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Paper 40
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner,

v.

MINDBASEHQ, LLC,
Patent Owner.

IPR2021-01251
Patent 6,510,433 B1

Before NORMAN H. BEAMER, NABEEL U. KHAN, and KARA L. SZPONDOWSKI, *Administrative Patent Judges.*

SZPONDOWSKI, *Administrative Patent Judge*.

JUDGMENT
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)
Dismissing Petitioner's Motion to Strike as Moot
37 C.F.R. §§ 42.5, 42.71(a)

I. INTRODUCTION

We instituted *inter partes* review of claims 1–46 of U.S. Patent No. 6,510,433 B1, issued on January 21, 2003 (Ex. 1001, "the '433 patent"), in response to a Petition (Paper 3, "Pet.") filed by Google LLC ("Petitioner"). (Paper 8, "Inst. Dec."). During the trial, MindbaseHQ, LLC ("Patent Owner") filed a Response to the Petition (Paper 15, "PO Resp."), Petitioner filed a Reply (Paper 25, "Reply"), and Patent Owner filed a Sur-reply (Paper 26, "Sur-reply"). In addition, Petitioner filed a Motion to Strike (Paper 29, "Mot. Strike"), and Patent Owner filed an Opposition (Paper 33, "Opp. Strike").

An oral hearing was held on October 11, 2022, and a copy of the transcript was entered into the record. Paper 39 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the complete record, Petitioner has shown, by a preponderance of the evidence, that claims 1–13, 20–32, 41, and 42 of the '433 patent are unpatentable. However, Petitioner has not shown, by a preponderance of the evidence, that claims 14–19, 33–40, and 43–46 of the '433 patent are unpatentable.

II. BACKGROUND

A. *Related Matters*

Petitioner advises that the '433 patent is the subject of the following district court litigation: *MindbaseHQ LLC v. Google LLC*, No. 1-20-cv-24742 (S.D. Fla.) (terminated on Mar. 12, 2021) and *MindbaseHQ LLC v. Google LLC*, No. 3:21-cv-03603 (N.D. Cal.) (transferred on Mar. 13, 2021) ("related litigation"). Pet. 7.

Petitioner concurrently filed a petition in IPR2021-01252 involving U.S. Patent No. 6,665,680, which is a continuation of the '433 patent. *Id.*

B. The '433 Patent (Ex. 1001)

The '433 patent is titled "Database Structure Having Tangible and Intangible Elements and Management System Therefor" and is generally directed to "a new organizational protocol for creating and manipulating relational databases and database structures." Ex. 1001, code (54), 1:16–18. The '433 patent states that "[p]resently available databases do not categorize data elements into specific categories with rules for storing and manipulating each type of data element." *Id.* at 2:28–30.

Because "[t]he inventive arrangements use the neuron-synapse-neuron model for structuring relationships of all data elements in a new database structure[,] . . . the database system . . . is referred to as the MINDBASE database system." *Id.* at 2:19–23. The MINDBASE data system is generally described as follows:

> The inventive arrangements categorize all MINDBASE data elements as either tangible data elements or intangible data elements. Tangible data elements are physical data elements that have weight. Tangible data elements are defined as "cause" data elements. Intangible data elements are all other data elements. Intangible data elements are further categorized into verbs which are identified as "effect" data elements and descriptive data elements which are identified as "descriptors[]". Descriptors are used to describe tangible data elements and the degree of performance of tangible data elements.

Id. at 2:28–42. The '433 patent states that "[t]he unique categorization of cause, effect, and descriptive data elements and their specific uses is not followed by any other database system." *Id.* at 2:45–48.

Further, "[t]he MINDBASE format is based on the completely detailed information people have in their minds instead of the 'verbal shorthand' that people generally use when speaking or writing." *Id.* at 2:65–3:1. Thus,

> [f]or a computer system to simulate the way people communicate, it must have a way to store all of the descriptive details and word associations that people usually leave out of their communications. The MINDBASE system has the unique ability to store all of the possible relationships that are usually left out of verbal shorthand and all other database systems. The MINDBASE system classifies each word as either a cause, an effect, or a descriptor. The MINDBASE system can also differentiate between multiple uses of the same word for different parts of speech. For example, some words like 'book' can be a noun, verb, or an adjective. The MINDBASE system can advantageously be provided with a very detailed dictionary routine that classifies all words as causes, effects, or descriptors. This routine also differentiates between uses of the same word for different parts of speech.

Id. at 3:19–35.

C. Illustrative Claims

Among the challenged claims, claims 1, 14, 20, 33, and 41 are independent. Independent claims 1 and 14 and dependent claim 43 are reproduced below, with brackets noting Petitioner's identifiers.

1. [1.0] A database of information stored in a fixed medium, said database comprising:

> [1.1] a set of tangible data elements, said tangible data elements representing things which have physical weight and can cause an effect;

[1.2] a set of intangible data elements, said intangible data elements representing words and concepts which have no physical weight and cannot be weighed;

[1.3] said set of intangible data elements including a first subset of effect data elements, said effect data elements representing verbs standing alone and in combination with other words, which describe actions, objectives, results, missions, procedures and processes; and,

[1.4] said set of intangible data elements including a second subset of descriptive data elements, said descriptive data elements describing said tangible data elements, said effect data elements and degrees of performance of said tangible data elements.

14. [14.0] A database system, comprising:

[14.1] a database stored in a fixed medium and having a set of tangible data elements representing things which have physical weight and can cause an effect and a set of intangible data elements representing words and concepts which have no physical weight and cannot be weighed;

[14.2] said set of intangible data elements including a first subset of effect data elements representing verbs, standing alone and in combination with other words, which describe actions, objectives, results, missions, procedures and processes, and a second subset of descriptive data elements describing said tangible data elements, said effect data elements and degrees of performance of said tangible data elements; and,

[14.3] a dictionary routine for automatically classifying and storing words entered into said database according to said sets and subsets of data elements.

43. [43.0] A method for inter-relating different databases structured as recited in claim 41, comprising the steps of:

[43.1] for each of said databases, and in any order, [43.1.1] normalizing names of like data elements having different names in

said different databases and [43.1.2] normalizing names of different data elements having like names in said different databases;

[43.2] normalizing data elements which are separate in any one of said databases and which are grouped together as single data elements in any other of said databases;

[43.3] comparing each of said normalized databases with each other one of said normalized databases;

[43.4] recording all common data elements found during each said comparing step; and,

[43.5] recording one location of each said common data element in each of said databases.

Ex. 1001, 35:12–28, 36:7–24, 38:46–39:5, 39:12–28.

D. Evidence

Petitioner relies on the following references (*see* Pet. 9).

Reference	Exhibit	Patent/Printed Publication
Conlon	1005	Conlon, et al., *Developing a Large Lexical Database for Information Retrieval, Parsing, and Text Generation Systems*, Information Processing & Management, Vol. 29, No. 4, pp. 415-431 (1993)
Miller	1013	Miller, *Nouns in WordNet: A Lexical Inheritance System*, International Journal of Lexicography, Vol. 3, No. 4, pp. 245–264 (1990)
Beckwith	1016	Beckwith, et al., *Implementing a Lexical Network*, International Journal of Lexicography, Vol. 3, No. 4, pp. 302–312 (1990)
Fong	1029	Fong, et al., *Guide on Logical Database Design*, NBS Special Publication 500-122 (1985)

E. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–46 are unpatentable on the following grounds (Pet. 9):

Claims Challenged	35 U.S.C. §[1]	References
1, 2, 9, 12–21, 28, 32–40	103(a)	Conlon
3–6, 8, 10, 11, 22–25, 27, 29–31, 41, 42	103(a)	Conlon, Miller
7, 26	103(a)	Conlon, Miller, Beckwith
43–46	103(a)	Conlon, Miller, Fong

In support, Petitioner relies on the Declaration of Dr. Bernard J. Jansen (Ex. 1002) and the Rebuttal Declaration of Dr. Jansen (Ex. 1057). Patent Owner relies on the Declaration of Dr. Sanjay Ranka (Ex. 2001) and the Rebuttal Declaration of Dr. Ranka (Paper 27[2]). A deposition transcript has been entered into the record for Dr. Ranka (Ex. 1051).

1. Conlon (Ex. 1005)

Conlon is an article titled "Developing a Large Lexical Database for Information Retrieval, Parsing, and Text Generation Systems." Ex. 1005, 415. Petitioner contends that Conlon was catalogued and accessible to the public in 1993, more than one year before the '433 patent's earliest possible effective date, and is prior art under 35 U.S.C. § 102(b). Pet. 27 (citing Ex. 1005; Ex. 1011, 1–2).

[1] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), amended 35 U.S.C. § 103. Because the '433 patent has an effective filing date prior to the effective date of the applicable AIA amendment, we refer to the pre-AIA version of § 103.
[2] We remind Patent Owner that evidence must be filed in the form of an exhibit. *See* 37 C.F.R. § 42.63(a).

Conlon describes the organization and design of the tables of a lexical database, which is stored in an Oracle Relationship Database Management System, and constructed by combining material from a number of machine-readable sources. Ex. 1005, 415 (Abstract). Conlon's lexical database "contains information about approximately 50,000 word entries (each word may have many senses)" and "is grouped by major parts of speech into tables for nouns, verbs, adjectives, and adverbs." *Id.* at 416. Conlon states "[t]o support our goals, we need to collect and organize the huge amounts of information used routinely by humans to process language." *Id.*

Conlon explains that "[e]ach source of lexical data has a different structure and must be treated differently." *Id.* at 418. For example, "[i]n order to translate knowledge from machine-readable dictionaries into a form usable in a lexical database, it must be analyzed and formalized in order to make it sufficiently explicit for machine use. We have performed this analysis by semi-automatic methods." *Id.*

As one example, "the definition of 'chip' in homograph number 1 and sense number 1 provided by [Collins English Dictionary] is shown in Table 2," reproduced below:

Table 2. Definition

chip	1	1	a thin strip of potato fried in deep fat

Table 2, above, depicts the definition of "chip 1 1," including "a thin strip of potato fried in deep fat." *Id.*

Conlon states that "[a]fter analyzing this definition semi-automatically, we have been able to create explicit information about 'chip,'" such as Table 3, reproduced below:

Table 3. Lexical information

chip	1	1	regular	sing	count	common	no-gen	concrete	inan

Id. at 418–419. Table 3, above, depicts the lexical information of "chip 1 1," including: (1) "concrete (from part of the definition 'a thin strip of potato . . .')"; (2) "countable (from the part of the definition 'a thin strip of potato . . .')"; (3) "inanimate ('potato' is not an animate noun)"; (4) "regular (the plural form is 'chips')"; (5) "singular (the Collins English Dictionary specifies the plural form of words explicitly)"; (6), "a common noun (the word 'chip' does not begin with a capital letter)"; and (7) "neuter (there is no gender specification)". *Id.* at 419.

Conlon's lexical database "contains tables of lexical and semantic relations and relationships, to make it possible to find terms related to any given word." *Id.* at 421. The "organization is based on parts of speech, with each part of speech involving different types of syntactic and semantic information." *Id.* There is a main table that "contains word entries in alphabetical order." *Id.* There are also separate tables for each part of speech, including nouns, verbs, adjectives, and adverbs. *Id.* at 422. The noun tables include "whether a noun is abstract or concrete," as "[t]hese two groups of nouns can be modified by different groups of adjectives." *Id.* The verb tables include "whether a verb is regular or irregular, dynamic or stative, transitive or intransitive (or both), whether a verb takes a sentential complement or not, or whether it can be put into passive voice or not." *Id.* at 423. "For each argument of the verb we must also indicate its syntactic role (as subject, direct object, indirect object, or object of a preposition), its case (agent, patient, beneficiary, etc.), whether its appearance is obligatory,

optional, or elliptical, and the selectional restrictions (animate, inanimate, human) imposed on the filler of that slot." *Id.; see also id.* at Table 14. The adjective tables are classified in a way that the system knows which adjectives are appropriate for the nouns they will modify. *Id.* at 424. "Adverbs are the most complicated part of speech" because "[t]hey can modify nouns, verbs, adjectives, adverbs, or whole sentences." *Id.* at 425. Conlon, therefore, describes an adverb classification table and an adverb placement table. *Id.*

Conlon's "[l]exical entries throughout the database are connected by a network of lexical and semantic relations," the most frequent of which are those that are familiar from commercial dictionaries. *Id.* at 426. The lexical database also contains tables of relations and the words and phrases they connect. *Id.*

2. Miller (Ex. 1013)

Miller is an article titled "Nouns in WordNet: A Lexical Inheritance System." Ex. 1013, 245. Petitioner contends that Miller was catalogued and accessible to the public in 1993, more than one year before the '433 patent's earliest possible effective date, and is prior art under 35 U.S.C. § 102(b). Pet. 60 (citing Ex. 1011, 1–2).

Miller describes organizing noun files in WordNet.[3] Miller states: "Definitions of common nouns typically give a superordinate term plus distinguishing features; that information provides the basis for organizing noun files in WordNet. The superordinate relation (hyponymy) generates a

[3] "WordNet is an on-line lexical reference system whose design is inspired by current psycholinguistic theories of human lexical memory." Ex. 1012, Abstr.

hierarchical semantic organization that is duplicated in the noun files by the use of labeled points between sets of synonyms." Ex. 1013, 245 (Abstract). Miller describes:

> The fundamental design that lexicographers try to impose on the semantic memory for nouns is not a circle, but a tree (in the sense of *tree* as a graphical representation). It is a defining property of tree graphs that they branch from a single stem without forming circular loops. The lexical tree can be reconstructed by following trails of superordinate terms: *oak@* ➔ *tree@* ➔ *plant@* ➔ *organism,* for example, where '@ ➔' is the transitive, asymmetric, semantic relation that can be read 'is a' or 'is a kind or. (By convention, '@ ➔' is said to point upward.) This design creates a sequence of levels, a hierarchy, going from many specific terms at the lower levels to a few generic terms at the top. Hierarchies provide conceptual skeletons for nouns; information about individual nouns is hung on this structure like ornaments on a Christmas tree.

Id. at 247. "The semantic relation that is represented above by '@ ➔' has been called the ISA relation, or the hypernymic or superordinate relation (since it points to a hypernym or superordinate term); it goes from specific to generic and so is a generalization." *Id.* Miller, therefore, describes a "lexical inheritance system," where "a systematic effort has been made to connect hyponyms with their superordinates (and vice versa)." *Id.* at 248.

3. Beckwith (Ex. 1016)

Beckwith is an article titled "Implementing a Lexical Network." Ex. 1016, 302. Petitioner contends that Beckwith "was published in the same issue of the *International Journal of Lexicography* as Miller (Ex-1013), and is prior art under 35 U.S.C. § 102(b) for the same reasons as Miller." Pet. 74 (citing Ex. 1011, 1–2).

Beckwith generally describes the "computer implementation of the lexical database described in" the Miller reference. Ex. 1016, 302 (Abstract). In particular, WordNet includes an index of familiarity associated with each word form. *Id.* at 304. Table 2 of Miller, reproduced below, depicts an example of this familiarity index where the superordinates of the word *bronco* are requested. *Id.* at 305.

Table 2. Hypernyms of *bronco* and their familiarity indices.

Word	Polysemy
bronco	1
@→horse	14
@→equid	0
@→odd-toed ungulate	0
@→herbivore	1
@→mammal	1
@→vertebrate	1
@→animal	4
@→organism	2

Table 2 depicts the hypernyms of bronco and their familiarity indexes. *Id.* For example, bronco has a familiarity index of 1, horse has a familiarity index of 14, equid has a familiarity index of 0, and so on. *Id.*

4. Fong (Ex. 1029)

Fong is an article titled "Guide on Logical Database Design." Ex. 1029. Petitioner contends that Fong "bears a publication date of February 1985, and was distributed to depository libraries in microfiche and available for purchase at least as of December 1986." Pet. 77 (citing Ex. 1029, 119; Ex. 1032, 46; Ex. 1031, 1; Ex. 1002 ¶ 278). Petitioner contends Fong is prior art under 35 U.S.C. § 102(b). *Id.*

Fong generally describes "an iterative methodology for Logical Database Design" that "lead[s] to the development of a high quality [Logical Database Design]." Ex. 1029, Abstract. One procedure is "normalization," which helps to ensure that the collection of entities is optimal. *Id.* at 8, 75. For example, Fong describes eliminating redundancies and combining entities with the same or equivalent identifiers. *Id.* at 75.

III. ANALYSIS

A. Legal Standards

"In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

A claim is unpatentable under 35 U.S.C. § 103(a) if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness,

i.e., secondary considerations. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

A patent claim "is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR*, 550 U.S. at 418. An obviousness determination requires finding "both 'that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.'" *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016) (citation omitted); *see KSR*, 550 U.S. at 418. Further, an assertion of obviousness "cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR*, 550 U.S. at 418; *In re NuVasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (a finding of a motivation to combine "must be supported by a 'reasoned explanation'" (citation omitted)).

B. Level of Ordinary Skill in the Art

The parties each propose a definition for a person of ordinary skill in the art. Pet. 14–15 (citing Ex. 1002 ¶ 53); PO Resp. 7–8[4] (citing Ex. 2001 ¶¶ 13–19). The proposed definitions have some similarities, as shown in underline below:

Petitioner's Proposal	Patent Owner's Proposal
"would have had at least a bachelor's degree in computer	"would be a person with a bachelor's degree in Computer

[4] Patent Owner's Response does not contain any page numbering. We start page number 1 on the page titled "Introduction." We remind Patent Owner to include page numbering in its future submissions.

science, computational linguistics, computational lexicography, or the equivalent, and at least two years of academic or industry experience in lexical databases, computational linguistics, computational lexicography, or the equivalent, and experience or coursework in computer science, database development, or the equivalent. Less experience can be remedied with additional education (e.g., a Master's degree); conversely, less education can be remedied with additional experience."	Science, Computer Engineering, or a related field, as those degrees generally include requisites for multiple database courses. Alternative to an applicable accredited degree," a person of ordinary skill in the art "would have at least two years' experience in database programming, development, and design."

Pet. 14–15; PO Resp. 7–8 (emphasis added). Petitioner contends that the level and skill of a person of ordinary skill in the art are reflected in the prior art. Pet. 15–27 (citing Ex. 1002 ¶¶ 56–101).

Patent Owner disputes Petitioner's proposed level of ordinary skill in the art. PO Resp. 5–11; Sur-reply 4–5[5]. Specifically, Patent Owner disputes Petitioner's inclusion of "lexical databases, computational linguistics, computational lexicography, or the equivalent"[6] because, according to Patent Owner, the technology of the '433 patent does not require this knowledge, but instead only requires computer database design or programming knowledge. PO Resp. 6–9; *see also id.* at 10 (stating that Patent Owner

[5] Patent Owner's Sur-reply also does not contain any page numbering. We start page number 1 on the page titled "Introduction."
[6] The parties refer to this as "LLL," and we will use the same abbreviation herein.

"agrees with [Petitioner] that a [person of ordinary skill in the art] have at least a bachelor's degree in computer science, or experience or coursework in computer database development, or the equivalent, with less experience remedied by more education"). Patent Owner contends that "LLL is used to interpret or organize text according to agreed-upon rules," but a person of ordinary skill in the art could not use LLL to create a database. *Id.* at 6; *see also id.* at 7. Patent Owner argues that requiring LLL knowledge eliminates almost all of the database developers and engineers at the time of the invention. *Id.* at 7.

We are not persuaded that because the '433 patent does not explicitly use the terms "lexical database," "computational linguistics," or "computational lexicography" (*see* PO Resp. 8, Sur-reply 4), no knowledge of these areas is required. Patent Owner's counsel acknowledged at the hearing that "lexical" means "words, related to words," Tr. 39:4–6, which is consistent with Petitioner's use of this term. *See* Reply 8 (Petitioner describing "lexical" as "relating to words or vocabulary").

As Petitioner argues, and we agree, the claims of the '433 patent do not support Patent Owner's arguments as to the level of ordinary skill in the art. *See* Reply 8 (citing Ex. 1057 ¶¶ 23–26). Claim 1 recites, for example, "intangible data elements representing words," including "effect data elements representing verbs standing alone and in combination with other words." Ex. 1001, 35:17–21 (claim 1). Other claims recite, for example, "linked words," "dictionary routine for automatically classifying and storing words," "dictionary routine links all sets of synonyms," "words having at least two different meanings." *See, e.g.*, Ex. 1001, 35:64 (claim 12), 36:22–23 (claim 14), 36:28–30 (claim 16), 36:32–34 (claim 17), 36:45–46

(claim 19). In the Sur-reply, Patent Owner argues that these words in the claims "are, at most, high school level grammar concepts," so "[n]o complex linguistic or lexicographic knowledge is needed to understand or implement these claims." Sur-reply 5. However, Petitioner is not asserting that complex knowledge is necessary for a person of ordinary skill in the art, and Patent Owner's arguments appear to at least somewhat concede that a person of ordinary skill in the art would have had some linguistic or lexicographic knowledge.

Further, the Specification of the '433 patent also belies Patent Owner's assertions that "qualifications in the arts and language and linguistics . . . is not supported by the description of the art in the '433 Patent" (PO Resp. 11; *see also* Sur-reply 5). *See e.g.*, Ex. 1001, 2:65–3:2 ("The MINDBASE format is based on the completely detailed information people have in their minds instead of the 'verbal shorthand' that people generally use when speaking and writing. FIG. 1 is a pictorial description of this process."); 3:22–26 ("The MINDBASE system has the unique ability to store all of the possible relationships that are usually left out of verbal shorthand and all other database systems. The MINDBASE system classifies each word as either a cause, an effect, or a descriptor."); 3:30–33 ("The MINDBASE system can advantageously be provided with a very detailed dictionary routine that classifies all words as causes, effects, or descriptors."). Indeed, the discussion of various language, words, and relationships between words in the examples and Figures provided in the '433 patent is too numerous to recount here, and supports that the database structure described in the '433 patent relates to words in some manner. *See generally* Ex. 1001, *e.g.*, *id.* at 7:63–8:5 (describing an example of "The tall

man drove the car 50 miles per hour"); 8:13–35 (describing an example of cause element "cake" and descriptors such as "round," "chocolate," "square," "sponge"); 11:16–44 (describing an example of "Chef Smith thinly slices the white bread with a serrated knife"); *see* Reply 8–9.

