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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/216,755	08/24/2011	Gracee Agrawal	NEUR-009	4735

81256   7590   09/27/2019

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ART UNIT	PAPER NUMBER
3791	

MAIL DATE	DELIVERY MODE
09/27/2019	PAPER

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PTOL-90A (Rev. 04/07)

UNITED STATES PATENT AND TRADEMARK OFFICE
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BEFORE THE PATENT TRIAL AND APPEAL BOARD
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Ex parte GRACEE AGRAWAL, TATJANA ZIKOV, and
STEPHANE BIBIAN[1]
———————————

Appeal 2018-004035
Application 13/216,755
Technology Center 3700
———————————

Before ULRIKE W. JENKS, TAWEN CHANG, and DAVID COTTA,
Administrative Patent Judges.

CHANG, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) involving claims to a
method of monitoring a subject or patient under anesthesia, which have been
rejected as being directed to a patent-ineligible judicial exception without
significantly more. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] Appellants identify the Real Party in Interest as NeuroWave System Inc.
(Br. 2.)

STATEMENT OF THE CASE

The Specification states:

> Electroencephalography (EEG) is the recording of electrical activity from the scalp surface, which is produced by the firing of neurons in the brain. . . .
>
> During deep anesthesia, the EEG may develop a . . . pattern of activity known as suppression-burst pattern . . . , consisting of bursts of high-voltage activity . . . periodically interrupted by episodes of suppression (low-voltage activity $< 10\,\mu V$). . . .
>
> . . . When not associated with a high dose of anesthetic drugs or CNS depressant drugs or hypothermia, the presence of suppression-burst pattern in EEG carries a grave prognosis due to its relation to severe encephalopathy. Some of the underlying neuropathological conditions which produce a suppression-burst pattern in EEG are head trauma, stroke, coma or anoxia.

(Spec. 1:14–2:3.)

The Specification teaches that, "[d]ue to the high clinical importance of the presence of suppression in EEG signals, . . . it is extremely important to be able to accurately detect the periods of EEG suppression in real-time during general anesthesia to avoid very deep anesthetic levels." (*Id.* at 2:9–12.) The Specification also teaches that "[t]he suppression periods in EEG waveform can be manually detected by human EEG experts" based on visual inspection for "periods of time, typically longer than 0.5 s, where the peak-to-peak amplitude of the EEG signal is very less [sic] (typically 5 to 20 μV)," but that "this method is not very robust due to the subjectivity in the visual analysis" and is furthermore "very time-consuming, tedious and expensive (due to the expertise required)." (*Id.* at 2:12–18.)

According to the Specification, "[c]urrent automated methodologies for the detection of suppression in EEG waveform are typically carried out based on the peak-to-peak method inherited from visual observation," but "this method is particularly sensitive to noise and can fail to detect suppression in certain conditions due to the susceptibility of the EEG signal . . . to various kinds of artifacts." (*Id.* at 2:22–26.) Further according to the Specification, therefore, "the objective of the present invention is to provide an automated method for robust detection of suppression periods in EEG signals in real time." (*Id.* at 2:19–21.)

Claims 1, 2, 4–9, 11–14, 21, and 23–26 are on appeal. Claim 8 is illustrative and reproduced below:

> 8. A method of monitoring a subject or patient under anesthesia comprising steps of:
>
> acquiring an electroencephalogram (EEG) signal, the EEG signal being an acquired raw EEG signal using two or more electrodes from a subject or patient;
>
> computing with a processor substantially at the same time as the EEG signal is acquired a first derivative of the EEG signal directly from the acquired raw EEG signal;
>
> analyzing the first derivative of the EEG signal to compute at least one suppression detection parameter, the at least one suppression detection parameter being used to detect suppression periods in the EEG signal;
>
> outputting a parameter based at least in part on the suppression detection parameter to a device for automatically controlling the patient's level of anesthesia; and

> determining a treatment for the subject or patient based at
> least in part on the outputted parameter.

(Br. 16 (Claims App.).)

The Examiner rejects claims 1, 2, 4–9, 11–14, 21, and 23–26 under 35 U.S.C. § 101 as being directed to a patent-ineligible judicial exception without significantly more. (Final Act. 5; Advisory Act. 2.)

DISCUSSION

Issue

The Examiner finds that the claims are directed to an abstract idea, namely a mathematical algorithm of "computing with a processor substantially at the same time the EEG signal is acquired a first derivative of the EEG signal directly from the acquired raw EEG signal" and "analyzing the first derivative of the EEG signal to compute at least one suppression detection parameter, the at least one suppression detection parameter being used to detect suppression periods in the EEG signal." (Ans. 5 (quoting claim 1).) The Examiner further finds that the claims do not include additional elements that amount to significantly more than the judicial exception, whether or not the limitations are considered separately or in combination. (*Id.*)

In particular, the Examiner finds that the additional elements in the independent claims include acquiring raw EEG signal from a subject using two or more electrodes, a processor, outputting a parameter to a device for communicating the outputted parameter to a clinician, and determining a treatment for the subject based at least in part on the outputted parameter. (*Id.* at 5–6.) The Examiner finds that acquiring EEG signal using two or

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more electrodes is "routine data gathering in order to input data to the mathematical algorithm." (*Id.* at 6.) Likewise, the Examiner finds that the claim elements relating to a processor and to outputting a parameter to a device are merely "generic computer functions" "recited at a high level of generality" or, in the alternative, are performing "analog steps that can be completed by mental thought." (*Id.*) Finally, the Examiner finds that determining a treatment based on an outputted parameter is "conventional and routine in the art." (*Id.*) Thus, the Examiner finds that none of these additional elements add meaningful limitations to the abstract idea (i.e., mathematical algorithm) to which claim 1 is directed, and further finds that "[l]ooking at the limitations as an ordered combination adds nothing that is not already present when looking at the elements taken individually." (*Id.* at 7.)

