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PATENT CLAIM CONSTRUCTION AND CORPUS LINGUISTICS

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The role of extrinsic sources in interpreting patent claims has been a source of debate in the U.S. Court of Appeals for the Federal Circuit. The Court for years encouraged the use of extrinsic sources such as dictionaries, encyclopedias, and treatises. The Court abruptly changed course in 2005, however, largely repudiating its earlier cases extolling the usefulness and reliability of extrinsic sources. The Court justifiably worried that undue reliance on dictionaries and other extrinsic sources subverted the role of intrinsic evidence. The Court also detailed the shortcomings of using extrinsic evidence to shed light on terms in patent claims, noting that reliance on extrinsic evidence would alter the scope of patent claims and "undermin[e] the public notice function of patents." The Federal Circuit was correct to hesitate before crediting many existing extrinsic sources as universally reliable guides to the meaning of patent claims. A patent's specification and prosecution history, however, often do not clarify a term sufficiently for courts to jettison extrinsic evidence completely. There is a need for objective sources that shed light on how a person of ordinary skill in the art would interpret a certain term.

This Article provides an overview regarding how an emerging tool—corpus linguistics—could fill the void. Corpus linguistics has the capability to perform language searches in a general or specialized database of words (corpus) to deduce the majority usage

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of a term. When a patent uses a word in an ordinary manner, litigants may use a general corpus to demonstrate the term's meaning. When, as is most common, a patent uses a term in a specialized scientific sense, litigants may construct an ad hoc, specialized corpus that could include relevant patents, published patent applications, scientific journals or treatises, or other scientific materials. Such specialized corpora would be specific to each subject area and would assist in determining how a specialized term or phrase is used in publications written by and for skilled artisans. When the intrinsic evidence is not sufficiently clear regarding how a person of ordinary skill in the art would interpret a term, courts may turn to the next best alternative—discovering, quantitatively, how the majority of persons of ordinary skill in the art use that term. In this way, methods of claim construction may more fully support the public notice function of patents.

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I. INTRODUCTION

Claim construction is the requisite first step in assessing liability in a patent infringement suit.[1] The court must interpret[2] the meaning of the asserted patent claims prior to the factfinder determining whether the accused product infringes on the asserted claims or determining that the asserted claims are not valid.[3] The claim construction inquiry "is an objective one" that emphasizes the importance of interpreting patent claims in context.[4] The inquiry requires the court to interpret the ordinary meaning of a claim term as "a person of ordinary skill in the art" would have understood the term at the time "of the effective filing date of the patent application."[5] The claim terms must always be interpreted "in the context of the entire patent, including the specification"[6]—i.e., the intrinsic evidence. The use of extrinsic evidence is generally limited

[1] Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc., 381 F.3d 1111, 1115 (Fed. Cir. 2004) (citations omitted).

[2] For purposes of this Article, the terms "construction" and "interpretation" are used interchangeably in the context of patent claim construction. *But see* Tun-Jen Chiang & Lawrence B. Solum, *The Interpretation-Construction Distinction in Patent Law*, 123 YALE L.J. 530, 546 (2013).

[3] *Innova/Pure Water, Inc.*, 381 F.3d at 1115 (citations omitted).

[4] *Id.* at 1117 (citations omitted); Phillips v. AWH Corp., 415 F.3d 1303, 1312–13, 1319 (Fed. Cir. 2005) (citations omitted).

[5] *Innova/Pure Water, Inc.*, 381 F.3d at 1116 (citations omitted); *Phillips*, 415 F.3d at 1313 (citations omitted).

[6] *Phillips*, 415 F.3d at 1313.

to better positioning the court to understand the patent's context by "'plac[ing] itself in the shoes of a person of ordinary skill in the art' [when] reading the claims alongside the rest of the specification."[7]

Despite the claim construction standard's thematic emphasis on context and objectivity, the existing extrinsic sources used to interpret patent claims—such as dictionaries, encyclopedias, and treatises—are not always inherently objective. These sources "only tell [us] whether 'a particular meaning is linguistically permissible,' not whether it is ordinary."[8] When "divorced from the intrinsic evidence [these existing extrinsic sources] risk[ ] transforming the meaning of the claim term to the artisan into the meaning of the term in the abstract, out of its particular context."[9] The Federal Circuit previously recognized this risk in *Phillips v. AWH Corp.*,[10] when the Court cautioned against relying too heavily on extrinsic sources that "focus[ ] the inquiry on the abstract meaning of words rather than on the meaning of claim terms within the context of the patent"—thereby altering the scope of patent claims and "undermining the public notice function of patents."[11]

The Federal Circuit was correct to hesitate before crediting many existing extrinsic sources as universally reliable guides to the meaning of patent claims. The technical complexities of patented inventions often necessitate a judge—who "is not usually a person conversant in the particular technical art involved and is not the hypothetical person skilled in the art to whom a patent is addressed"—to rely on, or at least review, extrinsic evidence when construing the meaning of claim terms within the context of the patent.[12] The *Phillips* court recognized a judge's reliance through its continued permission for district courts "to admit and use such

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[7] Astrazeneca AB v. Mutual Pharm., Inc., 384 F.3d 1333, 1337 (Fed. Cir. 2004) (citations omitted).

[8] James C. Phillips, Daniel M. Ortner, & Thomas R. Lee, *Corpus Linguistics & Original Public Meaning: A New Tool to Make Originalism More Empirical*, 126 YALE L.J.F. 21, 23 (2016) (citation omitted).

[9] *Phillips*, 415 F.3d at 1321.

[10] *Id.*

[11] *Id.* at 1319, 1321 (citation omitted).

[12] Markman v. Westview Instruments, Inc., 52 F.3d 967, 986 (Fed. Cir. 1995).

[extrinsic] evidence."[13] In other words, the court's caution of reliance was premised not on the conceptual value of extrinsic sources, but on the particular risk of relying on extrinsic evidence that lacks objective indicators of meaning when construing claim terms within the context of the patent.[14] Thus, extrinsic sources need objective indicators of meaning that shed light on how a person of ordinary skill in the art would interpret a claim term.

This Article proposes the use of corpus linguistics as a more reliable extrinsic source that also supports the claim construction standard's emphases on context and objectivity. Corpus linguistics is an empirical approach to "the study of language (linguistics) through systematic analysis of data derived from large databases of naturally occurring language (*corpora*, the plural of *corpus*, a body of language)."[15] The data arising from a linguistics corpus allows "legal interpreters to look for meaning in the surrounding linguistic context of an utterance" in a systematic manner and "to gain meaningful and quantifiable insight about the range of possible uses of a word and the frequency of its different senses."[16] To objectively construe the meaning of claim terms within the context of the patent, litigants should use a corpus that is representative of the persons having "ordinary skill in the art"—which may require the creation of a specialized corpus—and analyze the resulting empirical data based on a disclosed methodology.[17] The method of choosing or constructing the corpus and its resulting content would provide transparency regarding a proposed construction and would be subject to criticism through cross-examination and by opposing counsel's expert. In that case, a court could more confidently conclude that each party has not proffered cherry-picked "extrinsic

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[13] *Phillips*, 415 F.3d at 1319.

[14] *Id.* at 1318 (discussing the risks of each party cherry-picking the "extrinsic evidence most favorable to its cause" from "a virtually unbounded universe of potential extrinsic evidence" lacking objective indicators of meaning within the context of the patent).

[15] Thomas R. Lee & James C. Phillips, *Data-Driven Originalism*, 167 U. PA. L. REV. 261, 289 (2019).

[16] Thomas R. Lee & Stephen C. Mouritsen, *Judging Ordinary Meaning*, 127 YALE L.J. 788, 832 (2018) (citations omitted).

[17] *Phillips*, 415 F.3d at 1318–19 (citations omitted).

evidence most favorable to its cause."[18] It could subsequently determine the ordinary meaning of patent claims without relying on "human linguistic intuition alone"[19] to weigh the credibility of existing extrinsic sources that only define claim terms in the abstract—i.e., avoid "the considerable task of filtering the useful extrinsic evidence from the fluff" with only one's subjective intuitions about the usage and meaning of a term.[20]

This Article begins with an overview of patent law and the relevant considerations that inherently influence the reliability of claim construction and the subsequent determinations of patentability, infringement, and invalidity in Section II. Section III provides details of the claim construction standard and the emphasis placed on context and objectivity in patent claim construction. Next, this Article summarizes the shortcomings of certain extrinsic evidence as recognized by the Federal Circuit and further discusses the void developed from continued shortcomings of existing extrinsic sources. Section IV proposes the use of corpus linguistics to fill that void, provides details about the meaning and value of corpus linguistics, and discusses how corpus linguistics will solve several current issues recognized in patent claim construction. Section IV also includes case studies that incorporate corpus linguistics into claim construction. The section also discusses the use of a general corpus to assess the meaning of terms in an exemplary case based on a corpus linguistics analysis using a general corpus. Finally, this Article then introduces the process of developing a specialized corpus for an exemplary case and highlights the potential benefits of utilizing a specialized corpus.

II. PATENT LAW BASICS

This section includes a brief background on the process of obtaining a valid patent and on the hypothetical person standard that applies, or influences, the patentability (obtaining a patent), enforceability (challenging the validity of a patent), and scope (affecting the patent infringement assessment) of patent claims. This

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[18] *Id.*
[19] Lee & Mouritsen, *supra* note 16, at 831.
[20] *Phillips*, 415 F.3d at 1318–19 (citations omitted).

section also introduces the underlying theme of reliability that influences the relevant considerations in the claim construction process, which are addressed in detail in the next section, *infra* Section III.

A. Obtaining a Valid Patent

A patent is a written document in the public record that discloses a (presumed) patentable invention and places the public on notice that the federal government has issued to the patent owner an enforceable, exclusive right to make, use, offer to sell, or sell (or authorize others to do the same) the disclosed invention for a fixed term.[21] To obtain a valid patent, the inventor must file a patent application with the U.S. Patent and Trademark Office ("PTO"), which assesses whether the claimed invention meets the patentability requirements during the application process.[22] The claimed invention is patentable if it constitutes: (i) a "new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof"[23] that is (ii) novel—meaning not previously "patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention"[24]—and (iii) not obvious—meaning "the differences between the claimed invention and the prior art are such that the claimed invention as a whole would [not] have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains."[25] In addition, the patent application must include a specification with: (i) "a written description of the invention . . . 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, and shall set forth the best mode contemplated by the inventor or

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[21] 35 U.S.C. §§ 154, 271, 281.

[22] UNITED STATES PAT. & TRADEMARK OFF., https://www.uspto.gov/ [https://perma.cc/K86W-5NUU] (last visited Mar. 11, 2021).

[23] 35 U.S.C. § 101.

[24] *Id.* § 102(a)(1).

[25] *Id.* § 103.

joint inventor of carrying out the invention"[26] and (ii) "one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention."[27]

The patent application is "reviewed by [a] patent examiner[ ], [a] quasi-judicial official[ ] trained in the law and presumed to 'have some expertise in interpreting the [prior art] references and to be familiar from their work with the level of skill in the art and whose duty it is to issue only valid patents.'"[28] The examiner "determines the scope of claims in [the] patent application[ ]" by "giving claims their broadest reasonable construction 'in light of the specification as it would be interpreted by one of ordinary skill in the art.'"[29] The examiner then assesses the patentability of the claimed invention based on a review of the patent application and the prior art.[30] If the examiner determines that the original claims of the patent application are not patentable, the examiner rejects the patent application and provides a written explanation describing the basis for the rejection in a formal submission called an office action.[31] The patent applicant then has the opportunity to review the examiner's rejection—generally through a patent attorney—and may rebut the rejection or amend the claims in light of the examiner's rejection.[32] Typically, the applicant can only amend the claims and not the written description of the claimed invention.[33] The amended claims must therefore, in addition to the patentability requirements, find support in the original written description in order to be an allowable amendment.[34] The applicant then submits a response to the

[26] *Id.* § 112(a).

[27] *Id.* § 112(b).

[28] Markman v. Westview Instruments, Inc., 52 F.3d 967, 986 (Fed. Cir. 1995) (citations omitted) (four alterations in original).

[29] Phillips v. AWH Corp., 415 F.3d 1303, 1316 (Fed. Cir. 2005) (citation omitted).

[30] 37 C.F.R. § 1.104(a)(1) (2019).

[31] *Id.*

[32] *Id.* § 1.111(a)(1).