In addition, the title of the '433 patent is "Database Structure Having Tangible and Intangible Elements and Management System Therefor." Ex. 1001, code (54). These tangible data elements are "data elements that refer to things that have physical weight and can be weighed on a scale," and are called "cause" data elements. *Id.* at 7:11–15. Intangible data elements refer to things that do not have weight, and are "effect" data elements (e.g., verbs that either stand alone or are combined with other words), and "descriptors." *Id.* at 7:14–20 (emphasis added). As one example, the '433 patent analyzes the sentence "The tall man drove the car 50 miles per hour," and states that "man" and "car" are tangible cause elements, "drove" or "drove the car" are effect data elements, "tall" is a descriptor that describes "man," and "50 miles per hour" is a descriptor that describes "drove." *Id.* at 7:64–8:5.

Patent Owner's arguments effectively ignore these disclosures in the '433 patent, and focus entirely on the purported database design and functionality of the '433 patent, without further explanation. Moreover, although Dr. Ranka testifies that "LLL is used to interpret or organize text according to agreed-upon rules" and "can be useful in identifying parts of speech in sentences and the like" (Ex. 2001 ¶ 18), Patent Owner does not acknowledge that that is precisely what the '433 patent describes. *See, e.g.*, Ex. 1001, 3:26–35 ("The MINDBASE system can also differentiate between multiple uses of the same word for different parts of speech. For example,

some words like 'book' can be a noun, verb, or an adjective."); *see* Reply 9. We are also persuaded by Petitioner's arguments in Reply, supported by testimony from Dr. Jansen, as to how a person of ordinary skill in the art would have gained LLL experience in June 1997, and credit this testimony. *See* Reply 9–10 (citing Ex. 1057 ¶¶ 14, 29–31).

Moreover, Petitioner provides testimony from Dr. Jansen regarding the level of ordinary skill as reflected in the prior art that explains how its proposed level of skill in the art relates to the '433 patent. *See* Ex. 1002 ¶¶ 56–101; *e.g.*, Ex. 1002 ¶ 56 ("[Natural language processing] systems utilize lexical databases like the database disclosed by the '433 Patent."); ¶ 58 ("That basic premise [a theory and system of natural language processing] tracks exactly the Mindbase technology, which claims to put '[t]he mind's view of a data structure . . . directly into a computer.'") (citing Ex. 1001, Fig. 1a); ¶ 73 ("those skilled in the art of [natural language processing] were implementing systems that performed the same functions as the challenged claims of the '433 Patent . . . [and] lexical databases that categorized words by parts of speech and analyzed the relationship between those words were recognized as a central part of *any* [natural language processing] system").

Patent Owner contends that Dr. Jansen's testimony does not meet Petitioner's burden because it is wholly conclusory. PO Resp. 8–9. According to Patent Owner, Dr. Jansen provides only a single citation to the '433 patent (to Figure 1(a)), which is insufficient to show that the '433 patent includes teachings equivalent to lexical databases, computational linguistics, and computational lexicography. *Id.* We disagree with Patent Owner's arguments. Petitioner provides over 55 paragraphs of testimony

from Dr. Jansen in support of its proposed level of ordinary skill in the art. *See* Ex. 1002 ¶¶ 56–101; *see also* Ex. 1057 ¶¶ 23–31. Throughout this testimony, which is directed to a discussion of the knowledge of a person of ordinary skill in the art, Dr. Jansen refers back to the '433 patent in discussing natural language processing and lexical databases. *See, e.g.*, Ex. 1002 ¶ 56 ("[Natural language processing] systems utilize lexical databases like the database disclosed by the '433 Patent"), ¶ 58 ("[t]hat basic premise [a theory and system of natural language processing] tracks exactly the Mindbase technology, which claims to put '[t]he mind's view of a data structure . . . directly into a computer.'"), ¶ 59 ("[l]ike the '433 Patent, the database described by Pin-Ngern is organized by parts of speech, and 'includes noun, verb, adjective, and adverb sections.'"), ¶ 73 ("Thus, well before 1997, those skilled in the art of [natural language processing] were implementing systems that performed the same functions as the challenged claims of the '433 Patent."). And, as Patent Owner acknowledges, Dr. Jansen cites to Figure 1(a) of the '433 patent, which is "a pictorial description of" the "MINDBASE format" which "is based on the completely detailed information people have in their minds instead of the 'verbal shorthand' that people generally use when speaking or writing." Ex. 1001, 2:65–3:2 ("FIG. 1 is a pictorial description of this process.").

We, therefore, find that the record more strongly supports Petitioner's proposed definition of ordinary skill in the art, rather than Patent Owner's, which appears to selectively ignore large portions of the description provided in the '433 patent. We, therefore, find Petitioner's proposal is consistent with the level of ordinary skill in the art reflected in the '433 patent and by the prior art of record, and, therefore, adopt Petitioner's

proposed level of ordinary skill in the art for purposes of this Decision. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). However, although we apply Petitioner's proposed level of ordinary skill in the art, we would reach the same conclusion under Patent Owner's proposal.

C. Analogous Art

Patent Owner contends that Conlon, Miller, and Beckwith are not analogous art to the claimed invention. PO Resp. 9–11. A reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). *In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992). References are selected as being reasonably pertinent to the problem based on the judgment of a person having ordinary skill in the art. *Id.* ("[I]t is necessary to consider 'the reality of the circumstances,—in other words, common sense—in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor."); *In re Kahn*, 441 F.3d 977, 986-87 (Fed. Cir. 2006). "A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem." *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992).

Patent Owner argues that the '433 patent's field of endeavor "relates generally to the field of database management, and in particular, to a new organizational protocol for creating and manipulating relational databases

and database structures." PO Resp. 9 (citing Ex. 1001, 1:15–18). However, argues Patent Owner, "Conlon, Miller, and Beckwith relate to lexical databases, computational linguistics, and computational lexicography, rather than to database system structures and management systems." *Id.*

As discussed above, we are not persuaded that the '433 patent is as limited as Patent Owner argues. Regardless, Conlon was published in the *Information Processing & Management* journal, and relates to constructing a lexical database, including the organization of the lexical database and the design of the tables that comprise the database. Ex. 1005, 415 (Abstract). As Petitioner points out, Conlon uses an Oracle RDBMS to store and collect information, and manipulate databases using Oracle's SQL forms. Reply 11 (citing Ex. 1057 ¶ 55). Miller's WordNet is described as "Related Research" in Conlon, and Beckwith is related to WordNet. Ex. 1005, 417; Ex. 1016, 302 (stating in the Abstract "WordNet is the lexical database; LexPert is the suite of software tools used to build and access the database"); *see also* Ex. 1057 ¶¶ 56–57. We are persuaded by, and agree with, Petitioner's arguments that Conlon, Miller, and Beckwith all are in the same field of endeavor as the '433 patent. *See* Reply 10–12.

Patent Owner also argues that there are "four reasons to show that [Conlon, Beckwith, and Miller] are not reasonably pertinent to a [person of ordinary skill in the art] of the '433 Patent." PO Resp. 9–10. These four reasons are:

> 1) There is no literal mention of the technology of the proffered prior art within the '433 Patent. 2) There is no mention of innovating database system technology within the proffered prior art. 3) [Petitioner] has not shown that it is possible to substantively relate the '433 Patent disclosure with the technology of the proffered prior art. 4) Dr. Ranka, a data systems expert both currently and in 1997,

> provides extensive evidence that the technology of the '433 Patent, as well as a POSITA, do not relate to the technology of the proffered prior art.

PO Resp. 9–10. Patent Owner again contends that "[t]he art of the '433 Patent pertains to creating and managing a computer database system," but Patent Owner does not provide further explanation as to the problem faced by the inventor of the '433 patent. *See id.* at 10. Rather, Patent Owner's arguments essentially repeat its arguments made with respect to the level of ordinary skill in the art, which, as discussed above, we do not find persuasive. As Petitioner points out, one problem faced by the inventor of the '433 patent "was storing and relating a particular type of data in a database." Reply 12 (citing Ex. 1057 ¶¶ 28, 58–59). For the reasons set forth by Petitioner, which are unrebutted by Patent Owner, we also agree that Conlon, Beckwith, and Miller are reasonably pertinent to this problem. *See id.*

Accordingly, we determine that Conlon, Beckwith, and Miller are analogous art to the '433 patent.

D. Claim Construction

Petitioner contends that all terms should be given their ordinary and customary meaning. Pet. 27. In our Institution Decision, however, we determined that Petitioner had not established a reasonable likelihood that claims 14–19 and 33–40 were unpatentable because Petitioner had not sufficiently shown that Conlon discloses "a dictionary routine for automatically classifying and storing words entered into said database according to said sets and subsets of data elements," as recited in claim 14, and "automatically classifying and storing words entered into said database

according to sets and subsets of data elements," as recited in claim 33. Inst. Dec. 23–27. Following the Institution Decision, Petitioner sought authorization to file supplemental information regarding the construction of claims 14 and 33, which we granted. Papers 11–14.

Petitioner contends that, in our Institution Decision, we did not properly construe these claim terms. The crux of Petitioner's argument is that "dictionary routine" and "automatically classifying and storing" should be interpreted to refer to "*using* a dictionary lookup function, not initially *creating* [the dictionary]." Reply 6–7 (citing Ex. 1057 ¶¶ 44–50).

In the Sur-reply, Patent Owner contends that "[r]ather than precluding automation, [the citations relied upon by Petitioner] necessarily implies that at least some relationships are created automatically." Sur-reply 9. According to Patent Owner, "many other examples exist that support automatic creation," as recited in the claim language. *Id.*

Only terms that are in controversy need to be construed, and then "only to the extent necessary to resolve the controversy." *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))). After reviewing the parties' arguments and evidence, we determine that we do not need to expressly construe any term, including "dictionary routine" and "automatically classifying and storing." As will be discussed below in connection with the analysis of claim 14 (Section III.E.7), we determine that, whether these terms are construed in the sense of using a dictionary lookup function, or initially creating the dictionary, Petitioner has not shown by a preponderance of the evidence that Conlon teaches these limitations.

E. Ground 1: Obviousness Over Conlon

Petitioner contends claims 1, 2, 9, 12–21, 28, and 32–40 would have been obvious over Conlon. Pet. 27–60. We begin by addressing two general arguments raised by Patent Owner, and then turn to analyzing each of the claims and limitations in this ground.

1. Patent Owner's "Database" and Motivation to Combine Arguments

Patent Owner argues that "the word 'database' can have different meanings, depending on the contexts." PO Resp. 5. According to Patent Owner, Conlon includes two different contexts: (1) a lexical database in the context of a collection of related pieces of data or datasets; and (2) an Oracle Relational Database Management System ("Oracle DBMS") in the context of computer software that allows one to query, access, or manipulate data and datasets. *Id.* Patent Owner further cites to the '433 patent, describing the MINDBASE data system, and states that the "unique method of data relationship structuring [of the MINDBASE data system] is not found in any other database system." *Id.* Patent Owner states that "[t]hese distinctions will become apparent." *Id.*

However, Patent Owner fails to tie these purported distinctions to any particular limitation of the challenged claims. *See In re Self*, 671 F.2d 1344, 1348 (CCPA 1982) (rejecting arguments "not based on limitations appearing in the claims"). Patent Owner does not argue, for example, that the preamble of claim 1, which recites a "database," is limiting. Nor does Patent Owner provide a proposed construction for the term "database," or distinguish Conlon's teachings from the *limitations* in the claims.

Patent Owner also argues that there is no motivation to "[t]echnologically [c]ombine Conlon with a DBMS." PO Resp. 11 (emphasis omitted). According to Patent Owner, "simply storing lexical information in a traditional DBMS–as the Conlon reference uses the DBMS–does not innovate the DBMS" because it "does not change the DBMS structure or functionality at all." *Id.* Patent Owner argues that "Conlon certainly does not allege any improvement, innovation, or even change to the DBMS." *Id.*; *see also id.* at 12 ("What Conlon never claims to do–and never claims to attempt to do–is to create a new database design for general computing use.").

Patent Owner's arguments do not address Petitioner's contentions. As Patent Owner admits (PO Resp. 12), Conlon explicitly states that "our lexical database . . . is stored in an Oracle Relational Database Management System." Ex. 1005, 415. Thus, Petitioner is not combining Conlon with an Oracle DBMS – Conlon already explicitly teaches the combination. *See* Reply 12–13. Patent Owner's arguments are again not tied to the limitations in the claims, and do not explain why Conlon does not teach the limitations of the claims. Although Patent Owner states that "[t]he innovations of the '433 Patent could not be stored in the tables of an Oracle database," (PO Resp. 12), Patent Owner does not provide further explanation.

Although we find that Patent Owner's arguments generally fail to tie back to specific claim limitations,[7] to the extent Patent Owner's arguments

[7] Patent Owner takes this approach throughout the Patent Owner Response and Sur-reply. For example, in the Sur-reply, Patent Owner argues generally that the database of information of claim 1 "is 'a product of the innovative technology of the patents-in-suit' and does not simply refer to just any

touch on issues related to specific limitations, we address them in the context of the specific limitations discussed below.

2. Analysis of Independent Claim 1

a) Limitation [1.0]: "A database of information stored in a fixed medium, said database comprising:"

Petitioner asserts that Conlon discloses the preamble. Pet. 29–30 (citing Ex. 1005, 415, 421–425, Table 8; Ex. 1002 ¶ 116). For example, Conlon discloses a "lexical database, which is stored in an Oracle Relational Database Management System" that "contains information about approximately 50,000 word entries." *Id.* at 29.

Patent Owner does not specifically respond to these arguments. *See generally* PO Resp.

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches the preamble.[8]

b) Limitation [1.1]: "a set of tangible data elements, said tangible data elements representing things which have physical weight and can cause an effect"

Petitioner asserts that Conlon discloses this limitation. Pet. 30–32. Specifically, Petitioner asserts that Conlon's "[c]oncrete nouns are tangible

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collection of data," but does not distinguish the teachings of Conlon as relating to the claim limitations. *See, e.g.*, Sur-reply 1–4, 7-–8.

[8] In Reply, Petitioner asserts that the preamble is not limiting. Reply 4. Patent Owner does not argue whether the preamble is limiting or not. *See generally* PO Resp., Sur-reply. Because we find the evidence supports that Conlon teaches the preamble, we make no determination whether the preamble of claim 1 is limiting.

data elements representing things that have physical weight and can cause an effect." *Id.* at 30 (citing Ex. 1002 ¶¶ 119, 120). Dr. Jansen provides unrebutted testimony that "concrete nouns represent 'tangible things,' either things of natural kind (e.g. animals, trees, rock, cloud) or artifacts, things made by men (e.g. vehicles, architecture, machinery, furniture)." Ex. 1002 ¶ 120 (citing Ex. 1009 at 49). Petitioner also relies on Table 9 of Conlon, which depicts a noun table where every noun in the table is a concrete noun. Pet. 30 (citing Ex. 1002 ¶ 121); *see also* Reply 15 (citing to Dr. Ranka's testimony that each data element in Conlon's noun table, if placed on a scale, would have a weight greater than zero).

Patent Owner does not specifically respond to these arguments in the Patent Owner Response. *See generally* PO Resp.[9]

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches limitation [1.1].

[9] In the Sur-reply, Patent Owner appears to address this limitation. *E.g.*, Sur-reply 3 (arguing that the '433 patent does not use the word "noun" and that the '433 patent acts as its own lexicographer in defining the word "tangible."). Because these arguments were not raised in the Patent Owner Response, they are waived. *See* Paper 9 (Scheduling Order), 8 ("Patent Owner is cautioned that any arguments not raised in the response may be deemed waived."); Consolidated Trial Practice Guide 74 (Nov. 2019) ("CTPG"), 94 (same). Nonetheless, similar arguments are addressed below in the context of limitation [1.2], which we find unavailing. We find Patent Owner's arguments here similarly unavailing for the same reasons.

c) *Limitation [1.2]: "a set of intangible data elements, said intangible data elements representing words and concepts which have no physical weight and cannot be weighed"*

Petitioner contends that Conlon discloses limitation [1.2]. Pet. 32. In particular, Petitioner contends that Conlon's verb tables, adjective tables, and adverb tables contain verbs, adjectives, and adverbs that are all intangible data elements representing words and concepts which have no physical weight and cannot be weighed. *Id.* (citing Ex. 1002 ¶¶ 128–129). Petitioner asserts, citing to supporting testimony from Dr. Jansen, that "[b]ecause all verbs, adjectives, and adverbs are necessarily *intangible*, a word's appearance in any one of those tables in Conlon (Tables 11–19) would immediately inform a POSITA that the word has been classified by Conlon as an intangible data element and not a tangible data element." *Id.* (citing Ex. 1002 ¶¶ 129–130).

Patent Owner responds that Petitioner has not provided sufficient explanation as to how Conlon teaches this limitation. PO Resp. 14. Specifically, Patent Owner argues that the word "adverb" is not disclosed in the '433 patent, and the '433 patent "is not based on parts of speech of the English language." *Id.* Patent Owner argues that "[w]hile some claims may include the word 'verb,' it is not used the same way as Conlon . . . [a]nd there are no other parts of speech that are used in the" '433 patent. *Id.* (citing Ex. 2001 ¶ 39).

In the Reply, Petitioner reiterates its contentions, and argues that Patent Owner does not dispute that a verb is an intangible data element satisfying the limitation. Reply 15–17. Petitioner also argues that Patent Owner's argument that the '433 patent is not based on parts of speech "rings hollow." *Id.* at 17.

In the Sur-reply, Patent Owner again argues that the '433 patent does not use words like "adjective" or "adverb," and "does not substitute other words nor analogize the meanings of those other parts of speech." Sur-reply 3. Patent Owner contends that the '433 patent "is its own lexicon in defining the words 'tangible,' 'intangible,' and 'verb.'" *Id.* (citing Ex. 1001, 2:28–48). According to Patent Owner "[t]hose terms are specific to the ['433 patent's] unique categorization of data elements for its database structures and methods." *Id.* Patent Owner argues that the '433 patent "does not use the concepts of noun, adjective, or adverb, because these concepts are inapplicable to the computer database structuring that exists in every [c]laim and paragraph of the '433 Patent." *Id.*

Patent Owner's arguments do not undermine Petitioner's showing, which we find persuasive. *See* Reply 15–18. First, the Specification supports that a "verb" teaches this limitation. Ex. 1001, 7:18–23 ("[i]ntangible data elements are . . . 'effect' data elements . . . [which are] *verbs* that either stand alone or are combined with other words.") (emphasis added). Although Patent Owner contends that "verb" is used differently in Conlon (PO Resp. 14) than in the '433 patent, Patent Owner does not explain how or why. In addition, limitation [1.3], discussed below explicitly recites that an "intangible data element" includes "effect data elements representing *verbs standing alone and in combination with other words*."

Second, contrary to Patent Owner's arguments, the '433 patent does use the word "adjective" and does differentiate between parts of speech: "The MINDBASE system can also differentiate between multiple uses of the same word for different parts of speech. For example, some words like

'book' can be a noun, verb, or an adjective." Ex. 1001, 3:29–34[10]; *see also id. at* 3:32–34 ("This routine also differentiates between uses of the same word for different parts of speech"); *see also* Reply 17.

Moreover, although the '433 patent may not explicitly use the word "adverb," Patent Owner has not explained why an "adverb" or "adjective" does not teach the claimed intangible data elements. Indeed, the disclosure in the '433 patent supports that they do. *See, e.g.*, Ex. 1001, 7:14–25 (describing that "[i]ntangible data elements are . . . 'descriptors' . . . [which are] used to describe either cause elements, effect elements, or the degree of performance of cause elements."); *see also id.* at 7:55–8:5 (describing descriptors and "The tall man drove the car 50 miles per hour" example); *see also* discussion of limitation [1.4] below.

Dr. Ranka's testimony that Petitioner "incorrectly assumes that the intangible elements *are limited to* verbs, adjectives and adverbs," (Ex. 2001 ¶ 39, emphasis added), misunderstands Petitioner's argument. Petitioner asserts that Conlon's verbs, adjectives and adverbs, as set forth above, *teach* the recited intangible data elements, not that intangible data elements are *limited to* verbs, adjectives, and adverbs.

Accordingly, after considering the evidence and arguments of the complete record, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches limitation [1.2].

d) Limitation [1.3]: "said set of intangible data elements including a first subset of effect data elements, said effect data elements representing verbs standing alone and in

[10] As shown, pertinent to limitation [1.1], the '433 patent also uses the word "noun." *See* fn. 9 above.

> *combination with other words, which describe actions, objectives, results, missions, procedures and processes"*

Petitioner asserts that Conlon discloses this limitation. Pet. 32–34; Reply 18–20. Specifically, Petitioner relies on Conlon's Table 14, which is the "Case-frame table" and includes data elements representing (1) the syntactic role of the verb (e.g., subject, direct object, indirect object, object of a preposition); (2) its case (e.g., agent, patient, beneficiary); (3) occurrence (e.g., obligatory, optional, or elliptical); and (4) selectional restrictions (e.g., animate, inanimate, human). Pet. 32–33. Petitioner contends "[t]he WORD column in Table 14 discloses *effect data elements representing verbs standing alone*. The columns SYN-ROLE, CASE, OCCURRENCE, and SELECT-RESTRICT (each of which is associated with the verb in the WORD column) disclose *verbs in combination with other words*. Collectively, the information in Table 14 describes *actions, objectives, results, missions, procedures and processes*." *Id.* at 34 (citing Ex. 1002 ¶¶ 131–134). In the Reply, Petitioner provides a further example as to how Conlon's Table 14 describes that *action* of "selling." Reply 18–20 (citing Ex. 1057 ¶¶ 99–100).

Patent Owner argues that Petitioner "offers no logical explanation for" the equivalence with Conlon's Table 14 and this claim limitation. PO Resp. 14. Patent Owner further argues that Dr. Jansen does not explain how the information in Conlon's Table 14 teaches the claim limitations. *Id.* (citing Ex. 2001 ¶¶ 40–41). Patent Owner does not address this limitation in the Sur-reply. *See generally* Sur-reply.

