priority claim, inventor, and assignee. (See Fig. 12). Although at first blush it appears that the involvement of a non-United States actor is associated with an increased number of words, the difference in each case is not statistically significant.[60]

[59] *See, e.g.*, William Kingston, BEYOND INTELLECTUAL PROPERTY: MATCHING INFORMATION PROTECTION TO INNOVATION 77 (2010).

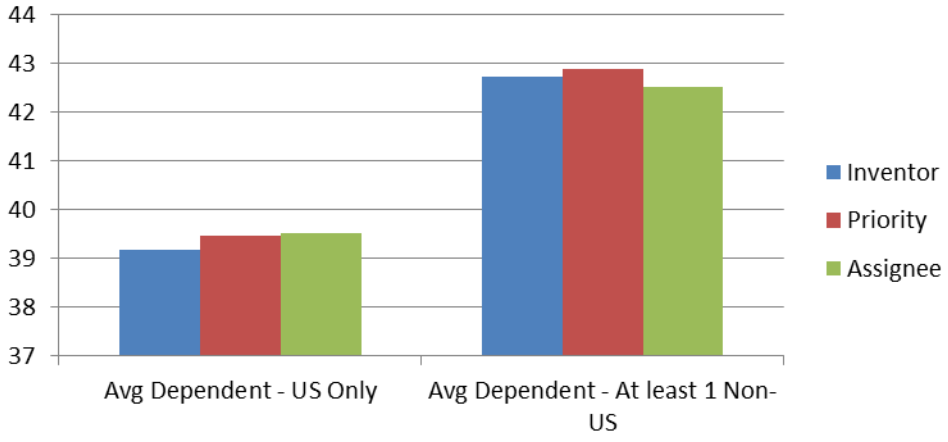
[60] Specifically, the two-tail probabilities, or *P*-values, calculated when measuring the effect of a non-United States priority, inventor, or assignee on average number of words per independent claim are 0.9, 0.7, and 0.8, respectively. All of these values are well outside of the standard measure of $P <= 0.05$ to consider the effect significant.

Fig. 12 Average Words per Independent Claim Based on Actor



The average number of words per dependent claim was similarly analyzed. (See Fig. 13). In the case of words per dependent claim, the presence of a foreign actor was significant – in each case, the data strongly suggested an association.[61]

Fig. 13 Average Words per Dependent Claim Based on Actor



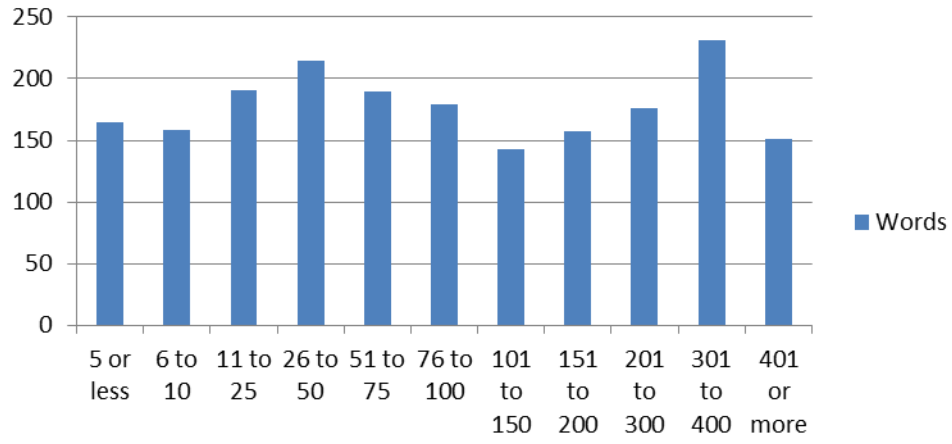
[61] Specifically, the *P*-values for the effect of a non-United States priority, inventor, or assignee on average number of words per dependent claim are 0.0004, 0.0002, and 0.0030, respectively.

Interestingly, and perhaps in explanation, the presence of a non-US actor in the role of priority, inventor, or assignee also has a significant effect on the number of dependent claims per patent. The average number of dependent claims in the presence of a non-US actor in any role is 9.90 claims, whereas patents that include only United States actors include an average of 11.05 dependent claims. The effect on the number of dependent claims for patents having at least one foreign actor is significant for every role – inventor, priority, or assignee.[62] It is possible that patents that have less dependent claims require more words per dependent claim to approximate the same scope of patent coverage. Simply put, the patents of non-United States actors may be cramming more information into fewer claims, resulting in a higher average word length per claim.