[33] *Id.* §§ 1.121(f)–(g).

[34] In other words, if the amended claims do not find support in the original written description, then the written description does not provide a full and exact

examiner's office action, which includes the amended claims and an explanation as to why these amendments result in a patentable invention.[35] The office actions and responses may continue between the applicant and the PTO until the examiner issues a final rejection—terminating the application process—or grants the patent application and issues a patent.[36]

The submissions between the applicant and the examiner during the application process—including the patent application, the office actions and responses, and ultimately the final rejection or issue of allowance—become part of the public record, also known as the "prosecution history" of an issued patent (or a rejected patent application).[37] The prosecution history represents a documented account of the negotiations between the patentee and the federal government.[38] However, "[n]o inquiry as to the subjective intent [or understanding] of the applicant or PTO is appropriate or even possible in the context of a patent infringement suit."[39] This is due, in part, to the common occurrence of there "be[ing] a significant difference between what an inventor thinks his patented invention is and what the ultimate scope of the claims is after allowance by the PTO" and the fact that the government's views "are generally not obtainable, except as reflected in the prosecution history."[40] Moreover, the subjective intent of the negotiating parties to the patent's issuance is also irrelevant because a patent constitutes a "public instrument[ ] [that] may create liability in third persons who were not participants in . . . the PTO proceedings," i.e., the patent application process.[41]

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description of the claimed invention, as required under 35 U.S.C. § 112(a), and therefore the claimed invention is not patentable under the statutory requirements for patentability.

[35] 37 C.F.R. § 1.111 (2019).

[36] *Id*. § 1.113.

[37] Phillips v. AWH Corp., 415 F.3d 1303, 1317 (Fed. Cir. 2005) (citation omitted).

[38] *Id.*

[39] Markman v. Westview Instruments, Inc., 52 F.3d 967, 985 (Fed. Cir. 1995) (citations omitted).

[40] *Id.* at 985–86 (citations omitted).

[41] *Id.* at 987.

B. The Public Notice Requirement and the PHOSITA Standard

The issued patent represents a federal grant to the patentee of temporally-limited monopoly rights that are enforceable against the public.[42] Congress authorized the grant of these enforceable monopoly rights over an invention through its constitutional power "[t]o promote the Progress of Science and useful Arts"[43] and delegated some of this power to the PTO to individually grant those rights if the invention met the statutory provisions regarding patentability.[44] The limited monopoly rights are offered in exchange for the public disclosure of the claimed invention as a way to encourage the sharing of valuable ideas that will result in continued inventive progress. This exchange has sometimes been characterized as a contract between the federal government and the inventor,[45] where the nature of the exchange is one that benefits both parties to the "contract."[46] However, the effect of this exchange is to give the patent owner the exclusive authority to control and enforce its monopoly rights against nonparties to the "contract"—who did not participate in the creation or refinement of the "contract's" language—for a fixed term.[47] The patent must therefore provide the public with sufficient notice to understand what it can and cannot do in order for the patentee to hold valid and enforceable monopoly rights—similar to the enforceability of a statute against the public.[48]

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[42] *See id.* (acknowledging the public's inability to participate in the patent application process despite the creation of potential liability for the public through the government's grant of a patent application).

[43] U.S. CONST. art. I, § 8, cl. 8; 35 U.S.C. § 101 *et seq.*

[44] *See* 35 U.S.C. § 101.

[45] *See, e.g.*, *Markman*, 52 F.3d at 984; Annal D. Vyas, *Alice in Wonderland v. CLS Bank: The Supreme Court's Fantastic Adventure into Section 101 Abstract Idea Jurisprudence*, 9 AKRON INTELL. PROP. J. 1, 4–5 (2015).

[46] *See generally* MAVIS FOWLER, THE LAW OF PATENTS 8–9 (1996) (describing the two main purposes of the patent system as protecting an inventor through the grant of a patent and promoting the progress of science through public disclosure of the invention).

[47] 35 U.S.C. §§ 271, 154(a)(2).

[48] *Markman*, 52 F.3d at 984–87 (concluding that claim construction is more analogous to statutory interpretation than contract interpretation because "both of these public instruments [that is, statutes and patents] may create liability in third persons who were not participants in the legislative process or the PTO proceedings").

This means that the patent must describe the claimed invention in a manner that enables "competitors . . . to ascertain to a reasonable degree the scope of the patentee's right to exclude" after reviewing "the patent and prosecution history . . . and applying established rules of construction to the language of the patent claim in the context of the patent."[49] This standard is an objective one that is informed by "a person of ordinary skill in the art at the time of the invention" ("PHOSITA").[50]

The PHOSITA serves as "an objective baseline from which to begin" construing the meaning of patent claims,[51] assessing whether a claimed invention is obvious,[52] and ensuring sufficient disclosure of information to enable others to make and use a claimed invention.[53] The standard interweaves itself through the patent system by applying to both pre- and post-grant proceedings, which creates a more consistent and predictable application of patent law.[54] For example, claim construction precedes both the patentability determination in a patent application process and the invalidity determination in a patent infringement suit, where both determinations are informed by the meaning of the claim and apply the same statutory provisions.[55] However, the contributing participants to those determinations may hold different subjective motives—e.g., the patent administrative body (promoting inventive progress); the patentee (broadening the patent claims to exclude all competition in the market); a competitor (invalidating a patent, limiting the scope of the patent, and increasing ease of market entry or competition); and the judiciary (resolving a question of law). Those different subjective motives could result in inconsistent and, therefore, unreliable determinations regarding a patent's meaning, scope, and validity—"thereby undermining the public notice

[49] *Id.* at 978–79 (citations omitted).

[50] Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc., 381 F.3d 1111, 1116–17 (Fed. Cir. 2004) (citations omitted).

[51] Phillips v. AWH Corp., 415 F.3d 1303, 1313 (Fed. Cir. 2005) (citations omitted).

[52] 35 U.S.C. § 103.

[53] *Id.* § 112(b).

[54] *Id.*

[55] *Phillips*, 415 F.3d at 1316 (internal quotations omitted); *Innova/Pure Water, Inc.*, 381 F.3d at 1115 (citations omitted).

function of patents" and inhibiting a meaningful exchange of ideas or inventive progression.[56]

The risk of unreliable determinations in patent law is surely reduced by construing the meaning of patent claims from the perspective of a "hypothetical person skilled in the art to whom the patent is addressed"[57] because it eliminates at least some of the influence that arises from participants' subjective motives and creates a consistent starting point to subsequently apply the construed claims to determine patentability or invalidity. However, participants' subjective motives still influence a claim's meaning, causing unreliable determinations in patent law, through the participants' reliance on cherry-picked extrinsic evidence to support a subjectively favorable construction of a claim—a concern that the Federal Circuit has recognized in the claim construction process.[58]

III. CLAIM CONSTRUCTION

Claim construction is a necessary part of assessing patentability of a patent application prior to issuance,[59] as well as a requisite first step in assessing liability in a patent infringement suit[60]—although, the PTO does not typically treat claim construction as a separate and distinct step from the patentability analysis, unlike in a patent infringement suit. This Article limits the remaining discussion of claim construction to its application in patent infringement suits.

A. The Claim Construction Standard

Claim construction is the process of determining the "ordinary and customary meaning"[61] that a patent claim "would have to a person of ordinary skill in the art at the time of the invention."[62] This "starting point is based on the well-settled understanding that inventors are typically persons skilled in the field of the invention and that patents are addressed to and intended to be read by others

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[56] *Phillips*, 415 F.3d at 1319 (citation omitted).
[57] Markman v. Westview Instruments, Inc., 52 F.3d 967, 986 (Fed. Cir. 1995).
[58] *Phillips*, 415 F.3d at 1318–19 (citations omitted).
[59] *Id.* at 1316 (citation omitted).
[60] *Innova/Pure Water, Inc*., 381 F.3d at 1115 (citations omitted).
[61] Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996).
[62] *Innova/Pure Water, Inc.*, 381 F.3d at 1116.

of skill in the pertinent art."[63] Importantly, the relevant inventor audience "is deemed to [have] read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification."[64] Thus, when construing the claims, the court begins its review with the patent's claims, specification,[65] and prosecution history—i.e., the intrinsic evidence.[66] While "the claim language is the most important source . . . to consider in construing the claim terms,"[67] the court does not "look at the ordinary meaning of the term . . . in a vacuum."[68] The intrinsic evidence as a whole "usually provides the technological and temporal context to enable the court to ascertain the meaning of the claim to one of ordinary skill in the art at the time of the invention."[69] The claims "define the invention to which the patentee is entitled the right to exclude"[70] and the specification, as "a concordance for the claims,"[71] is "the best source for discerning" the meaning of a claim term within the "proper context."[72] In addition, the prosecution history may enlighten the public (and therefore the court) of differences in scope between the patentee's

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[63] *Phillips*, 415 F.3d at 1313.

[64] *Id.*

[65] While the specification is statutorily defined to include the claims, courts sometimes discuss claims as separate and distinct from the other components of the specification. *Compare* 35 U.S.C. § 112(b) ("The specification shall conclude with one or more claims particularly point out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention."), *with* Ross-Hime Designs, Inc. v. United States, 126 Fed. Cl. 299, 313 (2016) ("Intrinsic evidence consists of the patent claims, specification, and the patent's prosecution history.") (citations omitted). Thus, for purposes of avoiding confusion with case language, the term "specification" generally refers to the written description and does not include the claims for the remainder of this Article.

[66] *Ross-Hime Designs, Inc.*, 126 Fed. Cl. at 313.

[67] Bondyopadhyay v. United States, 129 Fed. Cl. 793, 801 (2017) (citation omitted).

[68] Medrad, Inc. v. MRI Devices Corp., 401 F.3d 1313, 1319 (Fed. Cir. 2005) (alteration in original) (citations omitted).

[69] V-Formation, Inc. v. Benetton Group SpA, 401 F.3d 1307, 1310 (Fed. Cir. 2005) (citations omitted).

[70] Phillips v. AWH Corp., 415 F.3d 1303, 1312 (Fed. Cir. 2005) (citations omitted).

[71] *Id.* at 1315 (citation omitted).

[72] *V-Formation*, 401 F.3d at 1310 (citation omitted).

claim term and the ordinary meaning of the claim term if the patentee disclaimed a part of the ordinary meaning.[73] "The prosecution history is less useful in claim construction, however, because it can itself be ambiguous as it represents ongoing negotiations between the patent applicant and the PTO."[74] The court may also look to extrinsic evidence for guidance so long as it is "considered in the context of the intrinsic evidence."[75] Extrinsic evidence refers to "evidence outside of the patent record," such as dictionaries, encyclopedias, treatises, expert testimony, inventor testimony, and prior art not considered in the prosecution history.[76]

B. Claim Construction Remains Exclusively with the Court

Claim construction constitutes the construction of a written instrument and is therefore a question of law,[77] necessarily requiring the court to construe the asserted claims prior to the factfinder's liability assessment—the second step in determining infringement or invalidity.[78] While the construction of a patent claim is a "question solely of law," "subsidiary factfinding is sometimes necessary" if the patent "uses 'technical words or phrases not commonly understood,'" "giv[ing] rise to a factual dispute."[79] "[I]n that circumstance, the 'determination of the matter of fact'" must

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[73] Comput. Docking Station Corp. v. Dell, Inc., 519 F.3d 1366, 1379 (Fed. Cir. 2008) ("Prosecution disclaimer protects the rights of competitors to rely on representations made by the patentee during prosecution to guide their conduct.").

[74] Ross-Hime Designs, Inc. v. United States, 126 Fed. Cl. 299, 313 (2016) (citations omitted).

[75] *Phillips*, 415 F.3d at 1319. The standards surrounding the consideration for extrinsic evidence are discussed separately. *See infra* Section III.C.

[76] Advanced Aerospace Techs., Inc. v. United States, 122 Fed. Cl. 445, 458 (2015); Zodiac Pool Care, Inc. v. Hoffinger Indus., Inc., 206 F.3d 1408, 1414 (Fed. Cir. 2000).

[77] Markman v. Westview Instruments, Inc., 52 F.3d 967, 978 (Fed. Cir. 1995) ("The patent is a fully integrated written instrument . . . . It follows, therefore, from the general rule applicable to written instruments that a patent is uniquely suited for having its meaning and scope determined entirely by a court as a matter of law.").