Patent Owner essentially disputes the sufficiency of Petitioner's showing, but provides no further evidence, *i.e.*, explaining why Conlon's

Table 14 does not teach limitation [1.3].[11] It is well settled that mere attorney arguments and conclusory statements, which are unsupported by factual evidence, are entitled to little probative value. *See Johnston v. IVAC Corp.*, 885 F.2d 1574, 1581 (Fed. Cir. 1989) ("Attorneys' argument is no substitute for evidence."); *Gemtron Corp. v. Saint-Gobain Corp.*, 572 F.3d 1371, 1380 (Fed. Cir. 2009) ("[U]nsworn attorney argument . . . is not evidence and cannot rebut . . . other admitted evidence . . . ."). On this record, such argument does not undermine Petitioner's persuasive showing based on the evidence described above. *See* Pet. 32–34; Reply 18–20.

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches limitation [1.3].

e) *Limitation [1.4]: "said set of intangible data elements including a second subset of descriptive data elements, said descriptive data elements describing said tangible data elements, said effect data elements and degrees of performance of said tangible data elements"*

Petitioner asserts that Conlon discloses this limitation. Pet. 34–35. Specifically, Petitioner contends, with supporting testimony from Dr. Jansen, that Conlon's adjective table (Table 19) includes data elements that are descriptive data elements describing said tangible data elements. *Id.* at 35 (citing Ex. 1002 ¶ 135). Petitioner also contends, with supporting testimony from Dr. Jansen, that Conlon's adverb table (Table 21) contains data elements with information regarding adverb classifications, which are

[11] Dr. Ranka's cited testimony merely replicates Patent Owner's statements in the Patent Owner Response and does not provide further substance.

descriptive data elements describing effect data elements and degrees of performance of said tangible data elements. *Id.* (citing Ex. 1002 ¶¶ 136–137); *see also* Reply 20–21 (discussing Dr. Ranka's testimony that in the example of "Chef Smith thinly slices the white bread with a serrated knife," from the '433 patent, "white" is an "adjective" describing "bread," and "thinly" is an "adverb" describing "slices.").

Patent Owner argues that the '433 patent "is not reliant on English grammar, nor is it restricted to language at all." PO Resp. 14. According to Patent Owner, the claim "like the rest of the '433 Patent, is not based on lexical constructs, and that is why [Dr. Jansen] cannot explain in substantive detail how the claim language might be represented by the Conlon lexical database." *Id.* at 15–16.

Patent Owner's arguments are similar to those made in connection with limitation [1.2], described above, and for the same reasons, we find that they do not undermine Petitioner's showing. After considering the evidence and arguments of the complete record, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches limitation [1.4].

f) Conclusion

For the reasons discussed above, we determine, on the current record and for purposes of this decision, that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches all of the limitations in claim 1.

3. Analysis of Dependent Claim 2

Claim 2 depends from claim 1 and recites "each tangible data element is linked to each said effect data element partially or wholly caused by said

tangible data element" (limitation [2.1]) and "each effect element is linked to each said tangible data element required for said effect to occur" (limitation [2.2]). Ex. 1001, 35:30–35.

Petitioner contends that Conlon discloses these limitations. Pet. 36–39. In particular, Petitioner, supported by testimony from Dr. Jansen, contends that Conlon discloses linking related data elements, including linked relationships between subjects (nouns) and verbs, and provides several examples supporting this contention. *Id.* (citing Ex. 1005, 421, 422, 426; Ex. 1002 ¶¶ 138–142).

Patent Owner does not separately argue dependent claim 2 in the Patent Owner Response. *See* PO Resp. 15. In the Sur-reply, however, Patent Owner argues for the first time that that Conlon does not teach the limitations in claim 2. Sur-reply 8–9.

Patent Owner did not raise these arguments in the Patent Owner Response, and Petitioner did not further address claim 2 in the Reply. *See generally* PO Resp.; Reply. Accordingly, we view this argument as waived. *See* CTPG 74 ("Generally, a reply or sur-reply may only respond to arguments raised in the preceding brief . . . . While replies and sur-replies can help crystalize issues for decision, a reply or sur-reply that raises a new issue or belated presents evidence may not be considered.")

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches the limitations in claim 2.

4. Analysis of Dependent Claim 9

Claim 9 depends from claim 1 and recites "wherein each said data element is stored only once." Ex. 1001, 35:51–52. Petitioner relies on Conlon's disclosure that "[t]he addition of material from other sources . . . [has] *not increased the number of words and phrases*," due to Conlon performing "lexical disambiguation" by assigning a "unique identifier." Pet. 39 (citing Ex. 1005, 421–422, 427, Table 8; Ex. 1002 ¶ 149).

Patent Owner responds that "Conlon says it does not increase the number of words and phrases, and that a 'lexical disambiguation[']is assigned a unique identifier," but "Conlon does *not* state that it stores each lexical disambiguation only once." PO Resp. 15. According to Patent Owner "Conlon does not preclude storing lexical disambiguations i[n] multiple tables, as one single example. The lexical disambiguation, unique identifier, and any other information could very well be stored many times according to Conlon." *Id.*

Petitioner replies that Dr. Jansen testified that Conlon's unique identifier is assigned "so as not to duplicate identical data elements." Reply 21 (citing Ex. 1002 ¶ 149) (emphasis omitted); *see also* Ex. 1057 ¶ 114 (Dr. Jansen providing further explanation why Conlon does not store the data elements in multiple locations). Petitioner argues that Patent Owner does not identify anywhere in Conlon where the same data element appears to be stored more than once, and, moreover, the mere "appearance" of a data element in two locations does not mean it is 'stored' more than once." Reply 22 (citing Ex. 1002 ¶ 149 (Dr. Jansen testifying that pointers may be used); Ex. 1057 ¶¶ 115–119 (Dr. Jansen testifying that pointers allow data elements to appear twice but be stored only once).

In the Sur-reply, Patent Owner states "[f]or additional bases, the following claims are not disclosed in the proffered prior art. Claims 9, 12, and 13 are not disclosed by the proffered prior art," and cites to Dr. Ranka's Rebuttal Declaration ¶¶ 70–77. Sur-reply 10.

Initially, we note that Patent Owner's reliance on seven paragraphs of Dr. Ranka's Rebuttal Declaration[12] is an improper incorporation by reference, as Patent Owner did not discuss that testimony in the Sur-reply. 37 C.F.R. § 42.6(a)(3); *Cisco Systems, Inc. v. C-Cation Techs.*, LLC, IPR2014-00454, Paper 12 at 9–10 (PTAB Aug. 29, 2014) (informative). Accordingly, we will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration.

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches the limitations in claim 9.

5. Analysis of Dependent Claim 12

Petitioner contends that dependent claim 12, which depends from claim 2, would have been obvious over Conlon, and provides explanation as to how Conlon teaches each claim limitation. Pet. 39–41.

Patent Owner does not separately argue dependent claim 12 in the Patent Owner Response. PO Resp. 15. In the Sur-reply, however, Patent Owner argues for the first time that that Conlon does not teach the limitations in claim 12. Sur-reply 10. Patent Owner also states "[f]or

[12] Dr. Ranka's Rebuttal Declaration will be further discussed below, in connection with Petitioner's Motion to Strike.

additional bases, the following claims are not disclosed in the proffered prior art. Claims 9, 12, and 13 are not disclosed by the proffered prior art," and cites to Dr. Ranka's Rebuttal Declaration ¶¶ 70–77. *Id.*

For the same reasons as discussed above with respect to claim 2, we consider Patent Owner's belated arguments as to claim 12 waived. As stated above with respect to claim 9, we also will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration.

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches the limitations in claim 12.

6. Analysis of Dependent Claim 13

Claim 13 depends from claim 2 and recites "wherein at least one of each said link between a tangible data element and an intangible data element is itself linked to at least one specific degree of performance that describes in more detail said cause-effect relationship established by said at least one link between a tangible data element and an intangible data element." Ex. 1001, 36:1–6.

Petitioner contends Conlon discloses this limitation. Pet. 41–44. Petitioner contends that Conlon's database includes information from the Indiana adverbs lists, and Conlon discloses a semantic structure (Frame D) that shows a link between a tangible data element and an intangible data element (SUBJECT NOUN + FINITE VERB), which is itself linked to at least one specific degree of performance (+ ADVERB) that describes in more detail the cause-effect relationship. *Id.* at 41–42 (citing Ex. 1005,

419). According to Petitioner, the adverbs in the lexical database are linked via the Frame D relationship to the noun-verb pair, not merely to the verb standing alone. *Id.* at 42 (citing Ex. 1002 ¶ 155). Petitioner contends that Conlon either discloses the claimed "links for each cause-effect (noun-verb) pair or, at a minimum, renders such links obvious in view of the Indiana adverb lists and Jacobson's dictionary, as well as Conlon's stated desire to provide 'detailed and explicit information about words and phrases' and to 'find terms related to any given word.'" *Id.* at 44 (citing Ex. 1005, 415, 421; Ex. 1002 ¶ 158); *see also id.* at 42–44.

Patent Owner argues in the Patent Owner Response[13] that Petitioner "attempts to equate 'degree of performance' with 'adverbs' . . . [b]ut there is no such equation in the '433 Patent, as the patent does not even include the word 'adverb.'" PO Resp. 16; *see also* Ex. 2001 ¶¶ 51–53. Patent Owner further argues that "[Petitioner] here attempts to restrict the scope of the '433 Patent to English grammar." PO Resp. 16.

In the Reply, Petitioner argues that "Patent Owner never factually disputes that English words disambiguated as adverbs *fall within the scope of* degree of performance." Reply 22. Petitioner contends that "[a]dverbs in English are a *species* that fall within the claimed genus of degrees of

[13] As previously stated with respect to claims 9 and 12, in the Sur-reply Patent Owner states "[f]or additional bases, the following claims are not disclosed in the proffered prior art. Claims 9, 12, and 13 are not disclosed by the proffered prior art," and cites to Dr. Ranka's Rebuttal Declaration ¶¶ 70–77. Sur-reply 10. However, as previously stated, we will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration.

performance." *Id.* (citing Ex. 1057 ¶ 127). Petitioner further argues that Dr. Ranka agrees that "thinly" in the '433 patent's exemplary sentence "Chef Smith thinly slices the white bread with a serrated knife" is an adverb. *Id.* (citing Ex. 1057 ¶¶ 124–125; Ex. 1001, 11:19–41 ("'Thinly' . . . is the degree of performance of these cause elements.").

We agree with Petitioner, for the reasons set forth by Petitioner, as well as reasons previously discussed above with respect to limitations [1.2] and [1.4]. After considering the evidence and arguments of the complete record, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches the limitations in claim 13.

7. Analysis of Independent Claim 14

For limitations [14.0], [14.1], and [14.2], Petitioner relies on the same analysis as discussed above for limitations [1.0]–[1.4]. *See* Pet. 45.

Limitation [14.3] recites "a dictionary routine for automatically classifying and storing words entered into said database according to said sets and subsets of data elements." Ex. 1001, 36:22–24.

Petitioner contends Conlon discloses limitation [14.3]. Pet. 45–48. Specifically, Petitioner argues that Conlon "discloses a sub-program or function within a larger program for looking up words in a dictionary which automatically classifies and stores words entered into the [lexical database] and differentiates between uses of the same word for different parts of speech." *Id.* at 45 (citing Ex. 1002 ¶ 164). Petitioner asserts that Conlon "gives an example of looking up the word *chip* in homograph number 1 and sense number 1 . . . which yields the word's definition (Table 2) and also its lexical information, including that it is a concrete noun (Table 3)." *Id.* at 47–48 (citing Ex. 1005, 418–419); *see also* Ex. 1002 ¶ 167 (citing Ex. 1005,

¶¶ 418–419). Petitioner further contends that "Conlon's dictionary routine automatically generates a unique value (e.g., the information shown in Tables 2–3) in response to the entry of a unique key (e.g., *chip*, H#1, S#1)." Pet. 47–48 (citing Ex. 1002 ¶ 167).

In the Institution Decision, we determined that Petitioner had not sufficiently shown that Conlon discloses this limitation, because Petitioner's assertions that Conlon performs its classification *automatically* are not supported by the record. Inst. Dec. 23–25 (citing, e.g., Ex. 1005, 418, 423, 427). For example, we relied upon Conlon's disclosure that "[i]n order to translate knowledge from machine-readable dictionaries into a form usable in a lexical database, it must be analyzed and formalized in order to make it sufficiently explicit for machine use. We have performed this analysis by semiautomatic methods. For example, the definition of 'chip' in homograph number 1 and sense number 1 provided by CED is shown in Table 2." *Id.* at 24–25 (citing Ex. 1005, 418). As set forth in the Institution Decision (Inst. Dec. 25), Conlon then further affirms that the chip example is semi-automatic: "After analyzing this definition semi-automatically, we have been able to create explicit information about 'chip.'" Ex. 1005 at 418; *see also id.* at 423 ("Unfortunately, it is not possible to classify verbs automatically by analyzing machine-readable dictionary definitions. Currently, we are therefore in the process of generating this information by hand."); *id.* at 427 ("We are trying to automate this process, but most of the time human intervention is necessary. Different strategies are required for different sources, which complicates this task.").

In the Reply, Petitioner argues that limitation [14.3] "refers to using a dictionary look up function to look up words and their syntax (after the

words are already known by the database.)" Reply 23. In other words, Petitioner contends that this limitation refers to using a dictionary look up function rather than to the creation of the dictionary. *Id.* at 6–7. Petitioner reiterates its reliance on Tables 2–3 of Conlon, and, relying on the testimony of Dr. Jansen, asserts that this "is an example of SQL 'querying' in the Oracle RDBMS used by Conlon." *Id.* at 23–24 (citing Ex. 1057 ¶¶ 135–136). Petitioner asserts that "[w]hen an SQL query is entered using Oracle RDBMS, the query is stored both in a printed report and in a saved file." *Id.* at 24 (citing Ex. 1003 ¶ 137).

We determine that, under either interpretation of this limitation (i.e., whether automatically classifying and storing terms entered into said database occurs during the creation of the dictionary, or as the result of using a look up table), that Petitioner has not shown by a preponderance of the evidence that Conlon teaches this limitation.

Petitioner, relying on testimony from Dr. Jansen, asserts that Conlon's Table 2 and Table 3 are "examples of looking up the word chip in homograph number 1 and sense number 1." Ex. 1002 ¶ 167; Ex. 1057 ¶ 136. However, Conlon does not describe Table 2 and Table 3 as looking up the word chip, or as a query. Tables 2 and 3 are in Section 3, titled "Sources of Information," under sub-section 3.1, titled "Machine-readable dictionaries." Ex. 1005, 418–419. These sections, quoted above, describe the process of translating knowledge from a machine-readable dictionary into a form usable in a lexical database, and describe this process as semi-automatic, not automatic. *Id.* at 418. Conlon refers to the "definition" of "chip," and states that "[a]fter analyzing this definition semi-automatically, *we have been able to create explicit information about 'chip.'*" *Id.*

(emphasis added). Table 2 of Conlon, thus refers to the definition of "chip" and Table 3 of Conlon refers to the lexical information of "chip" *that has been created* by semi-automatic methods. Conlon does not describe these as "examples of looking up the word 'chip,'" as Petitioner and Dr. Jansen asserts, and we are not persuaded this is an accurate representation of Conlon's disclosure.

However, even if we accept that a user may look up any word in Conlon's lexical database to find its meaning or other information (*see* Ex. 1002 ¶ 166), Petitioner has not shown how looking up a word, e.g., the word "chip," discloses limitation [14.3]. Dr. Jansen testifies that "Conlon gives an example of using a dictionary routine to look up the word 'chip' in homograph number 1 and sense number 1, *which yields both the word's definition (Table 2) and the word's lexical information*, including that it is a concrete noun (Table 3)." Ex. 1057 ¶ 136 (emphasis added). Dr. Jansen further testifies that any SQL query and its output are stored by the Oracle RDBMS. *Id.* ¶ 137. However, neither Petitioner, nor Dr. Jansen, explains how yielding the word's definition and lexical information, and storing the SQL query, discloses *automatically classifying and storing words entered into said database*. Specifically, Petitioner has not shown how this shows *automatically classifying* the word that has been entered (i.e., looked up).

After considering the evidence and arguments of the complete record, we determine that Petitioner has not shown, by a preponderance of the evidence, that Conlon teaches limitation [14.3].

8. Analysis of Dependent Claims 15–19

Petitioner contends that dependent claims 15–19, which depend directly or indirectly from independent claim 14, would have been obvious

over Conlon, and provides explanation as to how the prior art teaches each claim limitation. Pet. 49–53.

As these claims depend from claim 14, we find that, for the same reasons as set forth for claim 14, that the Petitioner has not shown, by a preponderance of the evidence, that Conlon teaches the limitations in claims 15–19.

9. Analysis of Independent Claim 20 and Dependent Claims 21, 28, and 32

Petitioner contends that independent claim 20 would have been obvious over Conlon, largely for the same reasons as set forth in independent claim 1, and provides explanation as to how the prior art teaches each claim limitation. Pet. 54–55.

Patent Owner argues that "Conlon's lexical-database is not a DBMS and cannot, by itself, disclose DBMS functionality such as the 'storing' recited in Claim 20." PO Resp. 17. According to Patent Owner, "DBMS functionality is needed to disclose 'storing,' and [Petitioner] here relies solely on a lexical database, which cannot by itself perform DBMS functionality." *Id.* (citing Ex. 2001 ¶¶ 60–61).

As previously discussed, we agree with Petitioner that Conlon combines its lexical database with a DBMS, i.e., the Oracle RDBMS. Reply 25 (citing Ex. 1057 ¶ 75); *see* Ex. 1005, 415 ("We describe the organization of our lexical database, which is stored in an Oracle Relational Database Management System and the design of the tables that comprise the database."). We, therefore, find that Patent Owner's arguments do not undermine Petitioner's contentions.

Similarly, Petitioner contends that dependent claim 21 would have been obvious over Conlon, for the same reasons as set forth in dependent claim 2. Pet. 55. Petitioner also contends that dependent claim 28 would have been obvious over Conlon, for the same reasons as set forth in dependent claim 9, and dependent claim 32 would have been obvious over Conlon, for the same reasons as set forth in dependent claim 13. *Id.* at 56.

Patent Owner does not separately argue claims 21, 28, and 32 in the Patent Owner Response. *See generally* PO Resp. In the Sur-reply, Patent Owner states "[c]laims 20, 21, 28, and 32 are not disclosed by the proffered prior art" and cites to paragraphs 84–91 of the Ranka Rebuttal Declaration. Sur-reply 10.

As discussed above, we will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration. After considering the evidence and arguments of the complete record, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches the limitations in claims 20, 21, 28, and 32.

10. Analysis of Independent Claim 33 and Dependent Claims 34–40

Petitioner contends that independent claim 33 would have been obvious over Conlon, largely for the same reasons as set forth in independent claim 1 and independent claims 14 and 20, and provides explanation as to how the prior art teaches each claim limitation. Pet. 56–57. Petitioner contends that dependent claims 34–40, which depend directly or indirectly from independent claim 33, would have been obvious over Conlon, and provides explanation as to how the prior art teaches each claim limitation. *Id.* at 57–60.

We find that, for the same reasons as set forth for claim 14, regarding the requirement of "automatically classifying and storing words entered said database," that Petitioner has not shown, by a preponderance of the evidence, that Conlon teaches the limitations in claims 33–40.

11. Summary of Ground 1

Having considered the *Graham* factors,[14] including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the challenged claims, we are persuaded, based on the current record, that Petitioner has shown, by a preponderance of the evidence, that claims 1, 2, 9, 12, 13, 20, 21, 28, and 32 would have been obvious over Conlon, but *has not* shown, by a preponderance of the evidence, that claims 14–19 and 33–40 would have been obvious over Conlon.

F. Ground 2: Obviousness Over Conlon and Miller

Petitioner contends claims 3–6, 8, 10, 11, 22–25, 27, 29–31, 41, and 42 would have been obvious over the combination of Conlon and Miller. Pet. 60–73.

1. Analysis of Dependent Claims 3 and 4

Claim 3 depends from claim 1 and recites "wherein all said data elements are stored in hierarchical structures of parent-child relationships." Ex. 1001, 35:36–38.

Petitioner contends Miller teaches the limitations in claim 3. Pet. 63–64. Specifically, Petitioner contends that Miller discloses a "lexical tree" that "can be reconstructed by following trails of superordinate terms:

[14] Patent Owner does not submit evidence of secondary considerations. *See generally* PO Resp.

oak@→tree@→plant@→organism, for example, where '@→' is the transitive, asymmetric, semantic relation that can be read 'is a' or 'is a kind of.'" Pet. 63 (citing Ex. 1013, 247). Petitioner also asserts that "Miller further discloses that 'this design creates a sequence of levels, a hierarchy, going from many specific terms at the lower levels to a few generic terms at the top' and that '[h]ierarchies provide conceptual skeletons for nouns; information about individual nouns is hung on this structure like ornaments on a Christmas tree.'" *Id.* Petitioner argues that "any data element at the lower level of this *hierarchal structure* can be said to be the *child*, whereas the more generic term above it is its *parent*. The parent and child are related by the 'is a' or 'is a kind of' semantic relation represented by '@→.'" *Id.* at 63–64 (citing Ex. 1002 ¶¶ 225–226). Petitioner asserts that "[i]t would have been obvious to extend this parent-child organizational structure beyond the nouns in Miller and to apply it to *all said data elements* in the database, as motivated by Conlon and others." *Id.* at 64, (citing Ex. 1005, 421; Ex. 1002 ¶¶ 226–227). Petitioner argues that one of ordinary skill in the art would have naturally looked to Miller for guidance regarding how to implement a lexical inheritance system such as the described by Conlon, and would have a reasonable expectation of success in organizing Conlon's database entries in accordance with Miller's hierarchical semantic organization. *Id.* at 61–63 (citing Ex. 1002 ¶¶ 220–224).

Claim 4 depends from claim 3 and recites "wherein each said tangible data element having any children in said hierarchal structure must have at least two of said children." Ex. 1001, 35:39–41.

Petitioner contends Miller teaches the limitations in claim 4. Pet. 64–65. Specifically, Petitioner contends that in Miller's

oak@→tree@→plant@→organism example, the word *plant* has two children: *tree* and *oak* (albeit on different levels of the hierarchy). *Id.* at 64 (citing Ex. 1013, 247; Ex. 1002 ¶ 228). Petitioner also contends that Miller's Figure 1 depicts that each tangible data element has at least two children. *Id.* at 64–65 (citing Ex. 1013, Fig. 1, 252; Ex. 1002 ¶¶ 228–229).