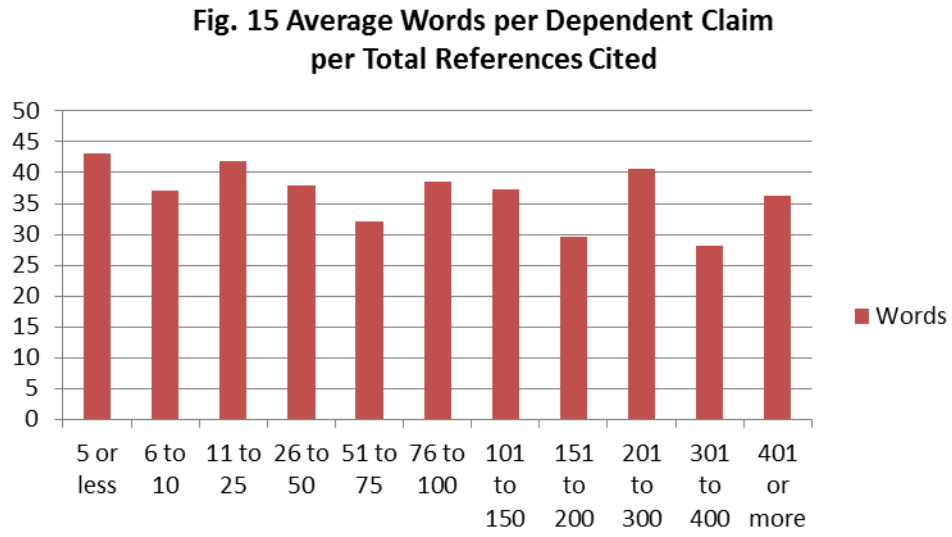
4. Prior Art

For the reasons discussed above, it would make sense if more words per claim were required in fields that are crowded by the prior art. One proxy for a crowded field is how many references are cited on the face of the patent. The references cited include prior art found by the examiner during prosecution, as well as prior art submitted by the patentee under the duty of disclosure.

Fig. 14 Average Words per Independent Claim per Total References Cited



[62] Specifically, the *P*-values, calculated when measuring the effect of a non-United States priority, inventor, or assignee on average number of dependent claims per patent are 0.001, 0.011, and 0.013, respectively. These values are below the standard 0.05 level of significance.

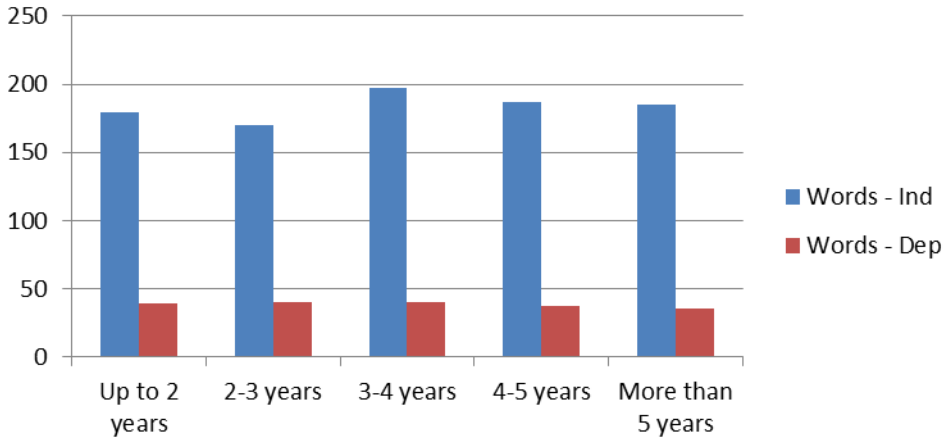


[*Additional analysis forthcoming*]

5. Prosecution Time

Another proxy for the crowdedness of a technology field is the amount of time a patent application spends in prosecution before being issued as a patent. The idea is that the more crowded the field, the more time it will take to traverse the prior art. Of course, there are other reasons why a patent may spend a long time in prosecution, such as the busyness of the examiners in that particular technology, the lack of haste with which the patentee acts, and the quality of the claims – each of which having nothing to do with crowdedness or prior art.

Fig 16 Average Words per Independent and Dependent Claim Based on Prosecution Time



[*Additional analysis forthcoming*]

II. AN EXPLANATION

In addition to the underlying technology and the law, there are a number of factors that come into play in patent claim drafting that cannot be measured. For example, patentees have an incentive to attain the broadest possible patent scope, often at the cost of vague patent claims.[63] In fact, it is true that the less that the patent's specification says, the broader the claim is likely to be because many terms are let open to interpretation.[64] Patentees have purposefully drafted poor claims to take advantage of the doctrine of equivalents, a mechanism where infringement can be found where the accused device or product does not fit squarely within the scope of the patentee's exclusive territory.[65] Patent attorneys also draft claims to

[63] *See, e.g.*, Jay Dratler, Jr., *Alice in Wonderland Meets the U.S. Patent System*, 38 AKRON L.REV. 299, 320 (2008); Lorie Graham & Stephen McJohn, *Thirty-Two Short Stories About Intellectual Property*, 3 HASTINGS SCI. & TECH. L.J. 1, 47 (2007)

[64] *See* Menell et al., *supra* note ___ at 749.