[78] *See* Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc., 381 F.3d 1111, 1115 (Fed. Cir. 2004) (citations omitted).

[79] Teva Pharms. USA, Inc. v. Sandoz, Inc., 574 U.S. 318, 319, 326 (2015) (citations omitted).

naturally "'preced[e]' the 'function of construction'"[80] because "a factual finding may be close to dispositive of the ultimate legal question of the proper meaning of the term in the context of the patent."[81] "[E]ven where the construction of a term of art has 'evidentiary underpinnings,'" the entirety of the claim construction determination remains "exclusively" with the court.[82]

Claim construction may raise reliability concerns where: (i) "patent law is 'a field where so much depends upon familiarity with specific scientific problems and principles not usually contained in the general storehouse of knowledge and experience'";[83] (ii) "many cases that give rise to litigation . . . require[ ] examination of terms that have a particular meaning in a field of art"[84]; and (iii) "[a] judge is not usually a person conversant in the particular technical art involved and is not the hypothetical person skilled in the art to whom a patent is addressed."[85] The Federal Circuit has repeatedly recognized these inherent complexities that may arise in the claim construction process due to the nature of patent law.[86] The Court has also recognized that patent claim construction is most analogous to statutory interpretation, and consistent with that analogy, a patent claim can "only [have] one correct interpretation . . . that applies to all persons."[87] The Court subsequently concluded that a judge "trained in the law" is still best positioned to "analyze the text of the patent and its associated public record and apply the established rules of construction, and in that way arrive at the true and consistent scope of the patent owner's rights to be given legal effect"[88]—

[80] *Id.* at 326 (second alteration in original) (citations omitted).
[81] *Id.* at 333.
[82] *Id.* at 321 (citation omitted).
[83] *Id.* at 327 (quoting Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605, 610 (1950)).
[84] Phillips v. AWH Corp., 415 F.3d 1303, 1314 (Fed. Cir. 2005).
[85] Markman v. Westview Instruments, Inc., 52 F.3d 967, 986 (Fed. Cir. 1995).
[86] *Id.*; *Phillips*, 415 F.3d at 1314.
[87] *Markman*, 52 F.3d at 979, 987 (noting that patent claim construction should not be treated as a matter of fact, which "would at once deprive the inventor of the opportunity to obtain a permanent and universal definition of his rights under the patent[,] and in each case of infringement it would subject him to the danger of false interpretation, from the consequences of which he could not escape").
[88] *Id.* at 979 (citations omitted).

ensuring consistency with the "fundamental principle of American law that 'the construction of a written evidence [remains] exclusively with[ ] the court.'"[89] However, to construe the meaning of words as one of ordinary skill in the art would understand those words in the context of the patent—i.e., one who is familiar with the technical art and the patent—a judge that often lacks familiarity in the technical art must gain the necessary familiarity in order "'to place [them]self in the shoes of a person of ordinary skill in the art' reading the claims alongside the rest of the specification."[90] To gain that familiarity, a judge may consult extrinsic evidence.[91]

C. Circumstances Surrounding a Court's Consideration of Extrinsic Evidence

The role of extrinsic sources in interpreting patent claims has been a source of debate at the Federal Circuit.[92] The Court has consistently acknowledged that the technical complexities of patent law necessitate discretion for the district court to consider extrinsic evidence.[93] The circumstances surrounding a court's permissible consideration of extrinsic evidence have not been consistently stated. For example, in some cases, the Court has said it can only look to extrinsic evidence if the claims are still ambiguous after considering the intrinsic evidence.[94] In other cases, the Court has authorized the consideration of extrinsic evidence "if the court deems it helpful" in its determination.[95] Unfortunately, there is no discussion regarding the synonymity of "ambiguous" and "helpful" (the "synonymity question"), and the Court does not provide a clear

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[89] *Id.* at 978 (citations omitted).

[90] Astrazeneca AB v. Mutual Pharm. Co., Inc., 384 F.3d 1333, 1337 (Fed. Cir. 2004) (citation omitted).

[91] *See infra* Section III.C (discussing the circumstances surrounding a court's consideration of extrinsic evidence).

[92] *See, e.g.*, *Astrazeneca*, 384 F.3d at 1337 (citations omitted); Tex. Digit. Sys., Inc. v. Telegenix, Inc., 308 F.3d 1193, 1202–04 (Fed. Cir. 2002); Phillips v. AWH Corp., 415 F.3d 1303, 1319 (Fed. Cir. 2005).

[93] *Phillips*, 415 F.3d at 1319.

[94] *See, e.g.*, Ross-Hime Designs, Inc. v. United States, 126 Fed. Cl. 299, 313 (2016) (citation omitted).

[95] *See, e.g.*, *Phillips*, 415 F.3d at 1318; Markman v. Westview Instruments, Inc., 52 F.3d 967, 980 (Fed. Cir. 1995).

reconciliation regarding the conditionality of the Court's consideration of extrinsic evidence (the "conditionality requirement").[96] Naturally, the standard for using extrinsic evidence represents an important consideration when analyzing whether a new (to patent law) extrinsic source is applicable and useful. Thus, this Article reviews the Federal Circuit's approach to claim construction and offers a clarifying opinion regarding when to consider extrinsic evidence.[97]

1. The Federal Circuit's Consideration of Extrinsic Evidence

Historically, the Federal Circuit has always considered the intrinsic evidence when construing patent claims, but the emphasis placed on the evidence was not always consistent. In *Texas Digital Systems, Inc. v. Telegenix, Inc.*,[98] the Court placed "greater emphasis [on] dictionary definitions of claim terms" and "assigned a less prominent role to the specification and the prosecution history."[99] The Court saw dictionaries, encyclopedias, and treatises as "objective resources that serve as reliable sources of information on the established meanings that would have been attributed to the terms of the claims by those of skill in the art."[100] The Court consulted the intrinsic record after considering these extrinsic sources, claiming a "presumption in favor of a dictionary definition."[101]

The Federal Circuit largely repudiated this line of cases in *Phillips v. AWH Corp.*, where the Court rejected the *Texas Digital* methodology that permitted review of the intrinsic record "only after a determination is made . . . as to the ordinary meaning or meanings of the claim term in dispute" based on the extrinsic evidence.[102] The

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[96] The "conditionality requirement" refers to the "only after," "only when," "only if" kind of language incorporated into the rule for considering intrinsic or extrinsic evidence.

[97] It is this standard that the Authors apply to their assessment regarding the availability and usefulness of corpus linguistics as an additional extrinsic source in claim construction.

[98] Tex. Digit. Sys., Inc. v. Telegenix, Inc., 308 F.3d 1193 (Fed. Cir. 2002).

[99] *Phillips*, 415 F.3d at 1319 (discussing *Tex. Digit. Sys.*, 308 F.3d at 1193).

[100] *Tex. Digit. Sys.*, 308 F.3d at 1202–03.

[101] *Id.* at 1204.

[102] *Phillips*, 415 F.3d at 1320.

Phillips court cautioned against relying too heavily on extrinsic sources that "focus[ ] the inquiry on the abstract meaning of words rather than on the meaning of claim terms within the context of the patent,"[103] thereby risking "change [to] the meaning of claims in derogation of the 'indisputable public records consisting of the claims, the specification and the prosecution history'" and "undermining the public notice function of patents."[104] In other words, the *Texas Digital* methodology "entirely divorced [an adopted dictionary definition] from the context of the written description."[105] Without context, the court greatly risks construing claims in a manner that is contrary to the claim construction standard—i.e., using the PHOSITA as "an objective baseline"[106]—and contrary to the patentability statute requiring enablement—i.e., describing the invention "in such full, clear, concise, and exact terms as to enable any person skilled in the art" to make or use the same.[107] The *Phillips* court ultimately concluded that district courts maintain the discretion to admit and use extrinsic evidence because "extrinsic evidence may be useful," but warned that they "should keep in mind the flaws inherent in each type of evidence and assess that evidence accordingly."[108] "Under this approach to claim construction, evidence extrinsic to the patent is useful insofar as it 'can shed useful light on the relevant art—and thus better allow a court to place itself in the shoes of a person of ordinary skill in the art' reading the claims alongside the rest of the specification."[109]

The *Phillips* court eliminated one split in the case law regarding the consideration of extrinsic evidence: the option to review extrinsic evidence first.[110] Yet, the Court did not clearly repudiate the inverse conditionality requirement, mandating intrinsic evidence to be "ambiguous" prior to considering extrinsic evidence.[111] The

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[103] *Id.* at 1321.
[104] *Id.* at 1318–19 (citations omitted).
[105] *Id.* at 1321.
[106] *Id.* at 1313.
[107] 35 U.S.C. § 112(a).
[108] *Phillips*, 415 F.3d at 1319.
[109] Astrazeneca AB v. Mut. Pharm. Co., 384 F.3d 1333, 1337 (Fed. Cir. 2004) (citation omitted).
[110] *Phillips*, 415 F.3d at 1319–24.
[111] *Id.*

Court also did not determine whether "ambiguous" can be synonymous with terms like "helpful" or "useful"—all of which are adjectives used in case descriptions of the standard for considering extrinsic evidence.[112] At a glance, this ambiguity is problematic and may even offer some insight into some inconsistencies identified in the evidentiary analysis for claim construction, as well as the ultimate construction of claim terms. However, a review of the case law demonstrates that the inconsistencies identified in these standards are not contradictory and actually rely on the same underlying principles, thereby offering clarity as to the correct standard for considering extrinsic evidence during the claim construction determination.

2. When Extrinsic Evidence May Be Considered

The conditionality requirement does not mean extrinsic evidence can only be considered after a determination that the intrinsic evidence is ambiguous. The Federal Circuit has previously noted that its "strong cautionary statements on the proper *use* of extrinsic evidence . . . might be misread by some members of the bar as restricting a trial court's ability to *hear* such evidence."[113] The Court did clarify that, "[t]o the contrary, trial courts generally can hear expert testimony for background and education on the technology implicated by the presented claim construction issues."[114] However, the Court somewhat muddles this clarification by also stating that the district court can only "hear[ ] and rely[ ] on expert testimony on an ultimate claim construction question in cases in which the intrinsic evidence . . . does not answer the question."[115] The Court's inconsistent clarification can be problematic because the court must often rely on extrinsic evidence "for background and education on the technology implicated by the presented claim construction issues" in order to determine whether the claim terms (after a review of the intrinsic evidence) are ambiguous from the

[112] *See, e.g.*, Ross-Hime Designs, Inc. v. United States, 126 Fed. Cl. 299, 313 (2016); *Phillips*, 415 F.3d at 1319; *Astrazeneca*, 384 F.3d at 1337.

[113] Key Pharms. v. Hercon Lab'ys Corp., 161 F.3d 709, 716 (Fed. Cir. 1998) (emphases in original).

[114] *Id.*

[115] *Id.*

correct "objective baseline."[116] That is, the district court has the duty to construe patent claims—which includes determining whether there is ambiguity—as a judge would have understood the claims at the time of the invention. Yet, a judge "is not the hypothetical person skilled in the art to whom a patent is addressed."[117] In that situation, it is highly likely that a review of the intrinsic evidence—without reliance on extrinsic evidence providing the judge with the necessary technical familiarity—will have an apparent ambiguity because there is insufficient context to determine the meaning of the claim, unless: i) "the specification . . . reveal[s] a special definition . . . to a claim term by the patentee that differs from the meaning it would otherwise possess"; or ii) the term has only one meaning regardless of context.[118] This is not to say that the specification does not provide the necessary context to determine the term's meaning, nor to say that the intrinsic evidence is generally ambiguous,[119] but to say that a judge does not have sufficient context "to place itself in the shoes of a person of ordinary skill in the art" to understand the meaning of "the claims alongside the rest of the specification."[120] That is, again, because a judge "is not the hypothetical person skilled in the art to whom a patent is addressed."[121] Thus, even selecting one of two available meanings of a term based on a reading of the patent, without reliance on at least some extrinsic evidence poses a risk, that a judge will construe the term based on his subjective intuition of the correct meaning when he is unfamiliar with or "not . . . conversant in the particular technical art involved."[122] That risk is inconsistent with the Federal Circuit's endorsement to hear extrinsic evidence "for background and education on the technology

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[116] *Id.*; *Phillips*, 415 F.3d at 1313.

[117] Markman v. Westview Instruments, Inc., 52 F.3d 967, 986 (Fed. Cir. 1995).