Patent Owner does not separately argue claims 3 and 4 in the Patent Owner Response. *See generally* PO Resp. In the Sur-reply, Patent Owner states "[c]laims 3–5 are not disclosed by the proffered prior art" and cites to paragraphs 103–109 of the Ranka Rebuttal Declaration. Sur-reply 10.

As discussed above, we will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration. After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that the combination of Conlon and Miller teaches the limitations in claims 3 and 4, and that a person of ordinary skill in the art would have had a reason to combine the references in the manner Petitioner proposes, with a reasonable expectation of success.

2. Analysis of Dependent Claim 5

Claim 5 depends from claim 3 and recites "wherein each said effect data element can have any number of children in said hierarchical structure." Ex. 1001, 35:42–44.

Petitioner contends Miller teaches the limitations in claim 5. Pet. 65. Petitioner asserts that Figure 2 of Miller shows one or two children on any given level of the hierarchy. *Id.* at 65–66 (citing Ex. 1013, 260; Ex. 1002 ¶¶ 230–231).

In its Response, Patent Owner argues that "Miller restricts the number of hierarchical children to one or two, while the ['433 patent] recites 'any number of children.'" PO Resp. 18 (citing Ex. 2001 ¶¶ 66–69).

In the Reply, Petitioner relies again on Figure 1 of Miller, which shows "seven unique beginners denoting different kinds of tangible things." Reply 29. According to Petitioner, "each beginner represents thousands of nouns in WordNet," so the "number of nouns (effect data elements) represented by these beginners is huge—with *thousands* of children under each parent—not just 'one or two.'" *Id.* (citing Ex. 1013, 245) (emphasis omitted).

In the Sur-reply, Patent Owner states "[c]laims 3–5 are not disclosed by the proffered prior art" and cites to paragraphs 103–109 of the Ranka Rebuttal Declaration. Sur-reply 10.

As discussed above, we will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration. After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that the combination of Conlon and Miller teaches the limitations in claim 5, and that a person of ordinary skill in the art would have had a reason to combine the references in the manner Petitioner proposes, with a reasonable expectation of success.

3. Analysis of Independent Claim 41 and Dependent Claims 6, 8, 10, 11, 22–25, 27, 29–31, 42

Petitioner relies on its analysis for claims 1–5 for limitations in independent claim 41. Pet. 71–72. In addition, Petitioner asserts that

Miller's Figure 2 discloses an example of a hierarchical structure defining vertical lines and horizontal levels. *Id.* (citing Ex. 1013, 260). Petitioner further asserts that "organizing parent-child relationships in structures defining vertical line and horizontal levels was well known in the field of lexical databases and would have been obvious to implement in the [lexical database] of Conlon." *Id.* at 73 (citing Ex. 1002 ¶¶ 264–265; Ex. 1009, 109–111). Petitioner contends that dependent claims 6, 8, 10, 11, 22–25, 27, 29–31, and 42, which depend directly or indirectly from independent claims 1, 20, and 41, would have been obvious over Conlon and Miller, and provides explanation as to how the prior art teaches each claim limitation. *Id.* at 66–71, 73.

Patent Owner does not separately argue these claims in the Patent Owner Response. PO Resp. 18–21. In the Sur-reply, Patent Owner states "[c]laim 41 is not disclosed by the proffered prior art" and cites to paragraphs 110–111 of the Ranka Rebuttal Declaration, and "[c]laims 6, 8, 10, 11, 22–25, 27, 29–31, and 42 are not disclosed by the proffered prior art" and cites to paragraphs 112–139 of the Ranka Rebuttal Declaration. Sur-reply 10.

As discussed above, we will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration. After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that the combination of Conlon and Miller teaches the limitations in claims 6, 8, 10, 11, 22–25, 27, 29–31, 41, and 42, and that a person of ordinary skill in the art would have had a reason to combine the

references in the manner Petitioner proposes, with a reasonable expectation of success.

4. Summary of Ground 2

Having considered the *Graham* factors, including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the challenged claims, we are persuaded, based on the current record, that Petitioner has shown, by a preponderance of the evidence, that claims 3–6, 8, 10, 11, 22–25, 27, 29–31, 41, and 42 would have been obvious over Conlon and Miller.

G. Ground 3: Obviousness Over Conlon, Miller, and Beckwith

Petitioner contends claims 7 and 26 would have been obvious over the combination of Conlon, Miller, and Beckwith. Pet. 74–77.

Claim 7 depends from claim 3 and recites "wherein said hierarchal structure is an outline." Ex. 1001, 35:47–48. Claim 26 depends from claim 22 and recites similar limitations. *Id.* at 37:28–30.

As explained above, Petitioner relies on Conlon and Miller as teaching the limitations of claims 3 and 22. *See supra* §§ III.F.1, III.F.3. Petitioner asserts that Beckwith teaches the additional limitations in claims 7 and 26. Pet. 76–77. Petitioner argues that Beckwith's Table 2 teaches a hierarchical structure of words organized in the form of an outline. *Id.* at 76 (citing Ex. 1016, 305, 308; Ex. 1002 ¶ 273). Petitioner asserts that Beckwith's outline structure can be applied to Conlon's example of "Rhode Island Red" IS-A "chicken" and "chicken" IS-A "bird." *Id.* at 77 (citing Ex. 1002 ¶¶ 274–275, Ex. 1005, 426). Petitioner argues that one of ordinary skill "seeking to build a 'good [lexical database]' per Conlon, and who is familiar with Miller's description of hierarchical noun structures in

WordNet, would have readily looked to Beckwith." *Id.* at 75. Petitioner contends that Beckwith describes the same lexical database as Miller (WordNet), was co-authored by the same person (George A. Miller), and was published together with Miller in the same journal issue. *Id.* at 75–76 (citing Ex. 1002 ¶¶ 270–272). Petitioner additionally asserts that "[o]rganizing Miller's hierarchical structures in outline form constitutes the use of a known technique to improve similar systems in the same way, or the application of a known technique to a known system ready for improvement to yield predictable results." *Id.* at 76.

Patent Owner does not separately argue these claims in the Patent Owner Response. *See* PO Resp. 18–21. In the Sur-reply, Patent Owner states "[c]laims 7 and 26 are not disclosed by the proffered prior art" and cites to paragraphs 140–145 of the Ranka Rebuttal Declaration. Sur-reply 10. As stated above, we will not consider these arguments, which are improperly incorporated by reference.

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that the combination of Conlon, Miller, and Beckwith teaches the limitations in claims 7 and 26. Therefore, having considered the *Graham* factors, including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the challenged claims, we are persuaded, based on the current record, that Petitioner has shown, by a preponderance of the evidence, that claims 7 and 26 would have been obvious over Conlon, Miller, and Beckwith, and that a person of ordinary skill in the art would

have had a reason to combine the references in the manner Petitioner proposes, with a reasonable expectation of success.

H. Ground 4: Obviousness Over Conlon, Miller, and Fong

Petitioner contends claims 43–46 would have been obvious over the combination of Conlon, Miller, and Fong. Pet. 77–86.

1. Analysis of Dependent Claim 43

Petitioner contends Conlon teaches limitations [43.0], [43.1], [43.1.1], [43.1.2], and [43.2] of claim 43. Pet. 79–83. With respect to the claimed "normalizing," Petitioner generally asserts that to the extent that Conlon does not expressly state that "normalizing" is performed, a person of ordinary skill in the art "would have immediately recognized that the above-described relational structures necessarily involved normalization," "normalization was an obvious and beneficial technique for building such structures," and "normalization would have been necessary or at least obvious." *Id.* (citing Ex. 1029 at 75–76, Ex. 1002 ¶¶ 293–295, 298–302; Pet. 78–79). In support, Petitioner relies on Fong to teach the claimed "normalizing." *Id.* at 78–79.

Limitation [43.3] recites "comparing each of said normalized databases with each other one of said normalized databases." Ex. 1001, 39:23–24. Petitioner asserts that "[o]nce the information has been normalized as taught by Fong, the next necessary step is to compare the normalized information." Pet. 83 (citing Ex. 1002 ¶ 303).

Limitation [43.4] recites "recording all common data elements found during each said comparing step." Ex. 1001, 39:25–26. Petitioner asserts that "[i]n order to combine entities with the same or equivalent identifiers as

taught by Fong, a POSITA would next record all common data elements found during the comparing step." Pet. 83 (citing Ex. 1002 ¶ 304).

Limitation [43.5] recites "recording one location of each said common data element in each of said databases." Ex. 1001, 39:27–28. Petitioner asserts that "[a]s explained above for claim 9, in Conlon, each data element is stored only once in the main table. Entities with the same or equivalent identifiers are combined and recorded once in the main table." Pet. 83 (citing Ex. 1002 ¶ 305).

In our Institution Decision, we determined that Petitioner had not sufficiently shown, for purposes of institution, that the references teach limitations [43.3], [43.4], and [43.5], so Petitioner had not established a reasonable likelihood of prevailing with respect to claim 43. Inst. Dec. 38–41. Specifically, we found that Petitioner had not identified with particularity how the references, particularly Fong, teach these limitations, and that Petitioner's position was confusing and vague. *Id.*

In the Reply Brief, Petitioner provides a detailed example, created by Dr. Jansen, purportedly explaining the principles from Fong and another reference, Hansen, and explaining how Fong's four conditions disclose limitations [43.1]–[43.5].[15] Reply 31–35. Petitioner also submits additional testimony from Dr. Jansen. *See* Ex. 1057 ¶¶ 222–261.

"It is of the utmost importance that petitioners in . . . IPR proceedings adhere to the requirement that the initial petition identify 'with particularity' the 'evidence that supports the grounds for the challenge to each claim.'" *Intelligent Bio–Systems*, 821 F.3d at 1369 (citing 35 U.S.C. § 312(a)(3)).

[15] Hansen, et al., Database Management and Design (2d ed. 1996) (Ex. 1034). Dr. Jansen cited to Hansen in paragraph 289 of Exhibit 1002.

"[T]he expedited nature of IPRs bring[s] with it an obligation for petitioners to make their case in their petition to institute. While the Board's requirements are strict ones, they are requirements of which petitioners are aware when they seek to institute an IPR." *Id.*; *see also* CTPG 73 ("Petitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g. to make out a prima facie case of unpatentability . . . [but] [a] party may submit rebuttal evidence in support of its reply."); 74 ("Generally, a reply or sur-reply may only respond to arguments raised in the preceding brief. 37 C.F.R. § 42.23 . . . . 'Respond,' in the context of 37 C.F.R. § 42.23(b), does not mean proceed in a new direction with a new approach as compared to the positions taken in a prior filing. While replies and sur-replies can help crystalize issues for decision, a reply or sur-reply that raises a new issue or belatedly presents evidence may not be considered."); *see also Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1078–80 (Fed. Cir. 2015) (holding that the Board may rely on new evidence submitted with a reply because the evidence was legitimately responsive to patent owner's arguments *and not needed for a prima facie case of obviousness*) (emphasis added).

Petitioner's arguments and explanation regarding the disclosures in Hansen and Fong, and Dr. Jansen's example explaining this disclosure, were not made in the Petition. *Compare, e.g.*, Pet. 83 (analysis of limitations [43.3], [43.4], [43.5], *with* Reply 33–35 (analysis of limitations [43.3], [43.4], [43.5]); *compare* Ex. 1002 ¶¶ 290–305 (Dr. Jansen's testimony regarding claim 43), *with* Ex. 1057 ¶¶ 222–261 (Dr. Jansen's rebuttal testimony regarding claim 43). At the hearing, Petitioner stated that the Reply went "deeper into [the] analysis," so "the thrust of the analysis did not

change." *See* Tr. 53:1–8. Petitioner stated that "[i]t is an inherency argument, just like the very beginning, relying precisely on the Fong Conditions 3 and 4." *Id.* at 53:6–8. However, inherency is not argued in the Petition, and we note that the arguments in the Reply, and evidence relied upon, including Dr. Jansen's Rebuttal Declaration, is significantly more detailed. *See* Pet. 78–83; Reply 31–35.

Inherency requires that "the limitation at issue necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art." *PAR Pharms., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1195–1196 (Fed. Cir. 2014). Although in the Petition, Petitioner stated generally that "normalization would have been necessary," and refers to "the next necessary step" in its analysis of limitation [43.3] (*see* Pet. 81–83), Petitioner did not state that limitations [43.4] and [43.5] were "necessary," Petitioner did not explain why "normalization" or limitation [43.3] were "necessary" (*see* Inst. Dec. 39–40), nor did Petitioner mention or provide an inherency analysis in its analysis of limitations [43.3–43.5]. Pet. 83. To that end, the Petition was deficient, and, as stated in the Institution Decision, "confusing and vague." *See Intelligent Bio–Systems*, 821 F.3d at 1369 (citing 35 U.S.C. § 312(a)(3)); Inst. Dec. 39–40.

We note that, in the Reply, Petitioner also does not state that the limitations are "inherent." *See* Reply 33–35. However, Petitioner now does state that each of limitations [43.3], [43.4], and [43.5] is "necessary." *Id.* Petitioner also provides additional "inherency-like" evidence in Dr. Jansen's Rebuttal Declaration. *See, e.g.*, Ex. 1057 ¶ 252 ("Sitting here today, I cannot think of a way of ensuring compliance with Fong's third and fourth conditions without **comparing** such entities with one another."); ¶ 256

("Sitting here today, I cannot think of a way of ensuring compliance with Fong's third and fourth conditions without **recording** each occurrence of two or more entities being the same or equivalent, given that such entities must ultimately be combined."); ¶ 260 ("Sitting here today, I cannot think of a way of ensuring compliance with Fong's third and fourth conditions without *recording one location* of the entities you wish to combine."). This argument and evidence would have been needed to support a prima facie case of unpatentability, including how the cited prior art teaches limitations [43.3], [43.4], and [43.5], if Petitioner intended to rely on an inherency theory.

Petitioner's attempt to supplement the Petition to make out a prima facie case of unpatentability via new arguments and evidence in the Reply is improper. Although "the Board will permit the petitioner, in its reply brief, to address issues discussed in the institution decision," Petitioner in the Reply does not merely "respond" to the issues discussed in our Institution Decision but instead "proceed[s] in a new direction with a new approach as compared to the positions taken in" the Petition by introducing in the Reply new argument and evidence not presented in the Petition regarding how limitations [43.3], [43.4], and [43.5] are "necessary" or inherent. *See* CTPG 73, 74. We decline to consider these late arguments and evidence. After considering the properly presented evidence and arguments of the complete record, we determine that Petitioner has not shown, by a preponderance of the evidence, that the combination of Conlon, Miller, and Fong teaches limitations [43.3–43.5].

2. Analysis of Dependent Claims 44–46

Claim 44 depends from claim 41, and recites, in part "proceeding with said integrating if respective top level data elements in said heterogenous databases and said parts thereof are substantially the same or differentiated only by descriptors." Ex. 1001, 40:1–4. Petitioner identifies this as limitation [44.1]. Claim 44 also recites "recording each new and old location of each said relocated data element as a cross reference," which Petitioner identifies as limitation [44.6]. *Id.* at 40:22–23.

In our Institution Decision, we determined that Petitioner had not sufficiently shown, for purposes of institution, that the references teach limitations [44.1] and [44.6]. Inst. Dec. 41–44. With respect to limitation [44.6],[16] in the Petition, Petitioner relies on the "[s]ame reasons as claim 9 and limitations [10.2] and [43.5]." Pet. 85. This is the full extent of Petitioner's analysis of this limitation. *Id.* In our Institution Decision, we stated that Petitioner had not sufficiently shown that limitation [43.5] was taught by the references, and further, Petitioner had not explained, nor was it readily apparent, how the analysis for claim 9 and limitation [10.2] taught the recited limitation in limitation [44.6]. Inst. Dec. 44.

In the Reply, Petitioner states "[r]ecording new and old locations (with pointer to old location)," and provides an illustration, created by Dr. Jansen, purportedly explaining why Fong teaches limitation [44.6]. Reply 38–39. Petitioner also relies on additional testimony from Dr. Jansen. *See*

[16] Because we determine that Petitioner has not shown by a preponderance of the evidence that the references teach limitation [44.6], we need not address Petitioner's additional arguments as to limitation [44.1].

Ex. 1057 ¶¶ 275–278.[17] Dr. Jansen's testimony relies on the analysis of limitation [43.5]. *Id.* ¶ 276. Dr. Jansen also testifies that the use of "pointers," as set forth in connection with claim 9, "serves as a cross reference that allows data that is stored (i.e., recorded in only one location to also be visible or accessible in other locations as well." *Id.* ¶ 277. Dr. Jansen further testifies that, through his illustration, the "same data elements are cross referenced through the use of a pointer to their old location in Database B." *Id.* ¶ 278.

As discussed above, we find that Petitioner failed to make a prima facie case as to limitation [43.5] in the Petition. Further, we find that Petitioner failed to make a prima facie in the Petition as to limitation [44.6], for the same reasons as discussed above with respect to limitations [43.3–43.5]. Further, even considering Petitioner's showing as to limitation [44.6] in the Reply, Petitioner still has not shown that the combination of references teaches "recording each new and old location of each said relocated data element as a cross reference." Rather, Petitioner relies on an illustration, rather than the references, without sufficiently tying the two together.

After considering the evidence and arguments of the complete record, we determine that Petitioner has not shown, by a preponderance of the evidence, that the combination of Conlon, Miller, and Fong teaches

[17] Dr. Jansen also states that he mistakenly used the word "only" in the first Declaration, when stating "a [person of ordinary skill in the art] would proceed with the integration of top level data elements from heterogeneous databases only if the top level data elements . . ." Ex. 1057 ¶ 266 n.11 (citing Ex. 1002 ¶ 307).

limitation [44.6]. Claims 45 and 46 depend from claim 44, so we, likewise find Petitioner's analysis deficient for the same reasons as with claim 44.

3. Summary of Ground 4

Having considered the *Graham* factors, including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the challenged claims, we determine that Petitioner has not shown, by a preponderance of the evidence, that claims 44–46 would have been obvious over Conlon, Miller, and Fong.

I. Petitioner's Motion to Strike

Petitioner filed a Motion to Strike Dr. Ranka's Rebuttal Declaration. Paper 29. Petitioner contends that Patent Owner's Sur-reply "was accompanied by an 88-page paper titled 'Rebuttal Declaration of Dr. Sanjay Ranka.'" Mot. Strike 2. Petitioner contends that the Ranka Rebuttal Declaration (Paper 27) violates 37 C.F.R. § 42.23(b), and states that Patent Owner opted not to depose Petitioner's witness, Dr. Jansen. *Id.* at 4; *see also id.* at 6. Petitioner further asserts that waiver of 37 C.F.R. § 42.23(b) is "unwarranted and not in the interests of justice." *Id.* at 5. Petitioner argues that if Patent Owner believed that the Reply or Dr. Jansen's Rebuttal Declaration improperly raised new issues, then Patent Owner should have followed the procedures set forth in the CTPG. *Id.* at 5–6 (citing CTPG 80–81). Petitioner asserts that waiving 37 C.F.R. § 42.23(b) would be highly prejudicial to Petitioner. *Id.* at 6–7.

Patent Owner responds that Petitioner raises new issues and evidence in the Reply "as demanding Patent Owner's Rebuttal Declaration." Opp. Strike 2–6.

37 C.F.R. § 42.23(b) states that "A sur-reply … may not be accompanied by new evidence other than deposition transcripts of the cross-examination of any reply witness."; *see also* CTPG 73 ("The sur-reply may not be accompanied by new evidence other than deposition transcripts of the cross-examination of any reply witness."). Patent Owner does not cite to, or provide any legal authority permitting a new declaration accompanying a sur-reply, nor did Patent Owner seek authorization to file the Ranka Rebuttal Declaration prior to filing it. *See* Opp. Strike. To that end, Petitioner appears to have the stronger argument. However, as discussed above, the Ranka Rebuttal Declaration is primarily used to improperly incorporate arguments by reference, and we decline to consider such arguments that are not raised in the Sur-reply. Accordingly, we do not rely on the Ranka Rebuttal Declaration in this Decision, so we dismiss Petitioner's Motion to Strike as moot.

IV. CONCLUSION

For the foregoing reasons, we are persuaded that Petitioner establishes by a preponderance of the evidence that claims 1–13, 20–32, 41, and 42 are unpatentable. We are not persuaded by a preponderance of the evidence that claims 14–19, 33–40, and 43–46 are unpatentable.

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1, 2, 9, 12–21, 28, 32–40	103(a)	Conlon	1, 2, 9, 12, 13, 20, 21, 28, 32	14–19, 33–40

3–6, 8, 10, 11, 22–25, 27, 29–31, 41, 42	103(a)	Conlon, Miller	3–6, 8, 10, 11, 22–25, 27, 29–31, 41, 42	
7, 26	103(a)	Conlon, Miller, Beckwith	7, 26	
43–46	103(a)	Conlon, Miller, Fong		43–46
Overall Outcome			1–13, 20–32, 41, 42	14–19, 33–40, 43–46

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–13, 20–32, 41, and 42 of the '433 patent have been shown to be unpatentable under 35 U.S.C. § 103(a);

FURTHER ORDERED that claims 14–19, 33–40, and 43–46 of the '433 patent have not been shown to be unpatentable under 35 U.S.C. § 103(a);

FURTHER ORDERED that Petitioner's Motion to Strike (Paper 29) is dismissed as moot; and

FURTHER ORDERED that, because this is a final written decision, parties to this proceeding seeking judicial review of our Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2021-01251
Patent 6,510,433 B1

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Paper 41
Entered: January 6, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner,

v.

MINDBASEHQ, LLC,
Patent Owner.

IPR2021-01252
Patent 6,665,680 B2

Before NORMAN H. BEAMER, NABEEL U. KHAN, and KARA L. SZPONDOWSKI, *Administrative Patent Judges.*

BEAMER, *Administrative Patent Judge*.