[65] Michael J. Meurer & Craig Allen Nard, *Invention, Refinement & Patent Scope: A New Perspective on the Doctrine of Equivalents*, 93 GEO. L.REV. 1947, 1973 (2005); F. Scott Kieff, *The Case for Registering Patents and the Law & Economics of Present Patent-Obtaining Rules*, 45 B.C. L.REV. 109-10 (2003).

particularly avoid falling within disadvantageous rulings of the courts.[66] Some of these rules include subject matter eligibility,[67] transnational infringement, and implied licensing.[68]

All of these factors, however, would further support the idea that claims should not all look the same. Something else is going on that is constraining how claims are drafted; a norm that has arisen out of the relationship between patentees and the Patent Office. This norm influences how the two parties interact, leading to consistently complex patent claims, generally not affected by any particular factor, regardless of differences in technology, time, and actor.[69] Only the relationship between the patentee and the Patent Office is consistent over all patents and, as the singularly consistent factor, likely governs claim drafting more than any law or regulation, creating a claims drafting norm. Because the Patent Office is always a party to patent acquisition, and because both patentees and patent attorneys are likely to be repeat players in the patent system, it is unlikely that either side is willing to risk the damages associated with violating the norm.

Based on the parties' ongoing relationship, their behavior during negotiation of patent claims is likely to be driven by informal and implicit mutual understandings.[70] This informal behavior may be manifest in how both parties approach patent claims. As noted earlier, the patentee has incentive to draft broad, vague claims.[71] The flipside is that the Patent

[66] *See generally,* John R. Thomas, *Of Text, Technique, and the Tangible: Drafting Patent Claims Around Patent Rules*, 17 J. MARSHALL J. COMPUTER & INFO L. 219 (1998).

[67] *See e.g.,* Thomas F. Cotter,*A Burkean Perspective on Patent Eligibility*, 22 BERKELEY TECH L.J. 855, 885 n. 156; Mark D. Janis, *Sustainable Agriculture, Patent Rights & Plant Innovation*, 9 IND. J. GLOBAL LEGAL STUD. 91, 96-101 (discussing drafting claims to avoid patent eligibility issues).

[68] *See, e.g.,* Christina M. Sperry, *Note: Building a Mystery: Repair, Reoconstruction, Implied Licenses, &* Hewlett-Packard Co. v. Repeat-O-Type Stencil Mfg. Corp., 5 B.U.J. SCI. & TECH. L. 9, para. 34 (1999) ("Patentees can avoid the problems associated with implied licenses if they draft their patent claims carefully….").

[69] *See, e.g.,* Cass R. Sunstein, *Social Norms & Social Roles*, 96 COLUM. L.REV. 903 (1996).

[70] *See, e.g.,* Ethan J. Leib, *Contracts & Friendship*, 59 EMORY L.J. 649, 654-55 (2010) (discussing the relational view of contract negotiation).

[71] *See* ___, *supra*.

Office has limited incentive to examine patent applications and, in fact, the choice not to expend resources on strictly examining each application has merit.[72] This relationship often causes the patentee to come to the negotiation with an application that "looks good," or something the Patent Office can easily grant. In this respect, their behavior exhibits a norm; although the behavior is not sanctioned by existing law or regulation, the parties adhere to it.

The norm then encourages the patentee to draft claims that "look good." With respect to patent claim length, this norm encourages unnecessarily long patent claims for two reasons. First, in general, the longer and more detailed a document is, the more remarkable it is generally found by a lay public. Few, if any, regular citizens will read or understand any given patent. Therefore, the fact that claims are lengthy and inclusive of numerous limitations – that is, sufficiently bulky -- will be enough to impress. The Patent Office has incentive to grant these patents to appease the public; to obtain a patent, the patentee has incentive to submit applications written in a way the Patent Office can easily grant. Second, when trying to make sure an object looks superficially "good," it is often sound practice to make it look similar to another object that has been previously judged "good." For this reason, a patentee has an incentive to draft claims that look like claims that have previously been issued by the Patent Office, and in the same respect, the Patent Office feels safe in granting claims that look similar. In effect, the artificial complexity of claims is a win-win situation for the patentee and the Patent Office. Unfortunately, lengthy patent claims, particularly where the complexity is not commensurate with the technology or law, presents a losing situation for patent comprehension.

[Additional discussion & conclusion]

[72] *See* Petherbridge, *supra* note ___ at 901 ("Limiting these sorts of expenditures [related to detailed examination of individual patent claims] can, therefore, be understood theoretically as fairly sound social judgment.").