[118] *Phillips*, 415 F.3d at 1316.

[119] Most likely, the intrinsic evidence is not ambiguous. And it should not be ambiguous in light of Section 112's definiteness and enablement requirements. But that does not mean there are not apparent ambiguities since patents are written for those having ordinary skill in the art, not judges.

[120] Astrazeneca AB v. Mut. Pharm. Co., 384 F.3d 1333, 1337 (Fed. Cir. 2004) (citation omitted).

[121] *Markman*, 52 F.3d at 986.

[122] *Id.*

implicated."[123] For these reasons, this Article argues that the Federal Circuit's somewhat muddled clarification was offering an implicit distinction between "background and education on the technology implicated" and "ultimate claim construction question" in its application of the conditionality requirement.[124] This Article construes the conditionality requirement (and necessarily the procedural consideration of extrinsic evidence) as follows:

1) The court may always consider extrinsic evidence that "better allow[s] [the] court to place itself in the shoes of a person of ordinary skill in the art reading the claims alongside the rest of the specification."[125] Informed by the extrinsic evidence necessary to place itself in the shoes of the PHOSITA, the court reviews the intrinsic evidence to determine the ordinary meaning of the claims from his PHOSITA perspective.
2) If a term is still ambiguous after review of the intrinsic evidence (informed by the extrinsic evidence necessary to make this consideration from the correct PHOSITA perspective), then the court may consider additional extrinsic evidence to resolve the ambiguity and reach the "ultimate claim construction question."[126]

This Article argues this construction is consistent with the Federal Circuit's standard and simply offers some clarification. Ultimately, "[w]hat is disapproved of is an attempt to use extrinsic evidence to arrive at a claim construction that is clearly at odds with the claim construction mandated by . . . the written record of the patent."[127] The claim construction mandated by the written record of the patent must always be from the perspective of the PHOSITA that is presumed to have read the patent. Thus, the perspective of the PHOSITA must inform the judge's reading of the patent. The judge must be sufficiently familiar with the "background and education on

[123] Key Pharms. v. Hercon Lab'ys. Corp., 161 F.3d 709, 716 (Fed. Cir. 1998).
[124] *Id.*
[125] *Astrazeneca*, 384 F.3d at 1337 (citation omitted).
[126] *Key Pharms.*, 161 F.3d at 716.
[127] *Id.* (citations omitted).

the technology implicated"[128] in order to acquire the perspective of the PHOSITA, often relying on extrinsic evidence, and that step must naturally precede the judge's reading of the patent. Extrinsic evidence can accordingly be considered prior to an ambiguity determination on the intrinsic evidence.

This Article's construction of the conditionality requirement also resolves the synonymity question because the "ambiguity" language must be understood in context of the rules to consider extrinsic evidence. Reviewed in context, the Federal Circuit implicitly refers to two separate ambiguities that arise based on the two-step process for considering extrinsic evidence (now clarified in this Article's construction of the conditionality requirement): i) the ambiguity that arises because a judge is unfamiliar with and "not . . . conversant in the particular technical art involved";[129] and ii) the ambiguity that cannot be resolved from the PHOSITA's reading of the patent.[130] The first ambiguity is resolved by the court's review and reliance upon the evidence necessary to "better allow [the] court to place itself in the shoes . . . of ordinary skill in the art."[131] Here, the first ambiguity is called an "apparent ambiguity." An apparent ambiguity refers to a "text [or claim term] [that] at first blush appears susceptible to more than one interpretation," but actually "has only one correct linguistic meaning, though that correct meaning may be difficult to discern."[132] "[S]uch ambiguities can be resolved if we have the right contextual evidence available . . . ."[133] Under this understanding of the first (apparent) ambiguity, the construction of the conditionality requirement permits the court to consider the "contextual evidence"[134] that "better allow[s] [the] court to place itself in the shoes of a person of ordinary skill in the art [to whom the patent is addressed]"[135]—which is the

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[128] *Id.*

[129] Markman v. Westview Instruments, Inc., 52 F.3d 967, 986 (Fed. Cir. 1995).

[130] *Key Pharms.*, 161 F.3d at 716.

[131] Astrazeneca AB v. Mutual, 384 F.3d 1333, 1337 (Fed. Cir. 2004) (citation omitted).

[132] Chiang & Solum, *supra* note 2, at 549.

[133] *Id.* at 550.

[134] *Id.*

[135] *Astrazeneca*, 384 F.3d at 1337 (citation omitted).

same permitted consideration the court has applied when using the "useful" language[136] and substantially similar to the "helpful" language the court has also implemented, therefore permitting the synonymity of these terms.[137]

This understanding and approach find further support in the Federal Circuit's discussion of ambiguity in *Markman v. Westview Instruments*.[138] In this case, the Court noted that "ideally there should be no 'ambiguity' in claim language to one of ordinary skill in the art that would require resort to evidence outside the specification and prosecution history."[139] The Court's discussion is because "the patent's claims [should be] sufficiently unambiguous for the PTO" to issue a patent, and, therefore, "there should exist no factual ambiguity when those claims are later construed by a court of law in an infringement action."[140] The Court noted that extrinsic evidence may still be necessary, however, "this evidence is not for the purpose of clarifying ambiguity in claim terminology. It is not ambiguity in the document that creates the need for extrinsic evidence but rather unfamiliarity of the court with the terminology of the art to which the patent is addressed."[141] In other words, the extrinsic evidence is needed to provide the right contextual evidence to clarify an apparent ambiguity—i.e., the correct interpretation of a term in the context of one familiar with "terminology of the art to which the patent is addressed."[142]

The second ambiguity does not impact the compatibility of the construction of the conditionality requirement and the Federal Circuit's potentially inconsistent iterations of the standard for considering extrinsic evidence.[143] However, there is brief discussion of this ambiguity as it is ultimately relevant to this Article's proposal

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[136] *See id.* (citation omitted).

[137] Phillips v. AWH Corp., 415 F.3d 1303, 1319 (Fed. Cir. 2005) (recognizing a court's discretion to consider extrinsic evidence that "help[s] educate the court regarding the field of invention and [that] help[s] the court determine what a person of ordinary skill in the art would understand claim terms to mean.").

[138] Markman v. Westview Instruments, Inc., 52 F.3d 967, 986 (Fed. Cir. 1995).

[139] *Id.*

[140] *Id.*

[141] *Id.*

[142] *Id.*

[143] Key Pharms. v. Hercon Laby's. Corp., 161 F.3d 709, 716 (Fed. Cir. 1998).

to incorporate corpus linguistic tools into the available extrinsic sources to consider in claim construction. The second ambiguity is most likely resolved by the court's review and reliance upon the extrinsic evidence that would have been available to and considered by the PHOSITA, if the PHOSITA's reading of the intrinsic evidence resulted in more than one interpretation of a claim term.[144] Thus, the second ambiguity may also be an apparent ambiguity that simply requires the court to consider those sources that would have been available to the PHOSITA that would provide the contextual extrinsic evidence necessary to resolve a term's ambiguity.[145] Yet, the second ambiguity may not necessarily be resolved with "the right contextual evidence available . . . ."[146] Should such a circumstance occur, then the claim's ambiguity would not enable a PHOSITA to make or use the invention and would, therefore, result in the invalidation of the claim.[147]

In sum, the court may consider extrinsic evidence on two occasions. First, the court may review and rely on any contextual evidence that will better allow the court to place itself in the shoes of the PHOSITA that is presumed to have read the patent. Second, the court may consider additional extrinsic evidence that would have been available to the PHOSITA only if the court's reading of the patent and prosecution history from the PHOSITA's perspective results in more than one interpretation of a claim term.

D. Evidentiary Shortcomings of Existing Extrinsic Sources

Despite the important role extrinsic evidence plays in ensuring a consistent application of the claim construction standard—i.e., ensuring that judges have the contextual evidence necessary to determine the ordinary meaning of a claim term in the context of a patent as a PHOSITA would read that patent—the existing extrinsic sources offer minimal, if any, guidance to the credibility and reliability of the sources considered. These sources are viewed "in general as less reliable than the patent and its prosecution history in

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[144] *Id.*
[145] *Id.*
[146] Chiang & Solum, *supra* note 2, at 550.
[147] *Key Pharms.*, 161 F.3d at 716.

determining how to read claim terms . . . ."[148] This perception is because: i) "extrinsic evidence by definition is not part of the patent and does not have the specification's virtue of being created at the time of patent prosecution for the purpose of explaining the patent's scope and meaning"; ii) "extrinsic publications may not be written by or for [the] skilled artisans and therefore may not reflect the understanding of a skilled artisan in the field of the patent"; iii) "expert reports and testimony [are] generated at the time of and for the purpose of litigation and thus can suffer from bias that is not present in intrinsic evidence"; iv) "there is a virtually unbounded universe of potential extrinsic evidence of some marginal relevance that could be brought to bear on any claim construction question" and "each party will naturally choose the pieces of extrinsic evidence most favorable to its cause, leaving the court with the considerable task of filtering the useful extrinsic evidence from the fluff"; and v) "undue reliance on extrinsic evidence poses the risk that it will be used to change the meaning of claim terms in derogation of the [intrinsic record], thereby undermining the public notice function of patents."[149]

The Federal Circuit has cautioned courts to "keep in mind the flaws inherent in each type of evidence and assess the evidence accordingly" when using extrinsic evidence to assess the ordinary meaning of claim terms.[150] The Court's concerns are valid when considering the existing extrinsic sources relied upon in claim construction proceedings. However, the flaws recognized by the Court were premised not on the conceptual value of extrinsic evidence as a whole, but on the particular risks of relying on extrinsic sources that lack objective indicators of meaning when construing claim terms within the context of the patent. In other words, the existing extrinsic sources risk separating the meaning of words from the context of the patent because these sources "focus[ ] the inquiry on the abstract meaning of words."[151] Moreover, where existing extrinsic sources provide two (or more) interpretations of the same claim term, the court risks construing the claims based on

[148] Phillips v. AWH Corp., 415 F.3d 1303, 1318 (Fed. Cir. 2005).
[149] *Id.* at 1318–19.
[150] *Id.* at 1319.
[151] *Id.* at 1321.

"human linguistic intuition alone," despite lacking the "linguistic intuition" of the PHOSITA—which may still result in unreliable construction—let alone having any certain methodology to objectively determine the linguistic meaning of the PHOSITA. That human linguistic intuition, even in a non-technical field, is often unreliable.[152] However, in patent law, where a judge does not typically represent the hypothetical person's ordinary skill in the technical field, the reliability problem is exacerbated because judges must often choose between cherry-picked extrinsic evidence that is not representative of the technical field as a whole, and must make credibility determinations regarding that evidence.[153]

This Article briefly reviews the risks of unreliable claim construction resulting from the flaws inherent in the existing extrinsic sources. These sources can be divided into two categories: 1) publicly available written resources that offer "linguistically permissible" meanings of words in the abstract; and 2) subjective testimony that does not reliably represent the PHOSITA's understanding of claim terms.[154]

1. Dictionaries, Encyclopedias, and Treatises

"[W]hile dictionaries are a good starting point, when faced with dueling plausible meanings, dictionaries cannot solve the dilemma of ambiguity because they only tell whether 'a particular meaning is linguistically permissible,' not whether it is ordinary."[155] This concern was recognized in *Phillips v. AWH Corp.*[156] In that case, the Court explained that "[d]ictionaries, by their nature, provide an

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[152] *Cf.* Lee & Phillips, *supra* note 15, at 289 ("So our intuitions are likely to be affected by our biases 'about what the constitutional language "ought to mean."' 'The influence of these beliefs on [judicial] intuitions may not be fully transparent;' in other words [judges] may have strong beliefs about what the constitutional language 'ought to mean,' and thus 'not recognize the role of their own biases and preconceptions.'" (alterations in original) (citation omitted)).

[153] *Phillips*, 415 F.3d at 1318–19 (citations omitted).

[154] Phillips et al., *supra* note 8, at 23. *See* Markman v. Westview Instruments, Inc., 52 F.3d 967, 985 (Fed. Cir. 1995); *Phillips*, 415 F.3d at 1318–19 (citations omitted).

[155] Phillips et al., *supra* note 8, at 23.