JUDGMENT
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)
Dismissing Petitioner's Motion to Strike as Moot
37 C.F.R. §§ 42.5, 42.71(a)

I. INTRODUCTION

We instituted *inter partes* review of claims 1–46 of U.S. Patent No. 6,665,680 B2, issued on December 16, 2003 (Ex. 1001, "the '680 patent"), in response to a Petition (Paper 3, "Pet.") filed by Google LLC ("Petitioner"). (Paper 8, "Inst. Dec."). During the trial, MindbaseHQ, LLC ("Patent Owner") filed a Response to the Petition (Paper 15, "PO Resp."), Petitioner filed a Reply (Paper 25, "Reply"), and Patent Owner filed a Sur-reply (Paper 27, "Sur-reply"). In addition, Petitioner filed a Motion to Strike (Paper 30, "Mot. Strike"), and Patent Owner filed an Opposition (Paper 34, "Opp. Strike").

An oral hearing was held on October 11, 2022, and a copy of the transcript was entered into the record. Paper 40 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the complete record, Petitioner has shown, by a preponderance of the evidence, that claims 1–13, 20–32, 41, and 42 of the '680 patent are unpatentable. However, Petitioner has not shown, by a preponderance of the evidence, that claims 14–19, 33–40, and 43–46 of the '680 patent are unpatentable.

II. BACKGROUND

A. Related Matters

Petitioner advises that the '680 patent is the subject of the following district court litigation: *MindbaseHQ LLC v. Google LLC*, No. 1-20-cv-24742 (S.D. Fla.) (terminated on Mar. 12, 2021) and *MindbaseHQ LLC v. Google LLC*, No. 3:21-cv-03603 (N.D. Cal.) (transferred on Mar. 13, 2021) ("related litigation"). Pet. 7.

Petitioner concurrently filed a petition in IPR2021-01251 involving U.S. Patent No. 6,510,433, which is a parent of the '680 patent. *Id.*

B. The '680 Patent (Ex. 1001)

The '680 patent is titled "Database Structure Having Tangible and Intangible Elements and Management System Therefor" and is generally directed to "a new organizational protocol for creating and manipulating relational databases and database structures." Ex. 1001, code (54), 1:17–19. The '680 patent states that "[p]resently available databases do not categorize data elements into specific categories with rules for storing and manipulating each type of data element." *Id.* at 2:30–32.

Because "[t]he inventive arrangements use the neuron-synapse-neuron model for structuring relationships of all data elements in a new database structure[,] . . . the database system . . . is referred to as the MINDBASE database system." *Id.* at 2:21–25. The MINDBASE data system is generally described as follows:

> The inventive arrangements categorize all MINDBASE data elements as either tangible data elements or intangible data elements. Tangible data elements are physical data elements that have weight. Tangible data elements are defined as "cause" data elements. Intangible data elements are all other data elements. Intangible data elements are further categorized into verbs which are identified as "effect" data elements and descriptive data elements which are identified as "descriptors[]". Descriptors are used to describe tangible data elements and the degree of performance of tangible data elements.

Id. at 2:32–43. The '680 patent states that "[t]he unique categorization of cause, effect, and descriptive data elements and their specific uses is not followed by any other database system." *Id.* at 2:46–49.

Further, "[t]he MINDBASE format is based on the completely detailed information people have in their minds instead of the 'verbal shorthand' that people generally use when speaking or writing." *Id.* at 2:66–3:2. Thus,

> [f]or a computer system to simulate the way people communicate, it must have a way to store all of the descriptive details and word associations that people usually leave out of their communications. The MINDBASE system has the unique ability to store all of the possible relationships that are usually left out of verbal shorthand and all other database systems. The MINDBASE system classifies each word as either a cause, an effect, or a descriptor. The MINDBASE system can also differentiate between multiple uses of the same word for different parts of speech. For example, some words like 'book' can be a noun, verb, or an adjective. The MINDBASE system can advantageously be provided with a very detailed dictionary routine that classifies all words as causes, effects, or descriptors. This routine also differentiates between uses of the same word for different parts of speech.

Id. at 3:20–35.

C. Illustrative Claims

Among the challenged claims, claims 1, 14, 20, 33, and 41 are independent. Independent claims 1 and 14 and dependent claim 43 are reproduced below, with brackets noting Petitioner's identifiers.

1. [1.0] A database of information stored in a fixed medium, said database comprising:

> [1.1] a set of tangible data elements, said tangible data elements representing things which have physical weight and can cause an effect;

[1.2] a set of intangible data elements, said intangible data elements representing words and concepts which have no physical weight and cannot be weighed;

[1.3] said set of intangible data elements including a first subset of effect data elements, said effect data elements representing at least one among verbs standing alone and verbs in combination with other words, which describe at least one among said tangible data elements, actions, objectives, results, missions, procedures and processes; and,

[1.4] said set of intangible data elements including a second subset having descriptive data elements, said descriptive data elements describing at least one among said tangible data elements, said effect data elements and degrees of performance of said tangible data elements, and the nature of the relationship between the tangible data elements and the effect data elements.

14. [14.0] A database system, comprising:

[14.1] a database stored in a fixed medium and having a set of tangible data elements representing things which have physical weight and can cause an effect and a set of intangible data elements representing words and concepts which have no physical weight and cannot be weighed;

[14.2] said set of intangible data elements including a first subset of effect data elements representing at least one among verbs standing alone and in combination with other words, which describe at least one among said tangible data elements, actions, objectives, results, missions, procedures and processes, and a second subset having descriptive data elements describing at least one among said tangible data elements, said effect data elements and degrees of performance of said tangible data elements and the nature of the relationship between the tangible data elements and the effect data elements; and,

[14.3] a dictionary routine for automatically classifying and storing words entered into said database according to said sets and subsets of data elements.

43. [43.0] A method for inter-relating different databases structured as recited in claim 41, comprising the steps of:

[43.1] for each of said databases, and in any order, [43.1.1] normalizing names of like data elements having different names in said different databases and [43.1.2] normalizing names of different data elements having like names in said different databases;

[43.2] normalizing data elements which are separate in any one of said databases and which are grouped together as single data elements in any other of said databases;

[43.3] comparing each of said normalized databases with each other one of said normalized databases;

[43.4] recording all common data elements found during each said comparing step; and,

[43.5] recording one location of each said common data element in each of said databases.

Ex. 1001, 35:22–43, 36:21–43, 39:43–40:13.

D. Evidence

Petitioner relies on the following references (*see* Pet. 9).

Reference	Exhibit	Patent/Printed Publication
Conlon	1005	Conlon, et al., *Developing a Large Lexical Database for Information Retrieval, Parsing, and Text Generation Systems*, Information Processing & Management, Vol. 29, No. 4, pp. 415-431 (1993)
Miller	1013	Miller, *Nouns in WordNet: A Lexical Inheritance System*, International Journal of Lexicography, Vol. 3, No. 4, pp. 245–264 (1990)
Beckwith	1016	Beckwith, et al., *Implementing a Lexical Network*, International Journal of

		Lexicography, Vol. 3, No. 4, pp. 302–312 (1990)
Fong	1029	Fong, et al., *Guide on Logical Database Design*, NBS Special Publication 500-122 (1985)

E. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–46 are unpatentable on the following grounds (Pet. 9):

Claims Challenged	35 U.S.C. §[1]	References
1, 2, 9, 12–21, 28, 32–40	103(a)	Conlon
3–6, 8, 10, 11, 22–25, 27, 29–31, 41, 42	103(a)	Conlon, Miller
7, 26	103(a)	Conlon, Miller, Beckwith
43–46	103(a)	Conlon, Miller, Fong

In support, Petitioner relies on the Declaration of Dr. Bernard J. Jansen (Ex. 1002) and the Rebuttal Declaration of Dr. Jansen (Ex. 1057). Patent Owner relies on the Declaration of Dr. Sanjay Ranka (Ex. 2003) and the Rebuttal Declaration of Dr. Ranka (Paper 28[2]). A deposition transcript has been entered into the record for Dr. Ranka (Ex. 1051).

1. Conlon (Ex. 1005)

Conlon is an article titled "Developing a Large Lexical Database for Information Retrieval, Parsing, and Text Generation Systems." Ex. 1005, 415. Petitioner contends that Conlon was catalogued and accessible to the

[1] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), amended 35 U.S.C. § 103. Because the '680 patent has an effective filing date prior to the effective date of the applicable AIA amendment, we refer to the pre-AIA version of § 103.

[2] We remind Patent Owner that evidence must be filed in the form of an exhibit. *See* 37 C.F.R. § 42.63(a).

public in 1993, more than one year before the '680 patent's earliest possible effective date, and is prior art under 35 U.S.C. § 102(b). Pet. 26 (citing Ex. 1005; Ex. 1011, 1–2).

Conlon describes the organization and design of the tables of a lexical database, which is stored in an Oracle Relationship Database Management System, and constructed by combining material from a number of machine-readable sources. Ex. 1005, 415 (Abstract). Conlon's lexical database "contains information about approximately 50,000 word entries (each word may have many senses)" and "is grouped by major parts of speech into tables for nouns, verbs, adjectives, and adverbs." *Id.* at 416. Conlon states "[t]o support our goals, we need to collect and organize the huge amounts of information used routinely by humans to process language." *Id.*

Conlon explains that "[e]ach source of lexical data has a different structure and must be treated differently." *Id.* at 418. For example, "[i]n order to translate knowledge from machine-readable dictionaries into a form usable in a lexical database, it must be analyzed and formalized in order to make it sufficiently explicit for machine use. We have performed this analysis by semi-automatic methods." *Id.*

As one example, "the definition of 'chip' in homograph number 1 and sense number 1 provided by [Collins English Dictionary] is shown in Table 2," reproduced below:

Table 2. Definition

chip	1	1	a thin strip of potato fried in deep fat

Table 2, above, depicts the definition of "chip 1 1," including "a thin strip of potato fried in deep fat." *Id.*

Conlon states that "[a]fter analyzing this definition semi-automatically, we have been able to create explicit information about 'chip,'" such as Table 3, reproduced below:

Table 3. Lexical information

chip	1	1	regular	sing	count	common	no-gen	concrete	inan

Id. at 418–419. Table 3, above, depicts the lexical information of "chip 1 1," including: (1) "concrete (from part of the definition 'a thin strip of potato . . .')"; (2) "countable (from the part of the definition 'a thin strip of potato . . .')"; (3) "inanimate ('potato' is not an animate noun)"; (4) "regular (the plural form is 'chips')"; (5) "singular (the Collins English Dictionary specifies the plural form of words explicitly)"; (6), "a common noun (the word 'chip' does not begin with a capital letter)"; and (7) "neuter (there is no gender specification)." *Id.* at 419.

Conlon's lexical database "contains tables of lexical and semantic relations and relationships, to make it possible to find terms related to any given word." *Id.* at 421. The "organization is based on parts of speech, with each part of speech involving different types of syntactic and semantic information." *Id.* There is a main table that "contains word entries in alphabetical order." *Id.* There are also separate tables for each part of speech, including nouns, verbs, adjectives, and adverbs. *Id.* at 422. The noun tables include "whether a noun is abstract or concrete," as "[t]hese two groups of nouns can be modified by different groups of adjectives." *Id.* The verb tables include "whether a verb is regular or irregular, dynamic or stative, transitive or intransitive (or both), whether a verb takes a sentential complement or not, or whether it can be put into passive voice or not." *Id.*

at 423. "For each argument of the verb we must also indicate its syntactic role (as subject, direct object, indirect object, or object of a preposition), its case (agent, patient, beneficiary, etc.), whether its appearance is obligatory, optional, or elliptical, and the selectional restrictions (animate, inanimate, human) imposed on the filler of that slot." *Id.*; *see also id.* at Table 14. The adjective tables are classified in a way that the system knows which adjectives are appropriate for the nouns they will modify. *Id.* at 424. "Adverbs are the most complicated part of speech" because "[t]hey can modify nouns, verbs, adjectives, adverbs, or whole sentences." *Id.* at 425. Conlon, therefore, describes an adverb classification table and an adverb placement table. *Id.*

Conlon's "[l]exical entries throughout the database are connected by a network of lexical and semantic relations," the most frequent of which are those that are familiar from commercial dictionaries. *Id.* at 426. The lexical database also contains tables of relations and the words and phrases they connect. *Id.*

2. Miller (Ex. 1013)

Miller is an article titled "Nouns in WordNet: A Lexical Inheritance System." Ex. 1013, 245. Petitioner contends that Miller was catalogued and accessible to the public in 1993, more than one year before the '680 patent's earliest possible effective date, and is prior art under 35 U.S.C. § 102(b). Pet. 60 (citing Ex. 1011, 1–2).

Miller describes organizing noun files in WordNet.[3] Miller states: "Definitions of common nouns typically give a superordinate term plus distinguishing features; that information provides the basis for organizing noun files in WordNet. The superordinate relation (hyponymy) generates a hierarchical semantic organization that is duplicated in the noun files by the use of labeled points between sets of synonyms." Ex. 1013, 245 (Abstract). Miller describes:

> The fundamental design that lexicographers try to impose on the semantic memory for nouns is not a circle, but a tree (in the sense of *tree* as a graphical representation). It is a defining property of tree graphs that they branch from a single stem without forming circular loops. The lexical tree can be reconstructed by following trails of superordinate terms: *oak@* ➔ *tree@* ➔ *plant@* ➔ *organism,* for example, where '@ ➔' is the transitive, asymmetric, semantic relation that can be read 'is a' or 'is a kind or. (By convention, '@ ➔' is said to point upward.) This design creates a sequence of levels, a hierarchy, going from many specific terms at the lower levels to a few generic terms at the top. Hierarchies provide conceptual skeletons for nouns; information about individual nouns is hung on this structure like ornaments on a Christmas tree.

Id. at 247. "The semantic relation that is represented above by '@ ➔' has been called the ISA relation, or the hypernymic or superordinate relation (since it points to a hypernym or superordinate term); it goes from specific to generic and so is a generalization." *Id.* Miller, therefore, describes a "lexical inheritance system," where "a systematic effort has been made to connect hyponyms with their superordinates (and vice versa)." *Id.* at 248.

[3] "WordNet is an on-line lexical reference system whose design is inspired by current psycholinguistic theories of human lexical memory." Ex. 1012, Abstr.

3. Beckwith (Ex. 1016)

Beckwith is an article titled "Implementing a Lexical Network." Ex. 1016, 302. Petitioner contends that Beckwith "was published in the same issue of the *International Journal of Lexicography* as Miller (Ex-1013), and is prior art under 35 U.S.C. § 102(b) for the same reasons as Miller." Pet. 73 (citing Ex. 1011, 1–2).

Beckwith generally describes the "computer implementation of the lexical database described in" the Miller reference. Ex. 1016, 302 (Abstract). In particular, WordNet includes an index of familiarity associated with each word form. *Id.* at 304. Table 2 of Miller, reproduced below, depicts an example of this familiarity index where the superordinates of the word *bronco* are requested. *Id.* at 305.

Table 2. Hypernyms of *bronco* and their familiarity indices.

Word	Polysemy
bronco	1
@→horse	14
@→equid	0
@→odd-toed ungulate	0
@→herbivore	1
@→mammal	1
@→vertebrate	1
@→animal	4
@→organism	2

Table 2 depicts the hypernyms of bronco and their familiarity indexes. *Id.* For example, bronco has a familiarity index of 1, horse has a familiarity index of 14, equid has a familiarity index of 0, and so on. *Id.*

4. Fong (Ex. 1029)

Fong is an article titled "Guide on Logical Database Design." Ex. 1029. Petitioner contends that Fong "bears a publication date of February 1985, and was distributed to depository libraries in microfiche and available for purchase at least as of December 1986." Pet. 77 (citing Ex. 1029, 119; Ex. 1032, 46; Ex. 1031, 1; Ex. 1002 ¶ 278). Petitioner contends Fong is prior art under 35 U.S.C. § 102(b). *Id.*

Fong generally describes "an iterative methodology for Logical Database Design" that "lead[s] to the development of a high quality [Logical Database Design]." Ex. 1029, Abstract. One procedure is "normalization," which helps to ensure that the collection of entities is optimal. *Id.* at 8, 75. For example, Fong describes eliminating redundancies and combining entities with the same or equivalent identifiers. *Id.* at 79.

III. ANALYSIS

A. Legal Standards

"In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

A claim is unpatentable under 35 U.S.C. § 103(a) if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

A patent claim "is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR*, 550 U.S. at 418. An obviousness determination requires finding "both 'that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.'" *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016) (citation omitted); *see KSR*, 550 U.S. at 418. Further, an assertion of obviousness "cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR*, 550 U.S. at 418; *In re NuVasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (a finding of a motivation to combine "must be supported by a 'reasoned explanation'" (citation omitted)).

B. Level of Ordinary Skill in the Art

The parties each propose a definition for a person of ordinary skill in the art. Pet. 14 (citing Ex. 1002 ¶ 53); PO Resp. 7–8[4] (citing Ex. 2001[*sic* 2003] ¶¶ 13–19).[5] The proposed definitions have some similarities, as shown in underline below:

Petitioner's Proposal	Patent Owner's Proposal
"would have had at least a bachelor's degree in computer science, computational linguistics, computational lexicography, or the equivalent, and at least two years of academic or industry experience in lexical databases, computational linguistics, computational lexicography, or the equivalent, and experience or coursework in computer science, database development, or the equivalent. Less experience can be remedied with additional education (e.g., a Master's degree); conversely, less education can be remedied with additional experience."	"would be a person with a bachelor's degree in Computer Science, Computer Engineering, or a related field, as those degrees generally include requisites for multiple database courses. Alternative to an applicable accredited degree," a person of ordinary skill in the art "would have at least two years' experience in database programming, development, and design."

[4] Patent Owner's Response does not contain any page numbering. We start page number 1 on the page titled "Introduction." We remind Patent Owner to include page numbering in its future submissions.

[5] Patent Owner's briefs refer to the Ranka Declaration as Ex. 2001, but in fact that declaration is filed as Ex. 2003 in this proceeding.

Pet. 14; PO Resp. 7–8 (emphasis added). Petitioner contends that the level and skill of a person of ordinary skill in the art are reflected in the prior art. Pet. 14–25 (citing Ex. 1002 ¶¶ 56–101).

Patent Owner disputes Petitioner's proposed level of ordinary skill in the art. PO Resp. 5–13; Sur-reply 4–5[6]. Specifically, Patent Owner disputes Petitioner's inclusion of "lexical databases, computational linguistics, computational lexicography, or the equivalent"[7] because, according to Patent Owner, the technology of the '680 patent does not require this knowledge, but instead only requires computer database design or programming knowledge. PO Resp. 6–9; *see also id.* at 10 (stating that Patent Owner "agrees with [Petitioner] that a [person of ordinary skill in the art] have at least a bachelor's degree in computer science, or experience or coursework in computer database development, or the equivalent, with less experience remedied by more education"). Patent Owner contends that "LLL is used to interpret or organize text according to agreed-upon rules," but a person of ordinary skill in the art could not use LLL to create a database. *Id.* at 6; *see also id.* at 7. Patent Owner argues that requiring LLL knowledge eliminates almost all of the database developers and engineers at the time of the invention. *Id.* at 7.

We are not persuaded that because the '680 patent does not explicitly use the terms "lexical database," "computational linguistics," or "computational lexicography" (*see* PO Resp. 8, Sur-reply 4), no knowledge

[6] Patent Owner's Sur-reply also does not contain any page numbering. We start page number 1 on the page titled "Introduction."

[7] The parties refer to this as "LLL," and we will use the same abbreviation herein.

of these areas is required. Patent Owner's counsel acknowledged at the hearing that "lexical" means "words, related to words," Tr. 39:4–6, which is consistent with Petitioner's use of this term. *See* Reply 8 (Petitioner describing "lexical" as "relating to words or vocabulary").

As Petitioner argues, and we agree, the claims of the '680 patent do not support Patent Owner's arguments as to the level of ordinary skill in the art. *See* Reply 8–9 (citing Ex. 1057 ¶¶ 23–26). Claim 1 recites, for example, "intangible data elements representing words," including "effect data elements representing at least one among verbs standing alone and in combination with other words." Ex. 1001, 35:31–33 (claim 1). Other claims recite, for example, "linked words," "dictionary routine for automatically classifying and storing words," "dictionary routine links all sets of synonyms," "words having at least two different meanings." *See, e.g.*, Ex. 1001, 36:12 (claim 12), 36:41–42 (claim 14), 36:47–48 (claim 16), 36:52–53 (claim 17), 36:64–65 (claim 19). In the Sur-reply, Patent Owner argues that these words in the claims "are, at most, high school level grammar concepts," so "[n]o complex linguistic or lexicographic knowledge is needed to understand or implement these claims." Sur-reply 5. However, Petitioner is not asserting that complex knowledge is necessary for a person of ordinary skill in the art, and Patent Owner's arguments appear to at least somewhat concede that a person of ordinary skill in the art would have had some linguistic or lexicographic knowledge.

Further, the Specification of the '680 patent also belies Patent Owner's assertions that "qualifications in the arts and language and linguistics . . . is not supported by the description of the art in the '680 Patent" (PO Resp. 11; *see also* Sur-reply 5). *See, e.g.*, Ex. 1001, 2:66–3:3

("The MINDBASE format is based on the completely detailed information people have in their minds instead of the 'verbal shorthand' that people generally use when speaking and writing. FIG. 1 is a pictorial description of this process."); 3:23–26 ("The MINDBASE system has the unique ability to store all of the possible relationships that are usually left out of verbal shorthand and all other database systems. The MINDBASE system classifies each word as either a cause, an effect, or a descriptor."); 3:31–33 ("The MINDBASE system can advantageously be provided with a very detailed dictionary routine that classifies all words as causes, effects, or descriptors."). Indeed, the discussion of various language, words, and relationships between words in the examples and Figures provided in the '680 patent is too numerous to recount here, and supports that the database structure described in the '680 patent relates to words in some manner. *See generally* Ex. 1001, *e.g.*, *id.* at 7:67–8:8 (describing an example of "The tall man drove the car 50 miles per hour"); 8:16–37 (describing an example of cause element "cake" and descriptors such as "round," "chocolate," "square," "sponge"); 11:20–52 (describing an example of "Chef Smith thinly slices the white bread with a serrated knife"); *see* Reply 8–9.

In addition, the title of the '680 patent is "Database Structure Having Tangible and Intangible Elements and Management System Therefor." Ex. 1001, code (54). These tangible data elements are "data elements that refer to things that have physical weight and can be weighed on a scale," and are called "cause" data elements. *Id.* at 7:14–17. Intangible data elements refer to things that do not have weight, and are "effect" data elements (e.g., verbs that either stand alone or are combined with other words), and "descriptors." *Id.* at 7:17–22 (emphasis added). As one example, the '680

patent analyzes the sentence "The tall man drove the car 50 miles per hour," and states that "man" and "car" are tangible cause elements, "drove" or "drove the car" are effect data elements, "tall" is a descriptor that describes "man," and "50 miles per hour" is a descriptor that describes "drove." *Id.* at 7:67–8:8.

Patent Owner's arguments effectively ignore these disclosures in the '680 patent, and focus entirely on the purported database design and functionality of the '680 patent, without further explanation. Moreover, although Dr. Ranka testifies that "LLL is used to interpret or organize text according to agreed-upon rules" and "can be useful in identifying parts of speech in sentences and the like" (e.g., groups of text) (Ex. 2003 ¶ 18), Patent Owner does not acknowledge that that is precisely what the '680 patent describes. *See, e.g.*, Ex. 1001, 3:28–32 ("The MINDBASE system can also differentiate between multiple uses of the same word for different parts of speech. For example, some words like 'book' can be a noun, verb, or an adjective."); *see* Reply 9. We are also persuaded by Petitioner's arguments in Reply, supported by testimony from Dr. Jansen, as to how a person of ordinary skill in the art would have gained LLL experience in June 1997, and credit this testimony. *See* Reply 9–10 (citing Ex. 1057 ¶¶ 14, 29–31).

Moreover, Petitioner provides testimony from Dr. Jansen regarding the level of ordinary skill as reflected in the prior art that explains how its proposed level of skill in the art relates to the '680 patent. *See* Ex. 1002 ¶¶ 56–101; *e.g.*, Ex. 1002 ¶ 56 ("[Natural language processing] systems utilize lexical databases like the database disclosed by the '680 Patent."); ¶ 58 ("That basic premise [a theory and system of natural language

processing] tracks exactly the Mindbase technology, which claims to put '[t]he mind's view of a data structure . . . directly into a computer.'") (citing Ex. 1001, Fig. 1a); ¶ 73 ("those skilled in the art of [natural language processing] were implementing systems that performed the same functions as the challenged claims of the '680 Patent . . . [and] lexical databases that categorized words by parts of speech and analyzed the relationship between those words were recognized as a central part of *any* [natural language processing] system").

Patent Owner contends that Dr. Jansen's testimony does not meet Petitioner's burden because it is wholly conclusory. PO Resp. 8–9. According to Patent Owner, Dr. Jansen provides only a single citation to the '680 patent (to Figure 1(a)), which is insufficient to show that the '680 patent includes teachings equivalent to lexical databases, computational linguistics, and computational lexicography. *Id.* We disagree with Patent Owner's arguments. Petitioner provides over 55 paragraphs of testimony from Dr. Jansen in support of its proposed level of ordinary skill in the art. *See* Ex. 1002 ¶¶ 56–101; *see also* Ex. 1057 ¶¶ 23–31. Throughout this testimony, which is directed to a discussion of the knowledge of a person of ordinary skill in the art, Dr. Jansen refers back to the '680 patent in discussing natural language processing and lexical databases. *See, e.g.*, Ex. 1002 ¶ 56 ("[Natural language processing] systems utilize lexical databases like the database disclosed by the '680 Patent"), ¶ 58 ("[t]hat basic premise [a theory and system of natural language processing] tracks exactly the Mindbase technology, which claims to put '[t]he mind's view of a data structure . . . directly into a computer.'"), ¶ 59 ("[l]ike the '680 Patent, the database described by Pin-Ngern is organized by parts of speech, and

'includes noun, verb, adjective, and adverb sections.'"), ¶ 73 ("Thus, well before 1997, those skilled in the art of [natural language processing] were implementing systems that performed the same functions as the challenged claims of the '680 Patent."). And, as Patent Owner acknowledges, Dr. Jansen cites to Figure 1(a) of the '680 patent, which is "a pictorial description of" the "MINDBASE format" which "is based on the completely detailed information people have in their minds instead of the 'verbal shorthand' that people generally use when speaking or writing." Ex. 1001, 2:66–3:2 ("FIG. 1 is a pictorial description of this process.").

We, therefore, find that the record more strongly supports Petitioner's proposed definition of ordinary skill in the art, rather than Patent Owner's, which appears to selectively ignore large portions of the description provided in the '680 patent. We, therefore, find Petitioner's proposal is consistent with the level of ordinary skill in the art reflected in the '680 patent and by the prior art of record, and, therefore, adopt Petitioner's proposed level of ordinary skill in the art for purposes of this Decision. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). However, although we apply Petitioner's proposed level of ordinary skill in the art, we would reach the same conclusion under Patent Owner's proposal.

C. Analogous Art

Patent Owner contends that Conlon, Miller, and Beckwith are not analogous art to the claimed invention. PO Resp. 9–11. A reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed

invention). *In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992). References are selected as being reasonably pertinent to the problem based on the judgment of a person having ordinary skill in the art. *Id.* ("[I]t is necessary to consider 'the reality of the circumstances,'. . . — in other words, common sense — in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor."); *In re Kahn*, 441 F.3d 977, 986–87 (Fed. Cir. 2006). "A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem." *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992).

Patent Owner argues that the '680 patent's field of endeavor "relates generally to the field of database management, and in particular, to a new organizational protocol for creating and manipulating relational databases and database structures." PO Resp. 10 (citing Ex. 1001, 1:15–18). However, argues Patent Owner, "Conlon, Miller, and Beckwith relate to lexical databases, computational linguistics, and computational lexicography, rather than to database system structures and management systems." *Id.* at 9.

As discussed above, we are not persuaded that the '680 patent is as limited as Patent Owner argues. Regardless, Conlon was published in the *Information Processing & Management* journal, and relates to constructing a lexical database, including the organization of the lexical database and the design of the tables that comprise the database. Ex. 1005, 415 (Abstract). As Petitioner points out, Conlon uses an Oracle RDBMS to store and collect

information, and manipulate databases using Oracle's SQL forms. Reply 11 (citing Ex. 1057 ¶ 55). Miller's WordNet is described as "Related Research" in Conlon, and Beckwith is related to WordNet. Ex. 1005, 417; Ex. 1016, 302 (stating in the Abstract "WordNet is the lexical database; LexPert is the suite of software tools used to build and access the database"); *see also* Ex. 1057 ¶¶ 56–57. We are persuaded by, and agree with, Petitioner's arguments that Conlon, Miller, and Beckwith all are in the same field of endeavor as the '680 patent. *See* Reply 10–12.

Patent Owner also argues that there are "four reasons to show that [Conlon, Beckwith, and Miller] are not reasonably pertinent to a [person of ordinary skill in the art] of the '680 Patent." PO Resp. 9–10. These four reasons are:

> 1) There is no literal mention of the technology of the proffered prior art within the '680 Patent. 2) There is no mention of innovating database system technology within the proffered prior art. 3) [Petitioner] has not shown that it is possible to substantively relate the '680 Patent disclosure with the technology of the proffered prior art. 4) Dr. Ranka, a data systems expert both currently and in 1997, provides extensive evidence that the technology of the '680 Patent, as well as a POSITA, do not relate to the technology of the proffered prior art.

PO Resp. 10. Patent Owner again contends that "[t]he art of the '680 Patent pertains to creating and managing a computer database system," but Patent Owner does not provide further explanation as to the problem faced by the inventor of the '680 patent. *See id*. Rather, Patent Owner's arguments essentially repeat its arguments made with respect to the level of ordinary skill in the art, which, as discussed above, we do not find persuasive. As Petitioner points out, one problem faced by the inventor of the '680 patent

"was storing and relating a particular type of data in a database." Reply 12 (citing Ex. 1057 ¶¶ 28, 58–59). For the reasons set forth by Petitioner, which are unrebutted by Patent Owner, we also agree that Conlon, Beckwith, and Miller are reasonably pertinent to this problem. *See Id*.

Accordingly, we determine that Conlon, Beckwith, and Miller are analogous art to the '680 patent.

D. Claim Construction

Petitioner contends that all terms should be given their ordinary and customary meaning. Pet. 26. In our Institution Decision, however, we determined that Petitioner had not established a reasonable likelihood that claims 14–19 and 33–40 were unpatentable because Petitioner had not sufficiently shown that Conlon discloses "a dictionary routine for automatically classifying and storing words entered into said database according to said sets and subsets of data elements," as recited in claim 14, and "automatically classifying and storing words entered into said database according to sets and subsets of data elements," as recited in claim 33. Inst. Dec., 24–28. Following the Institution Decision, Petitioner sought authorization to file supplemental information regarding the construction of claims 14 and 33, which we granted. Papers 11–14.

Petitioner contends that, in our Institution Decision, we did not properly construe these claim terms. The crux of Petitioner's argument is that "dictionary routine" and "automatically classifying and storing" should be interpreted to refer to "*using* a dictionary lookup function, not initially *creating* [the dictionary]." Reply 6–7 (citing Ex. 1057 ¶¶ 44–50).

In the Sur-reply, Patent Owner contends that "[r]ather than precluding automation, [the citations relied upon by Petitioner] necessarily implies that

at least some relationships are created automatically." Sur-reply 9. According to Patent Owner, "many other examples exist that support automatic creation," as recited in the claim language. *Id.*

Only terms that are in controversy need to be construed, and then "only to the extent necessary to resolve the controversy." *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))). After reviewing the parties' arguments and evidence, we determine that we do not need to expressly construe any term, including "dictionary routine" and "automatically classifying and storing." As will be discussed below in connection with the analysis of claim 14 (Section III.E.7), we determine that, whether these terms are construed in the sense of using a dictionary lookup function, or initially creating the dictionary, Petitioner has not shown by a preponderance of the evidence that Conlon teaches these limitations.

E. Ground 1: Obviousness Over Conlon

Petitioner contends claims 1, 2, 9, 12–21, 28, and 32–40 would have been obvious over Conlon. Pet. 27–59. We begin by addressing two general arguments raised by Patent Owner, and then turn to analyzing each of the claims and limitations in this ground.

1. Patent Owner's "Database" and Motivation to Combine Arguments

Patent Owner argues that "the word 'database' can have different meanings, depending on the contexts." PO Resp. 5. According to Patent Owner, Conlon includes two different contexts: (1) a lexical database in the context of a collection of related pieces of data or datasets; and (2) an Oracle

Relational Database Management System ("Oracle DBMS") in the context of computer software that allows one to query, access, or manipulate data and datasets. *Id.* Patent Owner further cites to the '680 patent, describing the MINDBASE data system, and states that the "unique method of data relationship structuring [of the MINDBASE data system] is not found in any other database system." *Id.* Patent Owner states that "[t]hese distinctions will become apparent." *Id.*

However, Patent Owner fails to tie these purported distinctions to any particular limitation of the challenged claims. *See In re Self*, 671 F.2d 1344, 1348 (CCPA 1982) (rejecting arguments "not based on limitations appearing in the claims"). Patent Owner does not argue, for example, that the preamble of claim 1, which recites a "database," is limiting. Nor does Patent Owner provide a proposed construction for the term "database," or distinguish Conlon's teachings from the *limitations* in the claims.

Patent Owner also argues that there is no motivation to "[t]echnologically [c]ombine Conlon with a DBMS." PO Resp. 11 (emphasis omitted). According to Patent Owner, "simply storing lexical information in a traditional DBMS–as the Conlon reference uses the DBMS–does not innovate the DBMS" because it "does not change the DBMS structure or functionality at all." *Id.* Patent Owner argues that "Conlon certainly does not allege any improvement, innovation, or even change to the DBMS." *Id.*; *see also id.* at 12 ("What Conlon never claims to do–and never claims to attempt to do–is to create a new database design for general computing use.").

Patent Owner's arguments do not address Petitioner's contentions. As Patent Owner admits (PO Resp. 11), Conlon explicitly states that "our

lexical database . . . is stored in an Oracle Relational Database Management System." Ex. 1005, 415. Thus, Petitioner is not combining Conlon with an Oracle DBMS – Conlon already explicitly teaches the combination. *See* Reply 12–13. Patent Owner's arguments are again not tied to the limitations in the claims, and do not explain why Conlon does not teach the limitations of the claims. Although Patent Owner states that "[t]he innovations of the '680 Patent could not be stored in the tables of an Oracle database," (PO Resp. 12), Patent Owner does not provide further explanation.

Although we find that Patent Owner's arguments generally fail to tie back to specific claim limitations,[8] to the extent Patent Owner's arguments touch on issues related to specific limitations, we address them in the context of the specific limitations discussed below.

2. Analysis of Independent Claim 1

a) Limitation [1.0]: "A database of information stored in a fixed medium, said database comprising:"

Petitioner asserts that Conlon discloses the preamble. Pet. 28 (citing Ex. 1005, 415, 421–425, Table 8; Ex. 1002 ¶ 116). For example, Conlon discloses a "lexical database, which is stored in an Oracle Relational Database Management System" that "contains information about approximately 50,000 word entries." *Id.*

[8] Patent Owner takes this approach throughout the Patent Owner Response and Sur-reply. For example, in the Sur-reply, Patent Owner argues generally that the database of information of claim 1 "is 'a product of the innovative technology of the patents-in-suit' and does not simply refer to just any collection of data," but does not distinguish the teachings of Conlon as relating to the claim limitations. *See, e.g.*, Sur-reply 1–4, 7–8.

Patent Owner does not specifically respond to these arguments. *See generally* PO Resp.

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches the preamble.[9]

b) Limitation [1.1]: "a set of tangible data elements, said tangible data elements representing things which have physical weight and can cause an effect"

Petitioner asserts that Conlon discloses this limitation. Pet. 28–30. Specifically, Petitioner asserts that Conlon's "[c]oncrete nouns are tangible data elements representing things that have physical weight and can cause an effect." *Id.* at 29 (citing Ex. 1002 ¶¶ 119, 120). Dr. Jansen provides unrebutted testimony that "concrete nouns represent 'tangible things,' either things of natural kind (e.g. animals, trees, rock, cloud) or artifacts, things made by men (e.g. vehicles, architecture, machinery, furniture)." Ex. 1002 ¶ 120 (citing Ex. 1009 at 49). Petitioner also relies on Table 9 of Conlon, which depicts a noun table where every noun in the table is a concrete noun. Pet. 29 (citing Ex. 1002 ¶ 121); *see also* Reply 15 (citing to Dr. Ranka's testimony that each data element in Conlon's noun table, if placed on a scale, would have a weight greater than zero).

[9] In Reply, Petitioner asserts that the preamble is not limiting. Reply 4. Patent Owner does not argue whether the preamble is limiting or not. *See generally* PO Resp., Sur-reply. Because we find the evidence supports that Conlon teaches the preamble, we make no determination whether the preamble of claim 1 is limiting.

Patent Owner does not specifically respond to these arguments in the Patent Owner Response. *See generally* PO Resp.[10]

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches limitation [1.1].

c) Limitation [1.2]: "a set of intangible data elements, said intangible data elements representing words and concepts which have no physical weight and cannot be weighed"

Petitioner contends that Conlon discloses limitation [1.2]. Pet. 31. In particular, Petitioner contends that Conlon's verb tables, adjective tables, and adverb tables contain verbs, adjectives, and adverbs that are all intangible data elements representing words and concepts which have no physical weight and cannot be weighed. *Id.* (citing Ex. 1002 ¶¶ 128–129). Petitioner asserts, citing to supporting testimony from Dr. Jansen, that "[b]ecause all verbs, adjectives, and adverbs are necessarily *intangible*, a word's appearance in any one of those tables in Conlon (Tables 11–19) would immediately inform a POSITA that the word has been classified by

[10] In the Sur-reply, Patent Owner appears to address this limitation. *E.g.*, Sur-reply 3 (arguing that the '680 patent does not use the word "noun" and that the '680 patent acts as its own lexicographer in defining the word "tangible."). Because these arguments were not raised in the Patent Owner Response, they are waived. *See* Paper 9 (Scheduling Order), 8 ("Patent Owner is cautioned that any arguments not raised in the response may be deemed waived."); Consolidated Trial Practice Guide 74 (Nov. 2019) ("CTPG"), 94 (same). Nonetheless, similar arguments are addressed below in the context of limitation [1.2], which we find unavailing. We find Patent Owner's arguments here similarly unavailing for the same reasons.

Conlon as an intangible data element and not a tangible data element." *Id.* (citing Ex. 1002 ¶¶ 129–130).

Patent Owner responds that Petitioner has not provided sufficient explanation as to how Conlon teaches this limitation. PO Resp. 14. Specifically, Patent Owner argues that the word "adverb" is not disclosed in the '680 patent, and the '680 patent "is not based on parts of speech of the English language." *Id.* Patent Owner argues that "[w]hile some claims may include the word 'verb,' it is not used the same way as Conlon . . . [a]nd there are no other parts of speech that are used in the" '680 patent. *Id.* (citing Ex. 2001 [*sic* 2003] ¶ 39).

In the Reply, Petitioner reiterates its contentions, and argues that Patent Owner does not dispute that a verb is an intangible data element satisfying the limitation. Reply 15–18. Petitioner also argues that Patent Owner's argument that the '680 patent is not based on parts of speech "rings hollow." *Id.* at 17.

In the Sur-reply, Patent Owner again argues that the '680 patent does not use words like "adjective" or "adverb," and "does not substitute other words nor analogize the meanings of those other parts of speech." Sur-reply 3. Patent Owner contends that the '680 patent "is its own lexicon in defining the words 'tangible,' 'intangible,' and 'verb.'" *Id.* (citing Ex. 1001, 2:30–49). According to Patent Owner "[t]hose terms are specific to the ['680 patent's] unique categorization of data elements for its database structures and methods." *Id.* Patent Owner argues that the '680 patent "does not use the concepts of noun, adjective, or adverb, because these concepts are inapplicable to the computer database structuring that exists in every [c]laim and paragraph of the '680 Patent." *Id.*

Patent Owner's arguments do not undermine Petitioner's showing, which we find persuasive. *See* Reply 15–18. First, the Specification supports that a "verb" teaches this limitation. Ex. 1001, 7:20–25 ("[i]ntangible data elements are . . . 'effect' data elements . . . [which are] *verbs* that either stand alone or are combined with other words.") (emphasis added). Although Patent Owner contends that "verb" is used differently in Conlon (PO Resp. 14) than in the '680 patent, Patent Owner does not explain how or why. In addition, limitation [1.3], discussed below explicitly recites that an "intangible data element" includes "effect data elements representing *verbs standing alone and in combination with other words*."

Second, contrary to Patent Owner's arguments, the '680 patent does use the word "adjective" and does differentiate between parts of speech: "The MINDBASE system can also differentiate between multiple uses of the same word for different parts of speech. For example, some words like 'book' can be a noun, verb, or an adjective." Ex. 1001, 3:27–32[11]; *see also id.* at 3:33–35 ("This routine also differentiates between uses of the same word for different parts of speech"); *see also* Reply 17.

Moreover, although the '680 patent may not explicitly use the word "adverb," Patent Owner has not explained why an "adverb" or "adjective" does not teach the claimed intangible data elements. Indeed, the disclosure in the '680 patent supports that they do. *See, e.g.*, Ex. 1001, 7:20–28 (describing that "[i]ntangible data elements are . . . 'descriptors' . . . [which are] used to describe either cause elements, effect elements, or the degree of performance of cause elements."); *see also id.* at 8:1–8:8 (describing

[11] As shown, pertinent to limitation [1.1], the '680 patent also uses the word "noun." *See* fn. 9 above.

descriptors and "The tall man drove the car 50 miles per hour" example); *see also* discussion of limitation [1.4] below.

Dr. Ranka's testimony that Petitioner "incorrectly assumes that the intangible elements *are limited to* verbs, adjectives and adverbs," (Ex. 2003 ¶ 39, emphasis added), misunderstands Petitioner's argument. Petitioner asserts that Conlon's verbs, adjectives and adverbs, as set forth above, *teach* the recited intangible data elements, not that intangible data elements are *limited to* verbs, adjectives, and adverbs.

Accordingly, after considering the evidence and arguments of the complete record, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches limitation [1.2].

d) *Limitation [1.3]: "said set of intangible data elements including a first subset of effect data elements, said effect data elements representing at least one among verbs standing alone and verbs in combination with other words, which describe at least one among said tangible data elements, actions, objectives, results, missions, procedures and processes"*

Petitioner asserts that Conlon discloses this limitation. Pet. 31–33; Reply 18–20. Specifically, Petitioner relies on Conlon's Table 14, which is the "Case-frame table" and includes data elements representing (1) the syntactic role of the verb (e.g., subject, direct object, indirect object, object of a preposition); (2) its case (e.g., agent, patient, beneficiary); (3) occurrence (e.g., obligatory, optional, or elliptical); and (4) selectional restrictions (e.g., animate, inanimate, human). *Id.* Petitioner contends "[t]he WORD column in Table 14 discloses *effect data elements representing verbs standing alone*. The columns SYN-ROLE, CASE, OCCURRENCE, and SELECT-RESTRICT (each of which is associated with the verb in the WORD column) disclose *verbs in combination with other words*.

Collectively, the information in Table 14 describes *actions, objectives, results, missions, procedures and processes*." *Id.* at 32–33 (citing Ex. 1002 ¶¶ 131–134). In the Reply, Petitioner provides a further example as to how Conlon's Table 14 describes that *action* of "selling." Reply 18–20 (citing Ex. 1057 ¶¶ 99–100).

Patent Owner argues that Petitioner "offers no logical explanation for" the equivalence with Conlon's Table 14 and this claim limitation. PO Resp. 14. Patent Owner further argues that Dr. Jansen does not explain how the information in Conlon's Table 14 teaches the claim limitations. *Id.* (citing Ex. 2001[*sic* 2003] ¶¶ 40–41). Patent Owner does not address this limitation in the Sur-reply. *See generally* Sur-reply.