[156] *Phillips*, 415 F.3d at 1321.

expansive array of definitions."[157] Thus, "[a] claim should not rise or fall based upon the preferences of a particular dictionary editor, or the court's independent decision, uninformed by the specification, to rely on one dictionary rather than another."[158] In other words, dictionary definitions offer an "expansive array" of permissible meanings in the abstract and subsequently leave a judge—not skilled in the art—to rely on his intuition to determine which meaning represents the "ordinary meaning" as one of ordinary skill in the art would have understood a term in the context of a patent.[159] There is a risk of "transforming the meaning of the claim term to the [PHOSITA] into the meaning of the term in the abstract, out of its particular context, which is the specification" when a court relies "on the dictionary divorced from the intrinsic evidence."[160] It is agreed that ensuring the term's meaning within the context of the patent is a priority.[161] "Context matters, and dictionaries . . . do not capture context and phrasal meanings."[162] Moreover, the contextual evidence necessary to ensure a reliable interpretation of a term's ordinary meaning is not limited to the patent.[163] It also requires the court to consider the term's meaning in the contextual perspective—or objective baseline—of the PHOSITA.[164] For these reasons, a dictionary alone rarely provides the contextual evidence necessary for the court to determine the linguistic meaning of the claim terms.[165] Substantially similar reasonings likewise apply to encyclopedias and treatises because these extrinsic sources do not identify the ordinary meaning from the PHOSITA's perspective, but instead offer the permissible linguistic meanings of terms.[166]

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[157] *Id.*
[158] *Id.* at 1322.
[159] *Id.* at 1321.
[160] *Id.*
[161] *Id.*
[162] Phillips et al., *supra* note 8, at 23.
[163] *See Phillips*, 415 F.3d at 1313.
[164] *Id.*
[165] *Id.* at 1318–19.
[166] *Id.*

2. Inventor and Expert Testimony

Inventor and expert testimony are often not reliable when determining the ordinary meaning of claim terms.[167] Concerning inventor testimony, it may be influenced by motives to construe claims as broadly as possible to incorporate the accused infringing products.[168] The bias inherently incorporated into an inventor's testimony substantially overrides any credibility that may be attributed to their understanding of the claim terms.[169] More importantly, the inventor does not often represent an objective starting point for determining how the PHOSITA would understand the claim terms, which is in part due to its subjective motives, but also due to the misconception that that patentee's understanding of the terms has any relevance.[170] The court has expressly discounted the subjective views of the patentee and the PTO.[171] Thus, inventor testimony is often unreliable without the addition of other extrinsic evidence that may offer credibility to such testimony.[172]

Expert testimony is often more constructive because experts are skilled in the art and do not possess the same incentives as do inventors, but experts are hired by parties to advance the interests of that party.[173] While experts might appear more objective, that is not always the case. Moreover, even the most objective expert, who seeks to create a reputation for unbiased testimony, is merely one person. His or her expert testimony reveals one PHOSITA's opinion regarding the meaning of a term, and thus only one person's intuition regarding the proper construction.[174]

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[167] *See* Markman v. Westview Instruments, Inc., 52 F.3d 967, 985–86 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370 (1996) (citations omitted).

[168] *See* SkinMedica, Inc. v. Histogen Inc., 727 F.3d 1187, 1205 (Fed. Cir. 2013) (citation omitted).

[169] *Id.* at 1195 (citation omitted).

[170] *Markman*, 52 F.3d at 985 (citation omitted). *See Phillips*, 415 F.3d at 1318–19 (citations omitted).

[171] *Markman*, 52 F.3d at 985 (citation omitted). *See Phillips*, 415 F.3d at 1318–19 (citations omitted).

[172] *See Markman*, 52 F.3d at 985 (citation omitted). *See Phillips*, 415 F.3d at 1318–19 (citations omitted).

[173] Moba, B.V. v. Diamond Automation, Inc., 325 F.3d 1306, 1315 (Fed. Cir. 2003) (citations omitted).

[174] *See Phillips*, 415 F.3d at 1318–19.

E. The Need for Linguistic Tools in Claim Construction

"[T]he best indicator of claim meaning is its usage in context as understood by one of skill in the art at the time of invention."[175] This means that the court must first become sufficiently familiar with the technical field to place itself into the shoes of one of skill in the art at the time of the invention.[176] Then, the court must determine the meaning of claim terms as they are used in context, beginning with the specification, and subsequently considering the relevant extrinsic evidence that would have been available to the PHOSITA if additional contextual evidence is necessary.[177] To do so reliably, the court must assess the dependability of the extrinsic evidence considered—i.e., the court must emphasize the objectivity and context of all extrinsic sources considered when determining the ordinary meaning of claim terms.[178] However, as discussed above, the existing extrinsic sources often lack the objectivity and context necessary to ensure the reliability of extrinsic evidence considered when construing patent claims.[179] For this reason, there is a need for additional linguistic tools in claim construction to aid courts in objectively choosing contextual evidence that will enlighten the court as to the meaning of claim terms as understood by the PHOSITA to whom the patent is addressed.[180] This Article proposes the use of corpus linguistics to guide the court to a more reliable construction of the claim terms as one of ordinary skill in the art would have understood those terms in the context of the patent.[181]

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[175] *Moba*, 325 F.3d at 1315 (citations omitted).
[176] *See id.*
[177] *See id.*
[178] *See id.*
[179] *See id.*
[180] *See id.*
[181] *See infra* Sections IV.A.2, IV.B (providing more details about why available corpus linguistic tools are useful and reliable in a claim construction determination).

IV. CORPUS LINGUISTICS

A. What Is Corpus Linguistics?

Corpus linguistics, at base, is a tool to analyze language usage.[182] This tool is an empirical approach to "the study of language (linguistics) through systematic analysis of data derived from large databases of naturally occurring language (*corpora*, the plural of *corpus*, a body of language)."[183] Unlike qualitative methods of determining word meaning, such as consulting dictionaries and analyzing isolated print examples of words or phrases, corpus linguistics is a quantitative linguistic methodology.[184] The data contained in a linguistic corpus allows "legal interpreters to look for meaning in the surrounding linguistic context of an utterance" in a systematic manner and "to gain meaningful and *quantifiable* insight about the range of possible uses of a word and the frequency of its different senses."[185] In other words, corpus linguistics' research methodology facilitates the study of language function and use through the analysis of large quantities of language.[186] The words contained in corpora occur naturally, meaning that they were produced in everyday speech or writings.[187] Some corpora contain millions or even billions of words written in newspapers, magazines, trade or academic journals, and fiction books.[188] Other corpora are more targeted, as discussed below, containing only those texts that exhibit the same characteristics as the language being studied (i.e., technical or scientific texts for interpretation of technical terms).

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[182] *See* Lee & Phillips, *supra* note 15, at 289.

[183] *See id.*

[184] Corpus linguistics is quantitative in nature in the sense that linguists use the methodology to analyze a large quantity of data through a randomized sample of a particular word or phrase. However, much of the corpus linguistics data must be analyzed in a non-statistical manner somewhat paralleling qualitative research methods.

[185] Lee & Mouritsen, *supra* note 16, at 832 (emphasis added) (citation omitted).

[186] DOUGLAS BIBER, THE OXFORD HANDBOOK OF LINGUISTIC ANALYSIS 159 (Bernd Heine & Heiko Narrog eds., 2009).

[187] *See* Lee & Mouritsen, *supra* note 16, at 795.

[188] Lee & Phillips, *supra* note 15, at 290; CORPUS OF CONTEMPORARY AMERICAN ENGLISH, https://www.english-corpora.org/coca/ [https://perma.cc/BA5U-2GJR].

1. Corpora

Generalized corpora are typically large corpora that are collected in an attempt to represent a "broad (often national) speech community."[189] Examples include American English, British English, and newspaper writing on the internet.[190] These corpora tend to collect massive amounts of texts in popular registers of their domain (e.g., academic publications, newspaper articles, popular fiction, etc.) and are useful for examinations targeted at answering broad research questions.[191] These corpora should be examined closely to determine if the included texts truly represent the target population. While these corpora are impressively large Corpus of Contemporary American English ("COCA") is now over one billion words in size, they do not accurately represent every language domain.[192] To clarify, though COCA could be useful in attempting to understand the general use of a term, it would not be the best corpus to determine how American slang is used in California.

Specialized corpora are corpora designed to answer specific research questions and represent specialized populations (e.g., Founding Era English, abstracts written in English by native Chinese speakers, aeronautical engineering texts, etc.).[193] This type of corpora, in contrast to generalized corpora, would be best to determine how American slang is used in California. In specialized corpora, it is likely to find texts that are more specific than those contained in a generalized corpus (e.g., tweets sent by Donald Trump since 2015). Specialized corpora are typically created on a case-by-case basis and are not as openly available as generalized corpora tend to be.[194] Contrary to popular belief, specialized corpora

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[189] Lee & Mouritsen, *supra* note 16, at 830.

[190] *Id.* at 830–31.

[191] *See id.* at 828–29.

[192] *See* Stephen C. Mouritsen, *The Dictionary Is Not a Fortress: Definitional Fallacies and a Corpus-Based Approach to Plain Meaning,* 2010 BYU L. REV. 1915, 1956 (2010) (explaining that sample texts "must contain speech and text from the linguistic community which [they] purport[ ] to represent").

[193] *See* RANDI REPPEN, THE ROUTLEDGE HANDBOOK OF CORPUS LINGUISTICS 32 (Anne O'Keeffe & Michael McCarthy eds., 2012).

[194] JESSE EGBERT, TOVE LARSSON, & DOUGLAS BIBER, DOING LINGUISTICS WITH A CORPUS: METHODOLOGICAL CONSIDERATIONS FOR THE EVERYDAY USER 172 (Susan Hunston ed., 2020).

are usually the most appropriate choice for answering research questions in corpus linguistics. They are not, however, as readily available or as user friendly as generalized corpora,[195] and thus are often overlooked.

2. Corpus Linguistic Tools

Corpus linguistic tools process data from a corpus that can be used to: (i) "measure the statistical *frequency* of words and word senses in a given speech community and over a given time period"; (ii) "show *collocation*, 'which is the tendency of words to be biased in the way they co-occur'"; and (iii) demonstrate "*concordance* . . . which allows [ ] users to review a particular word or phrase in hundreds of contexts, all on the same page of running text."[196]

There are many corpus linguistic tools, but for these purposes, the explanation is restricted to the few that will be pertinent to the examination. First, a corpus search for a particular word or phrase returns a random sample, avoiding the Federal Circuit's criticism of many extrinsic sources in that parties cannot "choose the pieces of extrinsic evidence most favorable to its cause, leaving the court with the considerable task of filtering the useful extrinsic evidence from the fluff."[197] Second, words in the corpus are tagged for grammatical content, which allows the user to search for (or compare) examples of, for instance, patent terms used in different grammatical senses.[198] Third, a corpus search allows a party to see each individual result in the context of its original sentence.[199] Depending on the user interface, a corpus will allow the user to view the 150 or more words surrounding the target words to assist in accurately determining the term's usage.[200] Fourth, corpora include tools to search for collocates.[201] Collocates are words most typically used in conjunction with the target term.[202] This tool is especially beneficial because the collocation shows "the tendency of words to be biased

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[195] *Id.*
[196] Lee & Mouritsen, *supra* note 16, at 831–32.
[197] Phillips v. AWH Corp, 415 F.3d 1303, 1318 (Fed. Cir. 2005).
[198] *Id.*
[199] *Id.*
[200] Lee & Mouritsen, *supra* note 16, at 831–32.
[201] *Id.*
[202] *Id.*

in the way they co-occur," thus, assisting in finding associations between words.[203] A collocation list "is therefore 'something of a short-cut to the information that could be obtained from concordance lines,' and may be used to confirm the data already extracted from the corpus."[204]

When constructing a specialized corpus, which will likely be necessary for many patent cases, other tools are available. These include part-of-speech ("POS") taggers, concordancers, and web scrapers.[205]

For parties hoping to construct their own corpus, for litigation or otherwise, the party may use a web scraper to begin.[206] A web scraper is a computer program that allows for automatic collection of texts from websites (e.g., automatic collection of patents from Google Patents).[207] Parties may also use AntConc, a particularly useful concordance program that allows a user to input their own corpus files to examine concordance lines, frequency data, collocations, and keywords.[208] This program uses concordancers, which are useful as they allow the user to examine the word of interest in all of the contexts in which it naturally occurs without having to manually identify the relevant locations.[209] Lastly, a party would use POS taggers, like the Biber Tagger, to automatically tag, in a constructed corpus, the part of speech (i.e., noun, verb, adjective) of a word as well as other grammatical information (i.e., compliment clause, action verb, etc.).[210] Thus, POS taggers make it

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[203] *Id.*

[204] *Id.*

[205] Laurence Anthony, *A Critical Look at Software Tools in Corpus Linguistics*, 30 LINGUSTIC RSCH. 144, 147, 152 (2013).