Patent Owner essentially disputes the sufficiency of Petitioner's showing, but provides no further evidence, *i.e.*, explaining why Conlon's Table 14 does not teach limitation [1.3].[12] It is well settled that mere attorney arguments and conclusory statements, which are unsupported by factual evidence, are entitled to little probative value. *See Johnston v. IVAC Corp.*, 885 F.2d 1574, 1581 (Fed. Cir. 1989) ("Attorneys' argument is no substitute for evidence."); *Gemtron Corp. v. Saint-Gobain Corp.*, 572 F.3d 1371, 1380 (Fed. Cir. 2009) ("[U]nsworn attorney argument . . . is not evidence and cannot rebut . . . other admitted evidence . . . ."). On this record, such argument does not undermine Petitioner's persuasive showing based on the evidence described above. *See* Pet. 32–34; Reply 18–20.

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has

[12] Dr. Ranka's cited testimony merely replicates Patent Owner's statements in the Patent Owner Response and does not provide further substance.

shown, by a preponderance of the evidence, that Conlon teaches limitation [1.3].

e) *Limitation [1.4]: "said set of intangible data elements including a second subset having descriptive data elements, said descriptive data elements describing at least one among said tangible data elements, said effect data elements and degrees of performance of said tangible data elements, and the nature of the relationship between the tangible data elements and the effect data elements"*

Petitioner asserts that Conlon discloses this limitation. Pet. 33–34. Specifically, Petitioner contends, with supporting testimony from Dr. Jansen, that Conlon's adjective table (Table 19) includes data elements that are descriptive data elements describing said tangible data elements. *Id.* at 35 (citing Ex. 1002 ¶ 135). Petitioner also contends, with supporting testimony from Dr. Jansen, that Conlon's adverb table (Table 21) contains data elements with information regarding adverb classifications, which are descriptive data elements describing effect data elements and degrees of performance of said tangible data elements. *Id.* at 34 (citing Ex. 1002 ¶¶ 136–137); *see also* Reply 20–21 (discussing Dr. Ranka's testimony that in the example of "Chef Smith thinly slices the white bread with a serrated knife," from the '680 patent, "white" is an "adjective" describing "bread," and "thinly" is an "adverb" describing "slices.").

Patent Owner argues that the '680 patent "is not reliant on English grammar, nor is it restricted to language at all." PO Resp. 14. According to Patent Owner, the claim "like the rest of the '680 Patent, is not based on lexical constructs, and that is why [Dr. Jansen] cannot explain in substantive detail how the claim language might be represented by the Conlon lexical database." *Id.* at 14–15.

Patent Owner's arguments are similar to those made in connection with limitation [1.2], described above, and for the same reasons, we find that they do not undermine Petitioner's showing. After considering the evidence and arguments of the complete record, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches limitation [1.4].

f) Conclusion

For the reasons discussed above, we determine, on the current record and for purposes of this decision, that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches all of the limitations in claim 1.

3. Analysis of Dependent Claim 2

Claim 2 depends from claim 1 and recites "each tangible data element is linked to each said effect data element partially or wholly caused by said tangible data element" (limitation [2.1]) and "each effect element is linked to each said tangible data element required for said effect to occur" (limitation [2.2]). Ex. 1001, 35:45–50.

Petitioner contends that Conlon discloses these limitations. Pet. 34–38. In particular, Petitioner, supported by testimony from Dr. Jansen, contends that Conlon discloses linking related data elements, including linked relationships between subjects (nouns) and verbs, and provides several examples supporting this contention. *Id.* (citing Ex. 1005, 421, 422, 426; Ex. 1002 ¶¶ 138–142, 147).

Patent Owner does not separately argue dependent claim 2 in the Patent Owner Response. *See* PO Resp. 15. In the Sur-reply, however,

Patent Owner argues for the first time that that Conlon does not teach the limitations in claim 2. Sur-reply 8–9.

Patent Owner did not raise these arguments in the Patent Owner Response, and Petitioner did not further address claim 2 in the Reply. *See generally* PO Resp.; Reply. Accordingly, we view this argument as waived. *See* CTPG 74 ("Generally, a reply or sur-reply may only respond to arguments raised in the preceding brief . . . . While replies and sur-replies can help crystalize issues for decision, a reply or sur-reply that raises a new issue or belated presents evidence may not be considered.")

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches the limitations in claim 2.

4. Analysis of Dependent Claim 9

Claim 9 depends from claim 1 and recites "wherein each said data element is stored only once." Ex. 1001, 35:66–67. Petitioner relies on Conlon's disclosure that "[t]he addition of material from other sources . . . [has] *not increased the number of words and phrases*," due to Conlon performing "lexical disambiguation" by assigning a "unique identifier." Pet. 38 (citing Ex. 1005, 421–422, 427, Table 8; Ex. 1002 ¶ 149).

Patent Owner responds that "Conlon says it does not increase the number of words and phrases, and that a 'lexical disambiguation[']is assigned a unique identifier," but "Conlon does *not* state that it stores each lexical disambiguation only once." PO Resp. 15. According to Patent Owner "Conlon does not preclude storing lexical disambiguations i[n] multiple tables, as one single example. The lexical disambiguation, unique

identifier, and any other information could very well be stored many times according to Conlon." *Id.*

Petitioner replies that Dr. Jansen testified that Conlon's unique identifier is assigned "so as not to duplicate identical data elements." Reply 21 (citing Ex. 1002 ¶ 149) (emphasis omitted); *see also* Ex. 1057 ¶ 114 (Dr. Jansen providing further explanation why Conlon does not store the data elements in multiple locations). Petitioner argues that Patent Owner does not identify anywhere in Conlon where the same data element appears to be stored more than once, and, moreover, the mere "'appearance' of a data element in two locations does not mean it is 'stored' more than once." Reply 22 (citing Ex. 1002 ¶ 149 (Dr. Jansen testifying that pointers may be used); Ex. 1057 ¶¶ 115–119 (Dr. Jansen testifying that pointers allow data elements to appear twice but be stored only once).

In the Sur-reply, Patent Owner states "[f]or additional bases, the following claims are not disclosed in the proffered prior art. Claims 9, 12, and 13 are not disclosed by the proffered prior art," and cites to Dr. Ranka's Rebuttal Declaration ¶¶ 70–77. Sur-reply 10.

Initially, we note that Patent Owner's reliance on seven paragraphs of Dr. Ranka's Rebuttal Declaration[13] is an improper incorporation by reference, as Patent Owner did not discuss that testimony in the Sur-reply. 37 C.F.R. § 42.6(a)(3); *Cisco Systems, Inc. v. C-Cation Techs.*, LLC, IPR2014-00454, Paper 12 at 9–10 (PTAB Aug. 29, 2014) (informative). Accordingly, we will not consider arguments that are not made in the Sur-

[13] Dr. Ranka's Rebuttal Declaration will be further discussed below, in connection with Petitioner's Motion to Strike.

reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration.

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches the limitations in claim 9.

5. Analysis of Dependent Claim 12

Petitioner contends that dependent claim 12, which depends from claim 2, would have been obvious over Conlon, and provides explanation as to how Conlon teaches each claim limitation. Pet. 38–39.

Patent Owner does not separately argue dependent claim 12 in the Patent Owner Response. PO Resp. 15. In the Sur-reply, however, Patent Owner argues for the first time that that Conlon does not teach the limitations in claim 12. Sur-reply 10. Patent Owner also states "[f]or additional bases, the following claims are not disclosed in the proffered prior art. Claims 9, 12, and 13 are not disclosed by the proffered prior art," and cites to Dr. Ranka's Rebuttal Declaration ¶¶ 70–77. *Id*.

For the same reasons as discussed above with respect to claim 2, we consider Patent Owner's belated arguments as to claim 12 waived. As stated above with respect to claim 9, we also will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration.

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches the limitations in claim 12.

6. Analysis of Dependent Claim 13

Claim 13 depends from claim 2 and recites "wherein at least one of each said link between a tangible data element and an intangible data element is itself linked to at least one specific degree of performance that describes in more detail said cause-effect relationship established by said at least one link between a tangible data element and an intangible data element." Ex. 1001, 36:15–20.

Petitioner contends Conlon discloses this limitation. Pet. 40–43. Petitioner contends that Conlon's database includes information from the Indiana adverbs lists, and Conlon discloses a semantic structure (Frame D) that shows a link between a tangible data element and an intangible data element (SUBJECT NOUN + FINITE VERB), which is itself linked to at least one specific degree of performance (+ ADVERB) that describes in more detail the cause-effect relationship. *Id.* at 40–41 (citing Ex. 1005, 419). According to Petitioner, the adverbs in the lexical database are linked via the Frame D relationship to the noun-verb pair, not merely to the verb standing alone. *Id.* at 41 (citing Ex. 1002 ¶ 155). Petitioner contends that Conlon either discloses the claimed "links for each cause-effect (noun-verb) pair or, at a minimum, renders such links obvious in view of the Indiana adverb lists and Jacobson's dictionary, as well as Conlon's stated desire to provide 'detailed and explicit information about words and phrases' and to 'find terms related to any given word.'" *Id.* at 43 (citing Ex. 1005, 415, 421; Ex. 1002 ¶ 158); *see also id.* at 41–43.

Patent Owner argues in the Patent Owner Response[14] that Petitioner "attempts to equate 'degree of performance' with 'adverbs' . . . [b]ut there is no such equation in the '680 Patent, as the patent does not even include the word 'adverb.'" PO Resp. 16; *see also* Ex. 2003 ¶¶ 51–53. Patent Owner further argues that "[Petitioner] here attempts to restrict the scope of the '680 Patent to English grammar." PO Resp. 16.

In the Reply, Petitioner argues that "Patent Owner never factually disputes that English words disambiguated as adverbs *fall within the scope of* degree of performance." Reply 22. Petitioner contends that "[a]dverbs in English are a *species* that fall within the claimed genus of degrees of performance." *Id.* (citing Ex. 1057 ¶ 127). Petitioner further argues that Dr. Ranka agrees that "thinly" in the '680 patent's exemplary sentence "Chef Smith thinly slices the white bread with a serrated knife" is an adverb. *Id.* (citing Ex. 1057 ¶¶ 124–125; Ex. 1001, 11:19–41 ("'Thinly' . . . is the degree of performance of these cause elements.").

We agree with Petitioner, for the reasons set forth by Petitioner, as well as reasons previously discussed above with respect to limitations [1.2] and [1.4]. After considering the evidence and arguments of the complete record, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches the limitations in claim 13.

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[14] As previously stated with respect to claims 9 and 12, in the Sur-reply Patent Owner states "[f]or additional bases, the following claims are not disclosed in the proffered prior art. Claims 9, 12, and 13 are not disclosed by the proffered prior art," and cites to Dr. Ranka's Rebuttal Declaration ¶¶ 70–77. Sur-reply 10. However, as previously stated, we will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration.

7. Analysis of Independent Claim 14

For limitations [14.0], [14.1], and [14.2], Petitioner relies on the same analysis as discussed above for limitations [1.0]–[1.4]. *See* Pet. 44.

Limitation [14.3] recites "a dictionary routine for automatically classifying and storing words entered into said database according to said sets and subsets of data elements." Ex. 1001, 36:41–43.

Petitioner contends Conlon discloses limitation [14.3]. Pet. 44–47. Specifically, Petitioner argues that Conlon "discloses a sub-program or function within a larger program for looking up words in a dictionary which automatically classifies and stores words entered into the [lexical database] and differentiates between uses of the same word for different parts of speech." *Id.* at 44 (citing Ex. 1002 ¶ 164). Petitioner asserts that Conlon "gives an example of looking up the word *chip* in homograph number 1 and sense number 1 . . . which yields the word's definition (Table 2) and also its lexical information, including that it is a concrete noun (Table 3)." *Id.* at 46–47 (citing Ex. 1005, 418–419); *see also* Ex. 1002 ¶ 167 (citing Ex. 1005, ¶¶ 418–419). Petitioner further contends that "Conlon's dictionary routine automatically generates a unique value (e.g., the information shown in Tables 2–3) in response to the entry of a unique key (e.g., *chip*, H#1, S#1)." Pet. 47 (citing Ex. 1002 ¶ 167).

In the Institution Decision, we determined that Petitioner had not sufficiently shown that Conlon discloses this limitation, because Petitioner's assertions that Conlon performs its classification *automatically* are not supported by the record. Inst. Dec. 24–26 (citing, e.g., Ex. 1005, 418, 423, 427). For example, we relied upon Conlon's disclosure that "[i]n order to translate knowledge from machine-readable dictionaries into a form usable

in a lexical database, it must be analyzed and formalized in order to make it sufficiently explicit for machine use. We have performed this analysis by semiautomatic methods. For example, the definition of 'chip' in homograph number 1 and sense number 1 provided by CED is shown in Table 2." *Id.* at 25 (citing Ex. 1005, 418). As set forth in the Institution Decision (*Id.*), Conlon then further affirms that the chip example is semi-automatic: "After analyzing this definition semi-automatically, we have been able to create explicit information about 'chip.'" Ex. 1005 at 418; *see also id.* at 423 ("Unfortunately, it is not possible to classify verbs automatically by analyzing machine-readable dictionary definitions. Currently, we are therefore in the process of generating this information by hand."); *id.* at 427 ("We are trying to automate this process, but most of the time human intervention is necessary. Different strategies are required for different sources, which complicates this task.").

In the Reply, Petitioner argues that limitation [14.3] "refers to using a dictionary look up function to look up words and their syntax (after the words are already known by the database.)" Reply 23. In other words, Petitioner contends that this limitation refers to using a dictionary look up function rather than to the creation of the dictionary. *Id.* at 6–7. Petitioner reiterates its reliance on Tables 2–3 of Conlon, and, relying on the testimony of Dr. Jansen, asserts that this "is an example of SQL 'querying' in the Oracle RDBMS used by Conlon." *Id.* at 23–24 (citing Ex. 1057 ¶¶ 135–136). Petitioner asserts that "[w]hen an SQL query is entered using Oracle RDBMS, the query is stored both in a printed report and in a saved file." *Id.* at 24 (citing Ex. 1003 ¶ 137).

We determine that, under either interpretation of this limitation (i.e., whether automatically classifying and storing terms entered into said database occurs during the creation of the dictionary, or as the result of using a look up table), that Petitioner has not shown by a preponderance of the evidence that Conlon teaches this limitation.

Petitioner, relying on testimony from Dr. Jansen, asserts that Conlon's Table 2 and Table 3 are "examples of looking up the word chip in homograph number 1 and sense number 1." Ex. 1002 ¶ 167; Ex. 1057 ¶ 136. However, Conlon does not describe Table 2 and Table 3 as looking up the word chip, or as a query. Tables 2 and 3 are in Section 3, titled "Sources of Information," under sub-section 3.1, titled "Machine-readable dictionaries." Ex. 1005, 418–419. These sections, quoted above, describe the process of translating knowledge from a machine-readable dictionary into a form usable in a lexical database, and describe this process as semi-automatic, not automatic. *Id.* at 418. Conlon refers to the "definition" of "chip," and states that "[a]fter analyzing this definition semi-automatically, *we have been able to create explicit information about 'chip.'*" *Id.* (emphasis added). Table 2 of Conlon, thus refers to the definition of "chip" and Table 3 of Conlon refers to the lexical information of "chip" *that has been created* by semi-automatic methods. Conlon does not describe these as "examples of looking up the word 'chip,'" as Petitioner and Dr. Jansen asserts, and we are not persuaded this is an accurate representation of Conlon's disclosure.

However, even if we accept that a user may look up any word in Conlon's lexical database to find its meaning or other information (*see* Ex. 1002 ¶ 166), Petitioner has not shown how looking up a word, e.g., the

word "chip," discloses limitation [14.3]. Dr. Jansen testifies that "Conlon gives an example of using a dictionary routine to look up the word 'chip' in homograph number 1 and sense number 1, *which yields both the word's definition (Table 2) and the word's lexical information*, including that it is a concrete noun (Table 3)." Ex. 1057 ¶ 136 (emphasis added). Dr. Jansen further testifies that any SQL query and its output are stored by the Oracle RDBMS. *Id.* ¶ 137. However, neither Petitioner, nor Dr. Jansen, explains how yielding the word's definition and lexical information, and storing the SQL query, discloses *automatically classifying and storing words entered into said database.* Specifically, Petitioner has not shown how this shows *automatically classifying* the word that has been entered (i.e., looked up).

After considering the evidence and arguments of the complete record, we determine that Petitioner has not shown, by a preponderance of the evidence, that Conlon teaches limitation [14.3].

8. Analysis of Dependent Claims 15–19

Petitioner contends that dependent claims 15–19, which depend directly or indirectly from independent claim 14, would have been obvious over Conlon, and provides explanation as to how the prior art teaches each claim limitation. Pet. 48–52.

As these claims depend from claim 14, we find that, for the same reasons as set forth for claim 14, that the Petitioner has not shown, by a preponderance of the evidence, that Conlon teaches the limitations in claims 15–19.

9. Analysis of Independent Claim 20 and Dependent Claims 21, 28, and 32

Petitioner contends that independent claim 20 would have been obvious over Conlon, largely for the same reasons as set forth in independent claim 1, and provides explanation as to how the prior art teaches each claim limitation. Pet. 53–54.

Patent Owner argues that "Conlon's lexical-database is not a DBMS and cannot, by itself, disclose DBMS functionality such as the 'storing' recited in Claim 20." PO Resp. 17. According to Patent Owner, "DBMS functionality is needed to disclose 'storing,' and [Petitioner] here relies solely on a lexical database, which cannot by itself perform DBMS functionality." *Id.* (citing Ex. 2001[*sic* 2003] ¶¶ 60–61).

As previously discussed, we agree with Petitioner that Conlon combines its lexical database with a DBMS, i.e., the Oracle RDBMS. Reply 25 (citing Ex. 1057 ¶ 75); *see* Ex. 1005, 415 ("We describe the organization of our lexical database, which is stored in an Oracle Relational Database Management System and the design of the tables that comprise the database."). We, therefore, find that Patent Owner's arguments do not undermine Petitioner's contentions.

Similarly, Petitioner contends that dependent claim 21 would have been obvious over Conlon, for the same reasons as set forth in dependent claim 2. Pet. 54–55. Petitioner also contends that dependent claim 28 would have been obvious over Conlon, for the same reasons as set forth in dependent claim 9, and dependent claim 32 would have been obvious over Conlon, for the same reasons as set forth in dependent claim 13. *Id.* at 55.

Patent Owner does not separately argue claims 21, 28, and 32 in the Patent Owner Response. *See generally* PO Resp. In the Sur-reply, Patent Owner states "[c]laims 20, 21, 28, and 32 are not disclosed by the proffered prior art" and cites to paragraphs 84–91 of the Ranka Rebuttal Declaration. Sur-reply 10.

As discussed above, we will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration. After considering the evidence and arguments of the complete record, we determine that Petitioner has shown, by a preponderance of the evidence, that Conlon teaches the limitations in claims 20, 21, 28, and 32.

10. Analysis of Independent Claim 33 and Dependent Claims 34–40

Petitioner contends that independent claim 33 would have been obvious over Conlon, largely for the same reasons as set forth in independent claim 1 and independent claim 20, and provides explanation as to how the prior art teaches each claim limitation. Pet. 55–56. Petitioner contends that dependent claims 34–40, which depend directly or indirectly from independent claim 33, would have been obvious over Conlon, and provides explanation as to how the prior art teaches each claim limitation. *Id.* at 56–59.

We find that, for the same reasons as set forth for claim 14, regarding the requirement of "automatically classifying and storing words entered said database," that Petitioner has not shown, by a preponderance of the evidence, that Conlon teaches the limitations in claims 33–40.

11. Summary of Ground 1

Having considered the *Graham* factors,[15] including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the challenged claims, we are persuaded, based on the current record, that Petitioner has shown, by a preponderance of the evidence, that claims 1, 2, 9, 12, 13, 20, 21, 28, and 32 would have been obvious over Conlon, but *has not* shown, by a preponderance of the evidence, that claims 14–19 and 33–40 would have been obvious over Conlon.

F. Ground 2: Obviousness Over Conlon and Miller

Petitioner contends claims 3–6, 8, 10, 11, 22–25, 27, 29–31, 41, and 42 would have been obvious over the combination of Conlon and Miller. Pet. 60–73.

1. Analysis of Dependent Claims 3 and 4

Claim 3 depends from claim 1 and recites "wherein all said data elements are stored in hierarchical structures of parent-child relationships." Ex. 1001, 35:51–53.

Petitioner contends Miller teaches the limitations in claim 3. Pet. 62–63. Specifically, Petitioner contends that Miller discloses a "lexical tree" that "can be reconstructed by following trails of superordinate terms: oak@→tree@→plant@→organism, for example, where '@→' is the transitive, asymmetric, semantic relation that can be read 'is a' or 'is a kind of.'" *Id.* (citing Ex. 1013, 247). Petitioner also asserts that "Miller further discloses that 'this design creates a sequence of levels, a hierarchy, going

[15] Patent Owner does not submit evidence of secondary considerations. *See generally* PO Resp.

from many specific terms at the lower levels to a few generic terms at the top' and that '[h]ierarchies provide conceptual skeletons for nouns; information about individual nouns is hung on this structure like ornaments on a Christmas tree.'" *Id.* at 63. Petitioner argues that "any data element at the lower level of this *hierarchal structure* can be said to be the *child*, whereas the more generic term above it is its *parent*. The parent and child are related by the 'is a' or 'is a kind of' semantic relation represented by '@→.'" *Id.* (citing Ex. 1002 ¶¶ 225–226). Petitioner asserts that "[i]t would have been obvious to extend this parent-child organizational structure beyond the nouns in Miller and to apply it to *all said data elements* in the database, as motivated by Conlon and others." *Id.* (citing Ex. 1005, 421; Ex. 1002 ¶¶ 226–227). Petitioner argues that one of ordinary skill in the art would have naturally looked to Miller for guidance regarding how to implement a lexical inheritance system such as the described by Conlon, and would have a reasonable expectation of success in organizing Conlon's database entries in accordance with Miller's hierarchical semantic organization. *Id.* at 62 (citing Ex. 1002 ¶¶ 220–224).

Claim 4 depends from claim 3 and recites "wherein each said tangible data element having any children in said hierarchal structure must have at least two of said children." Ex. 1001, 35:54–56.