[206] *See* Wolfram Bartussek, *Building Concise Text Corpora from Web Contents*, RESEARCHGATE 2 (2018), https://www.researchgate.net/publication/324508522_Building_Concise_Text_Corpora_from_Web_Contents [https://perma.cc/22ES-WNUV].

[207] *Id.*

[208] *See Concordancing with AntConc: An introduction to tools and techniques in corpus linguistics*, JACET NEWSLETTER ISSUE 55, at 2085 (2006).

[209] *Id.*

[210] Bethany Gray, *Tagging and Counting Linguistic Features for Multi-Dimensional Analysis*, *in* MULTI-DIMENSIONAL ANALYSIS: RESEARCH METHODS

possible to grammatically analyze large bodies of texts and understand the behaviors of individual words.[211] All of these tools are imperative to creating and analyzing a corpus, as they make it possible to examine features of interest (here, meanings of a word) in relatively short amounts of time.[212]

B. The Theoretical Case for Using Corpus Linguistics in Claim Construction

The claim construction standard aims to interpret claims as would a person having "ordinary skill in the art."[213] Granted, patents disclose an invention to the public, but a patent's principal purpose is to give notice to potential competitors (and other inventors) of the exact scope of the patentee's monopoly.[214] For this reason, courts endeavor to interpret patent claims in a manner consistent with how a potential competitor or inventor, skilled in the same field of inquiry, would interpret the scope of the patent's claims.[215]

Judges, who are tasked with interpreting patent claims as if they were a PHOSITA, can rarely rely on personal knowledge regarding the inventive field, and it would be nearly impossible for a judge to gain sufficient familiarity with the subject matter to obtain PHOSITA perspective during the pendency of a case. It is therefore imperative that courts employ objective tools for discovering meaning so as not to give a patent broader or narrower scope than those in the industry would ascribe to the invention.

Corpus linguistics could fill the void. Corpus linguistics has many characteristics that allow it to be an objective tool on which courts can rely in construing claims, the scope of which could impact an entire industry. Granted, corpus linguistics will not be dispositive in every (or even any) case, but the advantages of using corpus linguistics over other forms of extrinsic evidence are too numerous to ignore.

AND CURRENT ISSUES 43, 44–45 (Tony Berber Sardinha & Marcia Veirano Pinto eds., 2019).

[211] *Id.*

[212] *Id.*

[213] 35 U.S.C. § 103.

[214] *See* Phillips v. AWH Corp., 415 F.3d 1303, 1313 (Fed. Cir. 2005).

[215] *Id.*

Using corpora, for instance, is transparent. Corpus linguistics analysis is not done in a black box, and parties' counsel and experts have complete access to the results of any corpus analysis. The results and methodology would be subject to critique and cross-examination in a way not possible with using dictionaries and other extrinsic evidence. When parties construct their own specialized corpus, the chosen methodology—how two parties chose the sources, the representativeness of these sources, the size of the corpus, and all other aspects—would also be subject to cross-examination and potentially expert testimony.

Beyond the advantages of using a specialized corpus with representative samples of texts written by and for skilled artisans, corpus analyses in the patent context bring the benefits present in all corpus searches, such as:

- Results are randomized, so the court can more confidently conclude that each party has not proffered cherry-picked "extrinsic evidence most favorable to its cause."[216]
- Courts are not required to determine the meaning of patent claims, relying solely on "human linguistic intuition alone,"[217] weighing the credibility of existing extrinsic sources that only define claim terms in the abstract. Courts can avoid "the considerable task of filtering the useful extrinsic evidence from the fluff" with only its subjective intuition about the usage and meaning of a term.[218]
- Corpus results return many examples, so courts can be more confident that isolated examples are not ideocratic usages of a term.
- Corpus analyses can search for complete phrases.
- Examples of usage in corpora are real life examples in context.

In sum, corpus linguistics offers courts the ability to consider qualitatively how the majority of those in the inventive field use a particular term. Further, corpus linguistics allows courts to gain

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[216] *Id.* at 1318–19 (citations omitted).
[217] Lee & Mouritsen, *supra* note 16, at 831.
[218] *Phillips*, 415 F.3d at 1318–19 (citations omitted).

insight into how a PHOSITA would view the patent monopoly, which assists the court in applying the standard to interpret patent terms "as understood by one of skill in the art."[219]

As corpus linguists have shown, the intuition when it comes to language use is surprisingly inaccurate and unreliable.[220] Thus, methods such as corpus linguistics and tools such as corpora are extremely valuable in any field interested in the nature of authentic language use. Particularly, in law, corpus linguistics can be instrumental, as many cases hinge on determining the meaning of a word.[221] While dictionaries have been used to determine meaning in legal cases historically,[222] dictionaries have two major flaws: they cannot consider the use of a word in different contexts, and they cannot reliably provide the most common use of a word. Corpora, on the other hand, can be used to determine both how a word is used and how frequently a word is used in a specific manner. With corpora, one can obtain frequency counts of a word, determine how and how often a word is used across registers, examine a word in the natural contexts it occurred in, and obtain collocates, or words that frequently co-occur with the word of interest. Thus, with corpora, one can reliably determine not only the meaning of a word, but also the most common meaning.

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[219] Moba v. Diamond Automation, Inc., 325 F.3d 1306, 1315 (Fed. Cir. 2003) (citations omitted).

[220] Douglas Biber et al., *Corpus-based Approaches to Issues in Applied Linguistics*, 15 APPLIED LINGUISTICS, June 1, 1984, at 169, 169–189.

[221] *See, e.g.*, Int'l Rectifier Corp. v. IXYS Corp., 361 F.3d 1363 (Fed. Cir. 2004). *Cf.* Chiang & Solum, *supra* note 2, at 530 ("Linguistic ambiguity is believed to cause tremendous uncertainty about patent rights. Scholars and judges have accordingly devoted enormous attention to developing better linguistic tools to help courts understand patent claims."). Chiang and Solum contend, however, that lexical ambiguity does not play much of a role in patent claim construction; rather, judges construe terms to align with policy goals, "constructing" rather than "interpreting" patent claims. While Chiang and Solum provide some interesting insights into a court's process of interpreting (or, rather, constructing) patent terms, we are not persuaded that genuine issues of lexical ambiguity do not arise in patent law. Moreover, tools such as corpus linguistics may better assist courts to resolve lexical ambiguities so that courts need not resort to policy considerations.

[222] *See, e.g.*, Intex Recreation Corp. v. Metalast, S.A. Sociedad Unipersonal, 245 F. Supp. 2d 65, 65 (D.D.C. 2003).

C. General Corpus: Eon Corp. IP Holdings v. Silver Spring Networks

Courts are often tasked with determining the meaning of lexically ambiguous terms during patent claim construction. In many cases, the terms the court must construe are ordinary terms, terms not containing a technical or scientific meaning known only to those skilled in the art of the invention. One such case is *Eon Corporation IP Holdings v. Silver Spring Networks*.[223] In that case, Eon alleged that Silver Spring infringed three of Eon's patents related to "networks for two-way interactive communications."[224] These networks included local receivers that could be placed in locations where signals would be difficult to reach, including basements.

Eon's patent claims required that these local receivers, or "subscriber units," be "portable" or "mobile."[225] The two sides offered competing interpretations of these two words.[226] Since Silver Spring used small subscriber units in the manner specified by Eon's patent claims but attached these units to the side of buildings, it advanced a definition of *portable* and *mobile* that excluded Silver Spring's use.[227] It argued that the units must be "capable of being easily and conveniently moved from one location where the subscriber unit is operable to a second location where the subscriber unit is operable, and designed to operate without a fixed location."[228] Eon, unsurprisingly, held a broader view of its patent rights, arguing that the units merely needed to be "capable of being easily moved . . . but not that it actually has to move."[229] The one thing the parties agreed on was that "the terms 'portable' and 'mobile' carry the same meaning and can be construed the same."[230]

The district court declined to resolve the ambiguity, concluding solely that the terms "do not require construction because their

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[223] Eon Corp. IP Holdings v. Silver Spring Networks, 815 F.3d 1314, 1316 (Fed. Cir. 2016).
[224] *Id.*
[225] *Id.* at 1317.
[226] *Id*.
[227] *Id.*
[228] *Id.*
[229] *Id.* (alteration in original).
[230] *Id.* at 1317 n.1.

meanings are clear in the context of the claims and will be readily understandable to the jury."[231] The jury returned a verdict against Silver Spring, necessarily concluding that Silver Spring had infringed Eon's patents because the subscriber units Silver Spring utilized, which were small but attached to buildings, were portable or mobile.[232]

The Federal Circuit reversed.[233] The majority of the court found "that no reasonable jury could have found that Silver Spring's utility meters infringe the two remaining patents."[234] The majority construed the patent's terms to require a subscriber unit to be easily moved. The Court conceded that "[a]lthough the terms 'portable' and 'mobile' might theoretically, in the abstract, be given [a broader] meaning, they cannot be construed that way in the context" of the patents at issue.[235]

This Article sets out to test this conclusion empirically. First, it must be determined whether the parties (and the court) were correct in concluding that the terms "carry the same meaning and can be construed the same."[236] Second, it must be uncovered whether the terms could only "theoretically" be construed to reference any object capable of moving or whether such a usage was common or even the majority usage. For these purposes, the terms *mobile* and *portable* were examined, which are defined by dictionaries in the following way:

> **Mobile (adj.):** (1) able to move or be moved freely or easily (Google Dictionary)[237]; (2) capable of moving or being moved : MOVABLE // a *mobile* missile launcher // a *mobile* laboratory[238]
>
> **Portable (adj.):** (1) able to be easily carried or moved, especially because being of a lighter and smaller version than

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[231] *Id.* at 1317.
[232] *Id.* at 1318.
[233] *Id.*
[234] *Id.* at 1316.
[235] *Id.* at 1321.
[236] *Id.* at 1317 n.1.
[237] *Mobile*, GOOGLE, https://www.google.com/ [https://perma.cc/FC6K-M58C] (search for "mobile") (last visited Feb. 12, 2021).
[238] *Mobile*, *MERRIAM-WEBSTER.COM*, https://www.merriam-webster.com/dictionary/mobile [https://perma.cc/Q44W-W6ZU] (last visited Feb. 9, 2021).

usual[239]; (2) capable of being carried or moved about // a *portable* TV[240]

As shown by these definitions, the terms appear to share very similar meanings. Solely relying on these definitions, one could argue that the definitions are essentially the same, or that the definitions are subtly different. However, this Article hypothesizes that corpora may have shown that these two terms, though closely related in meaning, are in fact not synonymous. To test this hypothesis, the two terms must be searched in a general corpus of American English, COCA, to determine whether these terms demonstrate similar usage patterns.

1. Methods

a. The Corpus

The COCA was used to conduct this examination. COCA was selected as it is the only large, genre-balanced corpus of American English readily available.[241] While there are no claims that it is perfectly representative of American English, COCA is likely the most comprehensive and most commonly used corpora of American English.[242] COCA contains over one billion words divided equally among several genres, including "spoken, fiction, popular magazines, newspapers, [and] academic texts."[243] Additionally, the corpus is divided evenly over the years of 1990-2019.[244] These divisions are unimportant for our purposes, as this Article examines the above terms, *mobile* and *portable,* equally and fairly across the entire corpus. However, these divisions could be important to other inquiries, as they offer further explanations as to why a word is used in a specific manner.

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[239] *Portable*, GOOGLE, https://www.google.com/ [https://perma.cc/KYG4-3GNM] (search for "portable") (last visited Feb. 9, 2021).

[240] *Portable*, *MERRIAM-WEBSTER.COM*, https://www.merriam-webster.com/dictionary/portable [https://perma.cc/GZ4L-VJJP] (last visited Feb. 9, 2021).

[241] CORPUS OF CONTEMPORARY AMERICAN ENGLISH, *supra* note 188.

[242] *Id.*

[243] *Id.*

[244] *Id.*

b. The Searches

In this search, and all searches thereafter, *mobile* and *portable* will be tagged as adjectives, so results will be restricted to only generate how the terms are used in their adjectival forms. This restriction will avoid convolution with the usage of terms such as Mobile, Alabama, or a child's mobile. The initial step in determining whether *mobile* and *portable* are synonymous terms will be a general search of the two terms for the overall frequency and 100 randomly-generated concordance lines (the word in its authentic context). This information will be instrumental in the determination of how each term is used, as well as the commonality of the terms.

Next, the most common collocates of each term will be examined to help determine whether the terms contain nuanced differences in meaning. This examination will utilize the "collocates" tab on the COCA interface, which allows the user to examine the most common collocates individually as well as the frequency data for how commonly the collocates occur with the word of interest. In addition, the user can examine the word in context with the collocate for further understanding of how the word is used.

The last part of the examination will be a direct comparison between the collocates of the two terms. Using the "compare" tab on the COCA interface, this comparison will directly reveal the differences or similarities in the meaning and usage of the two terms. This feature will directly highlight the difference in collocations for the terms in a side-by-side chart comparison by determining the ratio of word one (in this case *mobile)* to word two (in this case *portable)*. If the words are indeed synonymous, some overlap in collocations would be expected.

2. Results

a. The General Search

The initial search revealed that the adjectival form of *mobile* occurs much more frequently in the corpus than the adjectival form of *portable*, with overall frequency counts of 10,245 and 5,747 respectively. While this search provides no conclusive results, the search does suggest that *mobile* may have a more versatile use than

portable. Next, 100 "randomly sample[d] concordance lines" of each term were collected. See Tables 1 and 2 below.

Table 1. *Randomly sampled concordance lines: Mobile*

	Year and Register	Concordance Line (word in context)
1	2015 ACAD	horizon included social networking, while the second horizon included **mobile** phones. 2008: The first horizon included collaboration webs. 2009: The first
2	2005 MAG	grandfather dug many years ago. We started with a **mobile** home, but then several years later replaced it with a modular home -
3	1999 MAG	of the wide western Pacific Ocean, engaging in widespread **mobile** combat. This truly would be the wondrous effect of the " central location
4	2013 MAG	mean you are protected. # Whenever you are using **mobile** devices at public hotspots, it is safe to assume you are not alone
5	1998 MAG	out questions and debate them: Can one be a Christian and be an upwardly **mobile** capitalist?
6	1993 MAG	's a need -- a twenty-four/seven operation. We're **mobile**; we'll come to you.' It's a serious -- sometimes
7	2003 SPOK	inspectors cannot discount the possibility that Iraq has developed **mobile** production facilities, or that it has production equipment at other hidden sites.
8	2013 NEWS	jumping on board to help companies implement and enforce new **mobile** device usage policies. Sales of MDM systems rose to $790 million in 2012
9	2002 NEWS	Levi donated several thousand dollars toward the county's first **mobile** defibrillator. Not two months later, Payne said, it saved a man
10	2002 NEWS	US to dovetail with the existing FAA system. New **mobile** radar units are filling blind spots. Technology is being installed that can "

Table 2. *Randomly sampled concordance lines: Portable*

	Year & Register	Concordance line (word in context)
1	2009 MAG	14,000 photos. Luckily, Lenovo makes a fast 320GB **portable** hard drive ($219; lenovo.com) with an attached USB cable and an
2	1991 SPOK	a commercial jet, they'd have an electronically secure **portable** phone and that purpose was fulfilled. What's happening, Pat, is
3	2011 MAG	months of battlefield setbacks. The upgraded explosives are more **portable** than the old stuff and easier to conceal. " They're keeping the
4	1993 SPOK	What we're talking about is something that is completely **portable**, something that you could read in bed, read at a coffee shop
5	2006 NEWS	to the Dish Network satellite service can buy a PocketDISH **portable** recorder ($200-$500) and transfer shows from their satellite set-top box. Many
6	1993 MAG	, if they sell any at all. (Many **portable** PCs still use 386 chips, however.) And new 286 systems are
7	2004 SPOK	these bottled waters. However, tap water's not **portable**. So, if you need to drink the six to eight glasses that we
8	2008 MAG	and the sound effects were tinny, but Nintendo's **portable** console offered gaming on the go. 21 Polyphonic Ringtones 1998 Whether your taste
9	2003 MAG	previous personal computers. 1985-89: Portable PCs finally become **portable**, with lightweight, notebook-style laptops, including models by Radio Shack, Compaq
10	2013 ACAD	Heights, IL). Height was measured using a **portable** child-adult measuring stadiometer board with inch-foot measuring tape and auto head lock (ShorrBoard

The concordance lines reveal two interesting characteristics of the terms. First, *mobile* appears most commonly before the noun it

is modifying, while *portable* appears evenly as a pre- and post-modifier of its respective noun. Additionally, *mobile* modifies both animate (e.g., we and capitalist) and inanimate objects (e.g., home, device, etc.), while *portable* modifies only inanimate objects (e.g., explosives, hard-drives, PCs, etc.). These modifications suggest that in authentic language use, there is a difference in preference that renders the definitions of the terms as slightly different. Moreover, it demonstrates that there are times when the terms are interchangeable (e.g., with the use of *phone*), and times when the terms are not (e.g., saying "we're portable" would be awkward but "we're mobile" is acceptable).

b. Collocations

To get a further sense of the two terms, the terms' most frequent collocates were next examined. For purposes of space, this Article only reports the five most frequent collocates before and after each term. Collocates before both terms consist of "a," "the," "and," "of," and a comma, in similar orders. This examination merely suggests that each term appears in a similar context, which is expected, considering that both terms were searched in their adjectival forms. Thus, unsurprisingly, the most frequent collocates before each term are function words and punctuation. Tables 3 and 4 below illustrate the order and frequency with which the collocates appear before each term.

Table 3. *Frequent collocates before mobile*

Number	Collocate	Frequency
1	A	1273
2	THE	1003
3	AND	553
4	OF	466
5	,	395

Table 4. *Frequent collocates before portable*

Number	Collocate	Frequency
1	A	1377
2	THE	485
3	,	355
4	AND	217
5	OF	211

Collocates that appear frequently after each term, however, demonstrate no overlap. As Table 5 and 6 illustrate, *mobile* appears frequently before "phone," "devices," "phones," "home," and "homes," while *portable* appears before "and," "phone," "radio," "computer," and "computers."

Table 5. *Frequent collocates after mobile*

Number	Collocate	Frequency
1	PHONE	758
2	DEVICES	626
3	PHONES	583
4	HOME	572
5	HOMES	295

Table 6. *Frequent collocates after portable*

Number	Collocate	Frequency
1	AND	123
2	PHONE	112
3	RADIO	101
4	COMPUTER	87
5	COMPUTERS	80

The collocates after each term reveal notable differences between the two terms. First, *portable* appears much more commonly in a list of other adjectives than does *mobile,* which is why "and" is *portable*'s most frequent collocate. These determinations, along with the findings that *portable* occurs more frequently as a post-modifier than *mobile,* suggest that *portable* exhibits behavior that is much more typical of an adjective than *mobile.* While no conclusions can be made about the terms' meanings based on this data, a conclusion can be made that there is a clear difference in preference for how language users prefer to use the two terms.

The second difference revealed by the collocates is that, although each of the collocates could occur with either word, there is a clear preference for when each term is used. For example, *portable radio* or *portable computer* suggests something slightly different from *mobile radio* or *mobile computer,* as does a *portable home* over *mobile home*. In effect, something that is *mobile* suggests that it can move easily (i.e., has wheels or is lightweight), while *portable* suggests something can *be moved* should someone or something wish to move it (i.e., requires someone to move it). The difference appears to be something that was made to be moved easily and often (*mobile*) versus something that can be moved when desired but is otherwise stationary (*portable*).

The results of the comparison of the collocates (displayed in Figure 1 below) support the above conclusions. The comparison shows the ratios of the terms when compared to one another and considers collocates that occur directly before and after the word. Evidenced in Figure 1, the collocates for *mobile* include both animate and inanimate objects, while *portable* includes only inanimate objects. Additionally, *mobile* appears more versatile in its use because the term suggests movement in more various ways than *portable.* For example, *mobile* can be used to refer to a *mobile* person, society, home, clinic, etc.; whereas, *portable* appears only to refer to objects that have the option to be moved.

WORD 1 (W1): **MOBILE** (1.78)				
WORD	W1	W2	W1/W2	SCORE
UPWARDLY	312	0	624.0	350.0
HOMES	295	1	295.0	165.5
BAY	46	0	92.0	51.6
SOCIETY	44	0	88.0	49.4
LAUNCHERS	42	0	84.0	47.1
HOME	573	7	81.9	45.9
BIOLOGICAL	30	0	60.0	33.7
DOWNWARDLY	29	0	58.0	32.5
SERVICES	28	0	56.0	31.4
COMMAND	27	0	54.0	30.3
SCUD	24	0	48.0	26.9
OPERATORS	23	0	46.0	25.8
TECHNOLOGIES	43	1	43.0	24.1
ADVERTISING	21	0	42.0	23.6
CLINIC	21	0	42.0	23.6
ROBOTS	21	0	42.0	23.6
INDUSTRY	20	0	40.0	22.4
OPERATING	39	1	39.0	21.9
POPULATION	19	0	38.0	21.3
LABS	18	0	36.0	20.2

WORD 2 (W2): **PORTABLE** (0.56)				
WORD	W2	W1	W1/W2	SCORE
TOILETS	78	0	156.0	278.1
CD	64	0	128.0	228.2
DVD	44	0	88.0	156.9
TOILET	42	0	84.0	149.7
TAPE	32	0	64.0	114.1
TYPEWRITER	32	0	64.0	114.1
OXYGEN	30	0	60.0	107.0
GENERATOR	54	1	54.0	96.3
MP3	25	0	50.0	89.1
CASSETTE	18	0	36.0	64.2
PLAYERS	17	0	34.0	60.6
TABLE	17	0	34.0	60.6
SPEAKERS	16	0	32.0	57.0
GENERATORS	52	2	26.0	46.3
HEATER	13	0	26.0	46.3
DOCUMENT	13	0	26.0	46.3
DESK	12	0	24.0	42.8
TINY	12	0	24.0	42.8
ELECTRONIC	23	1	23.0	41.0
STEREO	22	1	22.0	39.2

Figure 1. Comparison (by ratio) of mobile and portable

The results of the comparison support the conclusion that the definition of *mobile* refers to an object that can move or be moved, while the definition of *portable* refers only to an object that someone can move. The collocates *upwardly* and *downwardly* highlight this meaning of *mobile* nicely because both modify the adjective *mobile* and suggest directionality. Comparatively, if used with *portable* (e.g., *upwardly portable)*, *upwardly* and *downwardly* result in an awkward collocation that is unlikely to occur in natural language use. This awkward collocation is further supported by the fact that this combination never occurs in the corpus. Thus, one can conclude that *mobile* refers to movement more generally than *portable.*

Of course, this result does not suggest that *mobile* and *portable* cannot be used interchangeably, but instead suggests that language users prefer to use the terms in this sense. Likewise, the W2 column in Figure 1 suggests that users prefer to use these terms differently, as very little overlap is seen in the collocates of these two terms (the W2 column displays the ratio of how often the comparative word occurs with the collocate). In the aggregate, these results suggest that *mobile* and *portable* are in fact not synonymous and suggest a difference in meaning.

3. Conclusion

Based on the above results, this Article disagrees with the court's decision in *Advanced Aerospace Technologies*[245] to treat the terms *mobile* and *portable* as synonymous, discussed in more detail below. The corpus plainly demonstrates that language users prefer to use *mobile* and *portable* in different contexts, suggesting nuanced differences in the meanings of the terms. Specifically, *mobile* is more versatile and occurs with animate and inanimate objects, while *portable* is used specifically to refer to inanimate objects. Furthermore, *mobile* is commonly used to refer to items that can easily move or be moved (e.g., people, items on wheels, phones); whereas, *portable* typically refers to items that must be moved (e.g., computers, toilets, CD players). While these terms can be used interchangeably, the results of the corpus indicate that language users prefer not to use these terms synonymously. Therefore, this Article recommends that the terms be considered by the following definitions:

> **Mobile**: An object, person, or animal that is capable of moving or being moved. Can easily move from location to location.
>
> **Portable**: An object that is capable of being moved or designed to move but may be stationary for long periods of time.