Petitioner contends Miller teaches the limitations in claim 4. Pet. 63–64. Specifically, Petitioner contends that in Miller's *oak@→tree@→plant@→organism* example, the word *plant* has two children: *tree* and *oak* (albeit on different levels of the hierarchy). *Id.* (citing Ex. 1013, 247; Ex. 1002 ¶ 228). Petitioner also contends that Miller's

Figure 1 depicts that each tangible data element has at least two children. *Id.* at 64 (citing Ex. 1013, Fig. 1, 252; Ex. 1002 ¶¶ 228–229).

Patent Owner does not separately argue claims 3 and 4 in the Patent Owner Response. *See generally* PO Resp. In the Sur-reply, Patent Owner states "[c]laims 3–5 are not disclosed by the proffered prior art" and cites to paragraphs 103–109 of the Ranka Rebuttal Declaration. Sur-reply 10.

As discussed above, we will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration. After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that the combination of Conlon and Miller teaches the limitations in claims 3 and 4, and that a person of ordinary skill in the art would have had a reason to combine the references in the manner Petitioner proposes, with a reasonable expectation of success.

2. Analysis of Dependent Claim 5

Claim 5 depends from claim 3 and recites "wherein each said effect data element can have any number of children in said hierarchical structure." Ex. 1001, 35:57–59.

Petitioner contends Miller teaches the limitations in claim 5. Pet. 64–65. Specifically, Petitioner contends that Figure 1 of Miller shows that "each tangible data element has at least two children." *Id.* at 64. Petitioner also asserts that Figure 2 of Miller shows one or two children on any given level of the hierarchy. *Id.* at 64–65 (citing Ex. 1013, 260; Ex. 1002 ¶¶ 230–231).

In its Response, Patent Owner argues that "Miller restricts the number of hierarchical children to one or two, while the ['680 patent] recites 'any number of children.'" PO Resp. 18 (citing Ex. 2001[*sic* 2003] ¶¶ 66–69).

In the Reply, Petitioner relies again on Figure 1 of Miller, which shows "seven unique beginners denoting different kinds of tangible things." Reply 29. According to Petitioner, "each beginner represents thousands of nouns in WordNet," so the "number of nouns (effect data elements) represented by these beginners is huge—with *thousands* of children under each parent—not just 'one or two.'" *Id.* (citing Ex. 1013, 245).

In the Sur-reply, Patent Owner states "[c]laims 3–5 are not disclosed by the proffered prior art" and cites to paragraphs 103–109 of the Ranka Rebuttal Declaration. Sur-reply 10.

As discussed above, we will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration. After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that the combination of Conlon and Miller teaches the limitations in claim 5, and that a person of ordinary skill in the art would have had a reason to combine the references in the manner Petitioner proposes, with a reasonable expectation of success.

3. Analysis of Independent Claim 41 and Dependent Claims 6, 8, 10, 11, 22–25, 27, 29–31, 42

Petitioner relies on its analysis for claims 1–5 for limitations in independent claim 41. Pet. 71–72. In addition, Petitioner asserts that Miller's Figure 2 discloses an example of a hierarchical structure defining

vertical lines and horizontal levels. *Id.* at 72–73 (citing Ex. 1013, 260). Petitioner further asserts that "organizing parent-child relationships in structures defining vertical line and horizontal levels was well known in the field of lexical databases and would have been obvious to implement in the [lexical database] of Conlon." *Id.* (citing Ex. 1002 ¶¶ 264–265; Ex. 1009, 109–111). Petitioner contends that dependent claims 6, 8, 10, 11, 22–25, 27, 29–31, and 42, which depend directly or indirectly from independent claims 1, 20, and 41, would have been obvious over Conlon and Miller, and provides explanation as to how the prior art teaches each claim limitation. *Id.* at 65–70, 73.

Patent Owner does not separately argue these claims in the Patent Owner Response. PO Resp. 18–21. In the Sur-reply, Patent Owner states "[c]laim 41 is not disclosed by the proffered prior art" and cites to paragraphs 110–111 of the Ranka Rebuttal Declaration, and "[c]laims 6, 8, 10, 11, 22–25, 27, 29–31, and 42 are not disclosed by the proffered prior art" and cites to paragraphs 112–139 of the Ranka Rebuttal Declaration. Sur-reply 10.

As discussed above, we will not consider arguments that are not made in the Sur-reply, but are instead improperly incorporated by reference to the cited paragraphs in Dr. Ranka's Rebuttal Declaration. After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that the combination of Conlon and Miller teaches the limitations in claims 6, 8, 10, 11, 22–25, 27, 29–31, 41, and 42, and that a person of ordinary skill in the art would have had a reason to combine the

references in the manner Petitioner proposes, with a reasonable expectation of success.

4. Summary of Ground 2

Having considered the *Graham* factors, including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the challenged claims, we are persuaded, based on the current record, that Petitioner has shown, by a preponderance of the evidence, that claims 3–6, 8, 10, 11, 22–25, 27, 29–31, 41, and 42 would have been obvious over Conlon and Miller.

G. Ground 3: Obviousness Over Conlon, Miller, and Beckwith

Petitioner contends claims 7 and 26 would have been obvious over the combination of Conlon, Miller, and Beckwith. Pet. 73–77.

Claim 7 depends from claim 3 and recites "wherein said hierarchal structure is an outline." Ex. 1001, 35:62–63. Claim 26 depends from claim 22 and recites similar limitations. *Id.* at 37:50–52.

As explained above, Petitioner relies on Conlon and Miller as teaching the limitations of claims 3 and 22. *See supra* §§ III.F.1, III.F.3. Petitioner asserts that Beckwith teaches the additional limitations in claims 7 and 26. Pet. 75–77. Petitioner argues that Beckwith's Table 2 teaches a hierarchical structure of words organized in the form of an outline. *Id.* at 75–76 (citing Ex. 1016, 305, 308; Ex. 1002 ¶ 273). Petitioner asserts that Beckwith's outline structure can be applied to Conlon's example of "Rhode Island Red" IS-A "chicken" and "chicken" IS-A "bird." *Id.* at 76 (citing Ex. 1002 ¶¶ 274–275, Ex. 1005, 426). Petitioner argues that one of ordinary skill "seeking to build a 'good [lexical database]' per Conlon, and who is familiar with Miller's description of hierarchical noun structures in

WordNet, would have readily looked to Beckwith." *Id.* at 74–75. Petitioner contends that Beckwith describes the same lexical database as Miller (WordNet), was co-authored by the same person (George A. Miller), and was published together with Miller in the same journal issue. *Id.* at 75 (citing Ex. 1002 ¶¶ 270–272). Petitioner additionally asserts that "[o]rganizing Miller's hierarchical structures in outline form constitutes the use of a known technique to improve similar systems in the same way, or the application of a known technique to a known system ready for improvement to yield predictable results." *Id.* at 75.

Patent Owner does not separately argue these claims in the Patent Owner Response. *See* PO Resp. 21–22. In the Sur-reply, Patent Owner states "[c]laims 7 and 26 are not disclosed by the proffered prior art" and cites to paragraphs 140–145 of the Ranka Rebuttal Declaration. Sur-reply 10. As stated above, we will not consider these arguments, which are improperly incorporated by reference.

After considering the evidence and arguments of the complete record, and for the reasons set forth by Petitioner, we determine that Petitioner has shown, by a preponderance of the evidence, that the combination of Conlon, Miller, and Beckwith teaches the limitations in claims 7 and 26. Therefore, having considered the *Graham* factors, including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the challenged claims, we are persuaded, based on the current record, that Petitioner has shown, by a preponderance of the evidence, that claims 7 and 26 would have been obvious over Conlon, Miller, and Beckwith, and that a person of ordinary skill in the art would

have had a reason to combine the references in the manner Petitioner proposes, with a reasonable expectation of success.

H. Ground 4: Obviousness Over Conlon, Miller, and Fong

Petitioner contends claims 43–46 would have been obvious over the combination of Conlon, Miller, and Fong. Pet. 77–86.

1. Analysis of Dependent Claim 43

Petitioner contends Conlon teaches limitations [43.0], [43.1], [43.1.1], [43.1.2], and [43.2] of claim 43. Pet. 79–82. With respect to the claimed "normalizing," Petitioner generally asserts that to the extent that Conlon does not expressly state that "normalizing" is performed, a person of ordinary skill in the art "would have immediately recognized that the above-described relational structures necessarily involved normalization," "normalization was an obvious and beneficial technique for building such structures," and "normalization would have been necessary or at least obvious." *Id.* at 81–82 (citing Ex. 1029 at 75–76, Ex. 1002 ¶¶ 293–295, 298–302; Pet. 77–79). In support, Petitioner relies on Fong to teach the claimed "normalizing." *Id.* at 77–79.

Limitation [43.3] recites "comparing each of said normalized databases with each other one of said normalized databases." Ex. 1001, 40:7–8. Petitioner asserts that "[o]nce the information has been normalized as taught by Fong, the next necessary step is to compare the normalized information." Pet. 82 (citing Ex. 1002 ¶ 303).

Limitation [43.4] recites "recording all common data elements found during each said comparing step." Ex. 1001, 40:9–10. Petitioner asserts that "[i]n order to combine entities with the same or equivalent identifiers as

taught by Fong, a POSITA would next record all common data elements found during the comparing step." Pet. 83 (citing Ex. 1002 ¶ 304).

Limitation [43.5] recites "recording one location of each said common data element in each of said databases." Ex. 1001, 40:11–12. Petitioner asserts that "[a]s explained above for claim 9, in Conlon, each data element is stored only once in the main table. Entities with the same or equivalent identifiers are combined and recorded once in the main table." Pet. 83 (citing Ex. 1002 ¶ 305).

In our Institution Decision, we determined that Petitioner had not sufficiently shown, for purposes of institution, that the references teach limitations [43.3], [43.4], and [43.5], so Petitioner had not established a reasonable likelihood of prevailing with respect to claim 43. Inst. Dec. 38–42. Specifically, we found that Petitioner had not identified with particularity how the references, particularly Fong, teach these limitations, and that Petitioner's position was confusing and vague. *Id.*

In the Reply Brief, Petitioner provides a detailed example, created by Dr. Jansen, purportedly explaining the principles from Fong and another reference, Hansen, and explaining how Fong's four conditions disclose limitations [43.1]–[43.5].[16] Reply 31–35. Petitioner also submits additional testimony from Dr. Jansen. *See* Ex. 1057 ¶¶ 222–261.

"It is of the utmost importance that petitioners in . . . IPR proceedings adhere to the requirement that the initial petition identify 'with particularity' the 'evidence that supports the grounds for the challenge to each claim.'" *Intelligent Bio–Systems*, 821 F.3d. at 1369 (citing 35 U.S.C. § 312(a)(3)).

[16] Hansen, et al., Database Management and Design (2d ed. 1996) (Ex. 1034). Dr. Jansen cited to Hansen in paragraph 289 of Exhibit 1002.

"[T]he expedited nature of IPRs bring[s] with it an obligation for petitioners to make their case in their petition to institute. While the Board's requirements are strict ones, they are requirements of which petitioners are aware when they seek to institute an IPR." *Id.*; *see also* CTPG 73 ("Petitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g. to make out a prima facie case of unpatentability . . . [but] [a] party may submit rebuttal evidence in support of its reply."); 74 ("Generally, a reply or sur-reply may only respond to arguments raised in the preceding brief. 37 C.F.R. § 42.23 . . . . 'Respond,' in the context of 37 C.F.R. § 42.23(b), does not mean proceed in a new direction with a new approach as compared to the positions taken in a prior filing. While replies and sur-replies can help crystalize issues for decision, a reply or sur-reply that raises a new issue or belatedly presents evidence may not be considered."); *see also Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1078−80 (Fed. Cir. 2015) (holding that the Board may rely on new evidence submitted with a reply because the evidence was legitimately responsive to patent owner's arguments *and not needed for a prima facie case of obviousness*) (emphasis added).

Petitioner's arguments and explanation regarding the disclosures in Hansen and Fong, and Dr. Jansen's example explaining this disclosure, were not made in the Petition. *Compare, e.g.*, Pet. 82–83 (analysis of limitations [43.3], [43.4], [43.5], *with* Reply 33–35 (analysis of limitations [43.3], [43.4], [43.5]); *compare* Ex. 1002 ¶¶ 290–305 (Dr. Jansen's testimony regarding claim 43), *with* Ex. 1057 ¶¶ 222–261 (Dr. Jansen's rebuttal testimony regarding claim 43). At the hearing, Petitioner stated that the Reply went "deeper into [the] analysis," so "the thrust of the analysis did not

change." *See* Tr. 53:1–8. Petitioner stated that "[i]t is an inherency argument, just like the very beginning, relying precisely on the Fong Conditions 3 and 4." *Id.* at 53:6–8. However, inherency is not argued in the Petition, and we note that the arguments in the Reply, and evidence relied upon, including Dr. Jansen's Rebuttal Declaration, is significantly more detailed. *See* Pet. 79–83; Reply 31–35.

Inherency requires that "the limitation at issue necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art." *PAR Pharms., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1195–1196 (Fed. Cir. 2014). Although in the Petition, Petitioner stated generally that "normalization would have been necessary," and refers to "the next necessary step" in its analysis of limitation [43.3] (*see* Pet. 82), Petitioner did not state that limitations [43.4] and [43.5] were "necessary," Petitioner did not explain why "normalization" or limitation [43.3] were "necessary" (*see* Inst. Dec. 39–40), nor did Petitioner mention or provide an inherency analysis in its analysis of limitations [43.3–43.5]. Pet. 83. To that end, the Petition was deficient, and, as stated in the Institution Decision, "confusing and vague." *See Intelligent Bio–Systems*, 821 F.3d at 1369 (citing 35 U.S.C. § 312(a)(3)); Inst. Dec. 38–42.

We note that, in the Reply, Petitioner also does not state that the limitations are "inherent." *See* Reply 33–35. However, Petitioner now does state that each of limitations [43.3], [43.4], and [43.5] is "necessary." *Id.* Petitioner also provides additional "inherency-like" evidence in Dr. Jansen's Rebuttal Declaration. *See, e.g.*, Ex. 1057 ¶ 252 ("Sitting here today, I cannot think of a way of ensuring compliance with Fong's third and fourth conditions without **comparing** such entities with one another."); ¶ 256

("Sitting here today, I cannot think of a way of ensuring compliance with Fong's third and fourth conditions without **recording** each occurrence of two or more entities being the same or equivalent, given that such entities must ultimately be combined."); ¶ 260 ("Sitting here today, I cannot think of a way of ensuring compliance with Fong's third and fourth conditions without *recording one location* of the entities you wish to combine."). This argument and evidence would have been needed to support a prima facie case of unpatentability, including how the cited prior art teaches limitations [43.3], [43.4], and [43.5], if Petitioner intended to rely on an inherency theory.

Petitioner's attempt to supplement the Petition to make out a prima facie case of unpatentability via new arguments and evidence in the Reply is improper. Although "the Board will permit the petitioner, in its reply brief, to address issues discussed in the institution decision," Petitioner in the Reply does not merely "respond" to the issues discussed in our Institution Decision but instead "proceed[s] in a new direction with a new approach as compared to the positions taken in" the Petition by introducing in the Reply new argument and evidence not presented in the Petition regarding how limitations [43.3], [43.4], and [43.5] are "necessary" or inherent. *See* CTPG 73, 74. We decline to consider these late arguments and evidence. After considering the properly presented evidence and arguments of the complete record, we determine that Petitioner has not shown, by a preponderance of the evidence, that the combination of Conlon, Miller, and Fong teaches limitations [43.3–43.5].

2. Analysis of Dependent Claims 44–46

Claim 44 depends from claim 41, and recites, in part "proceeding with said integrating if respective top level data elements in said heterogenous databases and said parts thereof are substantially the same or differentiated only by descriptors." Ex. 1001, 40:17–20. Petitioner identifies this as limitation [44.1]. Claim 44 also recites "recording each new and old location of each said relocated data element as a cross reference," which Petitioner identifies as limitation [44.6]. *Id.* at 40:36–37.

In our Institution Decision, we determined that Petitioner had not sufficiently shown, for purposes of institution, that the references teach limitations [44.1] and [44.6]. Inst. Dec. 42–44. With respect to limitation [44.6],[17] in the Petition, Petitioner relies on the "[s]ame reasons as claim 9 and limitations [10.2] and [43.5]." Pet. 83. This is the full extent of Petitioner's analysis of this limitation. *Id.* In our Institution Decision, we stated that Petitioner had not sufficiently shown that limitation [43.5] was taught by the references, and further, Petitioner had not explained, nor was it readily apparent, how the analysis for claim 9 and limitation [10.2] taught the recited limitation in limitation [44.6]. Inst. Dec. 44.

In the Reply, Petitioner states "[r]ecording new and old locations (with pointer to old location)," and provides an illustration, created by Dr. Jansen, purportedly explaining why Fong teaches limitation [44.6]. Reply 38–39. Petitioner also relies on additional testimony from Dr. Jansen. *See*

[17] Because we determine that Petitioner has not shown by a preponderance of the evidence that the references teach limitation [44.6], we need not address Petitioner's additional arguments as to limitation [44.1].

Ex. 1057 ¶¶ 275–278.[18] Dr. Jansen's testimony relies on the analysis of limitation [43.5]. *Id.* ¶ 276. Dr. Jansen also testifies that the use of "pointers," as set forth in connection with claim 9, "serves as a cross reference that allows data that is stored (i.e., recorded in only one location to also be visible or accessible in other locations as well." *Id.* ¶ 277. Dr. Jansen further testifies that, through his illustration, the "same data elements are cross referenced through the use of a pointer to their old location in Database B." *Id.* ¶ 278.

As discussed above, we find that Petitioner failed to make a prima facie case as to limitation [43.5] in the Petition. Further, we find that Petitioner failed to make a prima facie in the Petition as to limitation [44.6], for the same reasons as discussed above with respect to limitations [43.3–43.5]. Further, even considering Petitioner's showing as to limitation [44.6] in the Reply, Petitioner still has not shown that the combination of references teaches "recording each new and old location of each said relocated data element as a cross reference." Rather, Petitioner relies on an illustration, rather than the references, without sufficiently tying the two together.

After considering the evidence and arguments of the complete record, we determine that Petitioner has not shown, by a preponderance of the evidence, that the combination of Conlon, Miller, and Fong teaches

[18] Dr. Jansen also states that he mistakenly used the word "only" in the first Declaration, when stating "a [person of ordinary skill in the art] would proceed with the integration of top level data elements from heterogeneous databases only if the top level data elements . . ." Ex. 1057 ¶ 266 n. 12 (citing Ex. 1002 ¶ 307).

limitation [44.6]. Claims 45 and 46 depend from claim 44, so we, likewise find Petitioner's analysis deficient for the same reasons as with claim 44.

3. Summary of Ground 4

Having considered the *Graham* factors, including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the challenged claims, we determine that Petitioner has not shown, by a preponderance of the evidence, that claims 44–46 would have been obvious over Conlon, Miller, and Fong.

I. Petitioner's Motion to Strike

Petitioner filed a Motion to Strike Dr. Ranka's Rebuttal Declaration. Paper 30. Petitioner contends that Patent Owner's Sur-reply "was accompanied by an 88-page paper titled 'Rebuttal Declaration of Dr. Sanjay Ranka.'" Mot. Strike 2. Petitioner contends that the Ranka Rebuttal Declaration (Paper 27) violates 37 C.F.R. § 42.23(b), and states that Patent Owner opted not to depose Petitioner's witness, Dr. Jansen. *Id.* at 4; *see also id.* at 6. Petitioner further asserts that waiver of 37 C.F.R. § 42.23(b) is "unwarranted and not in the interests of justice." *Id.* at 5. Petitioner argues that if Patent Owner believed that the Reply or Dr. Jansen's Rebuttal Declaration improperly raised new issues, then Patent Owner should have followed the procedures set forth in the CTPG. *Id.* at 5–6 (citing CTPG 80–81). Petitioner asserts that waiving 37 C.F.R. § 42.23(b) would be highly prejudicial to Petitioner. *Id.* at 6–7.

Patent Owner responds that Petitioner raises new issues and evidence in the Reply "as demanding Patent Owner's Rebuttal Declaration." Opp. Strike 2–6.

37 C.F.R. § 42.23(b) states that "A sur-reply … may not be accompanied by new evidence other than deposition transcripts of the cross-examination of any reply witness."; *see also* CTPG 73 ("The sur-reply may not be accompanied by new evidence other than deposition transcripts of the cross-examination of any reply witness."). Patent Owner does not cite to, or provide any legal authority permitting a new declaration accompanying a sur-reply, nor did Patent Owner seek authorization to file the Ranka Rebuttal Declaration prior to filing it. *See* Opp. Strike. To that end, Petitioner appears to have the stronger argument. However, as discussed above, the Ranka Rebuttal Declaration is primarily used to improperly incorporate arguments by reference, and we decline to consider such arguments that are not raised in the Sur-reply. Accordingly, we do not rely on the Ranka Rebuttal Declaration in this Decision, so we dismiss Petitioner's Motion to Strike as moot.

IV. CONCLUSION

For the foregoing reasons, we are persuaded that Petitioner establishes by a preponderance of the evidence that claims 1–13, 20–32, 41, and 42 are unpatentable. We are not persuaded by a preponderance of the evidence that claims 14–19, 33–40, and 43–46 are unpatentable.

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1, 2, 9, 12–21, 28, 32–40	103(a)	Conlon	1, 2, 9, 12, 13, 20, 21, 28, 32	14–19, 33–40
3–6, 8, 10, 11,	103(a)	Conlon, Miller	3–6, 8, 10, 11, 22–25, 27,	

22–25, 27, 29–31, 41, 42			29–31, 41, 42	
7, 26	103(a)	Conlon, Miller, Beckwith	7, 26	
43–46	103(a)	Conlon, Miller, Fong		43–46
Overall Outcome			1–13, 20–32, 41, 42	14–19, 33–40, 43–46

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–13, 20–32, 41, and 42 of the '680 patent have been shown to be unpatentable under 35 U.S.C. § 103(a);

FURTHER ORDERED that claims 14–19, 33–40, and 43–46 of the '680 patent have not been shown to be unpatentable under 35 U.S.C. § 103(a);

FURTHER ORDERED that Petitioner's Motion to Strike (Paper 30) is dismissed as moot; and

FURTHER ORDERED that, because this is a final written decision, parties to this proceeding seeking judicial review of our Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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