If the dictionary definitions (above)[246] are reexamined, the definitions this Article provided appear only slightly different, but are different enough to have potentially impacted the Court's decision.

D. Specialized Corpus: Advanced Aerospace Technologies v. United States

Many patent disputes rest on the interpretation of non-technical, non-scientific terms, but other terms either do not appear in general corpora or have specific meanings in the patent's field of

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[245] Advanced Aerospace Techs., Inc., v. United States, 122 Fed. Cl. 445, 482 (Fed. Cl. 2015).

[246] *Supra* notes 237–40. *See also Mobile*, DICTIONARY.COM, https://www.dictionary.com/browse/mobile?s=t [https://perma.cc/8ZAH-ZBFH] (last visited Feb. 11, 2021); *Portable*, *DICTIONARY.COM*, https://www.dictionary.com/browse/portable?s=t [https://perma.cc/A28Z-LN3U] (last visited Feb. 11, 2021).

inventorship. Even if a term may seem ordinary, courts might be wary of relying on linguistic data that "may not be written by or for skilled artisans."[247] Thus, while it has been demonstrated that a general corpus can be used to uncover the nuanced differences between similar words and demonstrated the benefits corpora can offer over a dictionary in providing the general sense of a word (which is certainly a strength corpora can offer), general corpus is by no means the most beneficial application of corpora in legal cases.

The true strength of applying methods from corpus linguistics to legal cases comes from the fact that specialized corpora can be created on a case-by-case basis. This specialization is a flexibility that cannot be offered by catch-all methods such as dictionaries and general corpora. As each legal case is unique, creating corpora that can offer specialized definitions of terms will lead to jurisdictions that are more accurate and fair. Parties may therefore wish to construct a specialized corpus to overcome these hurdles.

A case where this type of specialized corpus may be useful is *Advanced Aerospace Technologies, Inc. v. United States*.[248] In that case, the parties disputed the meaning of the term *fixed*.[249] Advance Aerospace Technologies, Inc. ("AATI") obtained a patent on a launch and recovery system of unmanned aerial vehicles.[250] One of the patent claims included "[a]n unmanned aircraft comprising a fixed hook located more than half way outboard on a main wing of said aircraft."[251] AATI argued that *fixed* required that the hook be "securely placed or fastened" while the United States and Boeing advocated for a narrow construction, that the hook be "permanently attached to the aircraft or flying object."[252] Given that the issue is centered around the use of a term in a patent pertaining to aeronautical engineering, understanding how the term is typically

[247] Phillips v. AWH Corp., 415 F.3d 1303, 1318 (Fed. Cir. 2005).
[248] 122 Fed. Cl. 445, 463 (Fed. Cl. 2015).
[249] *Id.* at 464.
[250] *Id.* at 448–49.
[251] *Id.* at 463.
[252] *Id.* at 464.

used in that field would be a fair and unbiased way of determining which definition should be upheld.

Simply turning to a dictionary in this case would not suffice because, as demonstrated below, dictionaries provide fairly even support for both parties' definitions:

- Google's definition of *fixed*: (1) Fastened securely in position. "a fixed iron ladder down the port side" (2) (especially of a price, rate, or time) predetermined and not subject to or able to be changed. "most trusts locked investors in for a fixed period"[253]
- Dictionary.com's definition of *fixed*: (1) Fastened, attached, or placed so as to be firm and not readily movable; firmly implanted; stationary; rigid; (2) definitely and permanently placed: "a fixed buoy; a fixed line of defense."[254]
- Merriam-Webster's definition of *fixed* (1) securely placed or fastened: STATIONARY (2) not subject to change or fluctuation // "a *fixed* income"
  (3) IMMOBILE, CONCENTRATED // "a *fixed* stare."[255]

Additionally, simply examining the term in a general corpus, such as COCA, shows that the most common use of the word is related to finances. A quick search revealed that the five most common collocates of *fixed* are *effects, rates, income, cost,* and *price.* Thus, COCA demonstrates that neither of the alleged definitions in A*dvanced Aerospace Technologies* encompasses the general sense of the term. While all of the meanings of *fixed* could be further analyzed using COCA to determine which of the argued definitions is more commonly used, this analysis still might not accurately represent how the term is used in the argued context.

Therefore, this Article's findings still leave unclear which definition of *fixed*—permanent or secure—is the more common in the context of aeronautical engineering. In order to answer this

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[253] *Fixed*, GOOGLE, https://www.google.com/ [https://perma.cc/XMW3-BVBG] (search "fixed") (last visited Feb. 11, 2021).

[254] *Fixed*, *DICTIONARY.COM*, https://www.dictionary.com/browse/fixed?s=t [https://perma.cc/HT8B-AAYR] (last visited Feb. 11, 2021).

[255] *Fixed*, *MERRIAM-WEBSTER.COM*, https://www.merriam-webster.com/dictionary/fixed [https://perma.cc/8EQK-SERL] (last visited Feb. 11, 2021).

question, a specialized corpus would need to be created, examining how the term *fixed* is most commonly used in the field. Once the corpus is compiled, the term *fixed* would be searched in much the same way as *mobile* and *portable* above (i.e., frequency, distribution, contextual, and collocational data would be examined). As the field in question is aeronautical engineering, texts that are representative of published professional texts in aeronautical engineering would be collected to create a specialized corpus, Corpus of Aeronautical Engineering ("CAET").

An ideal corpus would be created based on guidelines from corpus design experts, Douglas Biber and Jesse Egbert, and thus be designed to include texts that represent the text varieties that exist in the population, and decisions about randomness, stratification, and size would be considered carefully.[256] In addition, before running the final analysis, the corpus would be evaluated for domain and linguistic representativeness, and changes would be made if necessary.[257] Like the creation of many specialized corpora, the ability to create a sample that is truly random would be limited by the practical constraints of time, text availability, and copyright permissions.[258] Thus, the sample would be mostly one of convenience; however, possible elements of randomness would be incorporated (i.e., texts would be randomly sampled from the accessible databases).[259]

To ensure that the texts are representative of the field of aeronautical engineering, research into the text types produced by

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[256] Douglas Biber, *Representativeness in Corpus Design*, 8 LITERARY & LINGUISTIC COMPUTING 243, 243–57 (1993); Jesse Egbert, *Corpus Design and Representativeness*, *in* MULTI-DIMENSIONAL ANALYSIS: RESEARCH METHODS AND CURRENT ISSUES 27, 27–42 (Tony Berber Sardinha & Marcia Veirano Pinto eds., 2019).

[257] Biber, *Representatives*, *supra* note 256, at 256 ("[T]he design of a representative corpus is not truly finalized until the corpus is completed, and analyses of the parameters of variation are required throughout the process of corpus development in order to fine-tune the representativeness of the resulting collection of texts."). *See* Egbert, *Corpus*, *supra* note 256, at 27–42.

[258] *See* Biber, *Representatives*, *supra* note 256, at 243–57; Egbert, *Corpus*, *supra* note 256, at 27–42.

[259] *See* Biber, *Representatives*, *supra* note 256, at 243–57; Egbert, *Corpus*, *supra* note 256, at 27–42.

professional aeronautical engineers would need to be conducted. Based on this research and consultations with aeronautical engineering experts, the text types (hereinafter referred to as "registers") to be included in the corpus would likely include:

- U.S. patents concerning designs related to "unmanned aerial vehicle," "airplane," or "aircraft" (to be collected from Google Patents)
- Conference proceedings and abstracts (to be collected from Engineering Village (Compendex))
- Professional and academic publications (to be collected from the Advanced Technologies & Aerospace Database (Proquest), IEEE Xplore, and Engineering Village (Compendex)
- Aeronautical engineering textbook chapters and book chapters (to be collected from Knovel and NAU Library)
- Technical reports including design reports, test reports, test procedures, technical notes, analysis reports, requirements analysis, and verification documents
- Relevant articles from newspapers, journals, magazines (to be collected from the Advanced Technologies & Aerospace Database (Proquest), IEEE Xplore, Engineering Village (Compendex), and NAU Library Database)
- Aerospace engineering forums and blogs (e.g., Wolfram, Aerospace Engineering Blog, AIAA, etc.)

As the parties would be interested in determining how the term *fixed* is generally used in the field, the corpus would be balanced, so that the corpus has approximately the same number of texts for each of the registers named above. Texts would ideally be selected as the unit of measurement as "texts are naturally occurring, recognizably self-contained, and functional units of language production and reception."[260] Texts would be collected in their entirety to ensure authenticity, which would result in differing numbers of words for each register; however, this discrepancy is not a major concern as balance and authentic representation of our target population are the

[260] Egbert, *Corpus*, *supra* note 256, at 27–42.

most important factors in accurately determining the definition of *fixed* in aeronautical engineering.

Additionally, because the goal would be to determine the behavior of the term *fixed* in its natural context, the parties would need to ensure that the corpus is large enough to get a stable estimate of the adjective *fixed*. There is no general consensus on how large a corpus must be to capture the behavior of a single term, as this is a fairly nascent area of research; however, Egbert created a formula that can be used to calculate a recommended sample size *a priori* by measuring stability in sample variance.[261] Thus, to get an estimate of variance, one would examine the frequency of the adjective *fixed* in the scientific/technical academic section of COCA—the section of the corpus that is most similar to the CAET—and use the following formula to calculate the needed sample size:[262]

$$\frac{s^2}{\left(\frac{e_t \bar{x}}{t}\right)^2}$$

In this formula, n = required sample size, s = estimated standard deviation for the population, e_t = tolerable error, equal to ½ the desired confidence interval ("CI"), $\bar{x}$ = sample mean, t = t-value for the desired probability level.[263] For these purposes, based on Biber and Egbert's recommendation, the tolerable error would be 10% of the mean score, and the t would be a z-score of 1.96 (which corresponds to a CI of 95%).[264] See Table 7 below for the estimate of text numbers to be collected (for each register).

Table 7. *Estimated amounts of texts to be collected*

Linguistic Feature	Mean in COCA	Standard Deviation in COCA	Tolerable Error	Required *N* (in texts)
Fixed	5.46	8.809	.273	3,999

[261] *Id.*
[262] *Id.*
[263] *Id.*
[264] Biber, *Representatives*, *supra* note 256, at 253; Egbert, *Corpus*, *supra* note 256, at 27–42.

Based on these calculations, an ideal corpus would need approximately 3,999 texts to capture the behavior of the term *fixed*, which would equate to approximately 571 texts per register. While this number may seem low, if texts are collected as randomly as possible and equally within the identified registers, the corpus should theoretically capture the variation of the term. However, this calculation is merely a starting point—the corpus would be checked, and additions would be made if necessary.

Once collected, the texts would be cleaned and converted into .txt files to ensure that computer-assisted linguistic analyses could be conducted without issue. The entire corpus would be tagged using the Biber Tagger,[265] so that part of speech can be used to facilitate the search of the term *fixed* (which would focus exclusively on the adjectival form, ensuring that the searches are not convoluted by the verb form). The texts would then be read into AntConc, a free concordance software, used to examine concordance lines, collocates, frequency, and the distribution data of the adjectival use of the term *fixed*. As the specialized corpus would be significantly smaller than COCA, the specialized corpus would likely have the ability to examine every instance of the term—rather than randomly sampled lines—to conclude which of the two disputed meanings of *fixed* is more commonly used in aeronautical engineering.

V. CONCLUSION

Courts are justifiably worried that undue reliance on extrinsic sources subverts the role of intrinsic evidence, which is the best evidence to determine the scope of patent claims. Courts understandably wish to avoid relying on evidence not available to the public in determining the meaning of patent terms, "thereby undermining the public notice function of patents."[266] This desire is especially salient when billions of dollars, the exclusive right to practice an invention, and the right to fairly compete in the market, hang in the balance.

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[265] Gray, *supra* note 210, at 44–45.

[266] Phillips v. AWH Corp., 415 F.3d 1303, 1319 (Fed. Cir. 2005).

However, corpus linguistics is unlike other extrinsic sources courts have encountered. This linguistic tool can allow courts to access information regarding how those skilled in the art would use technical terms. Thus, by uncovering this skilled usage, courts can more comfortably determine how a particular term should be construed. In other words, when the intrinsic evidence does not clearly demonstrate how a person of ordinary skill in the art would interpret a patent term, courts can turn to the next best alternative: discovering—quantitatively—how the majority of persons of ordinary skill in the art use that term. In this way, methods of claim construction may more fully support the public notice function of patents.