Appellants contend the claims are not directed to abstract ideas and further contend that, even assuming the claims are directed to patent-ineligible concepts, the claims contain additional elements that, considered as a whole, amount to significantly more than the abstract idea.

Appellants state that "[c]laim 8 is representative of the method claims in the instant application" and do not separately argue the claims. We thus limit our analysis to claim 8 as representative. The issue with respect to this rejection is whether claim 8 is directed to a patent-ineligible judicial exception (e.g., law of nature, natural phenomenon, or abstract idea) without significantly more.

Analysis

Except as otherwise noted,[2] we adopt the Examiner's findings of fact
and reasoning regarding the Examiner's rejection of claim 8 under 35 U.S.C.
§ 101 (Final Act. 5–7, 8–11; Ans. 3–18) and agree that claim 8 is
unpatentable as being directed to a judicial exception without significantly
more. Only those arguments timely made by Appellant in the Appeal Brief
(no Reply Brief was submitted) have been considered; arguments not so
presented in the Brief are waived. *See* 37 C.F.R. § 41.37(c)(1)(iv)
(2015); *see also Ex parte Borden*, 93 USPQ2d 1473, 1474 (BPAI 2010)
(informative) ("Any bases for asserting error, whether factual or legal, that
are not raised in the principal brief are waived."). We highlight the
following points for emphasis.

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[2] In the Answer, the Examiner states that "evidence is not a requirement for
a prima facie rejection under the two step [§ 101] analysis." (Ans. 5–6.) We
note that "whether a claim element or combination of elements is well-
understood, routine and conventional to a skilled artisan in the relevant field
is a question of fact." *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1368 (Fed.
Cir. 2018). To the extent the Examiner's statement contradicts the holding
in *Berkheimer*, we disagree with the Examiner's statement and do not adopt
it. *See also* USPTO's Memorandum on Changes in Patent Procedure
Pertaining to Subject Matter Eligibility, Recent Subject Matter Eligibility
Decision (*Berkheimer v. HP, Inc.*) 3–4 (Apr. 19, 2018) (explaining that "an
additional element (or combination of elements) is not well-understood,
routine or conventional unless the examiner finds, and expressly supports a
rejection in writing with," one or more specified types of evidence, including
express statements in the Specification or made by applicant during
prosecution, certain court decisions, appropriate publication, and/or "a
statement that the examiner is taking official notice of the well-understood,
routine, conventional nature of the additional element(s)").

We analyze this case under the framework set forth by the Supreme

Court in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 566

U.S. 66 (2012), and applied by our reviewing court in *Ariosa Diagnostics,*

Inc. v. Sequenom, Inc., 788 F.3d 1371 (Fed. Cir. 2015). As the *Ariosa* court

explained:

> In *Mayo* . . . , the Supreme Court set forth a framework for
> distinguishing patents that claim laws of nature, natural
> phenomena, and abstract ideas from those that claim
> patent-eligible applications of those concepts. First, we
> determine whether the claims at issue are directed to a
> patent-ineligible concept. . . . If the answer is yes, then
> we next consider the elements of each claim both
> individually and "as an ordered combination" to determine
> whether additional elements "transform the nature of the
> claim" into a patent-eligible application. . . . The Supreme
> Court has described the second step of this analysis as a
> search for an "inventive concept"—i.e., an element or
> combination of elements that is "sufficient to ensure that
> the patent in practice amounts to significantly more than a
> patent upon the [ineligible concept] itself."

Id. at 1375.

Whether Claim 8 Is Directed to Patent-Ineligible Concept

We begin with the first step of the *Mayo* test, namely whether a claim

is "directed to" a patent-ineligible concept. On January 7, 2019, the Director

of the USPTO issued the "2019 Revised Patent Subject Matter Eligibility

Guidance" ("Revised Guidance"), which provides further details regarding

how the Patent Office analyzes patent-eligibility questions under 35 U.S.C.

§ 101. 84 Fed. Reg. 50–57 (Jan. 7, 2019). Under the Revised Guidance, the

first step of the *Mayo* test (i.e., Step 2A of the Revised Guidance) is "a two-

pronged inquiry." *Id.* at 54. In prong one, we evaluate whether the claim

recites a judicial exception, such as laws of nature, natural phenomena, or abstract ideas. *Id.* The Revised Guidance explains that

> the abstract idea exception includes the following groupings of subject matter, when recited as such in a claim limitation(s) (that is, when recited on their own or per se):
> (a) Mathematical concepts—mathematical relationships, mathematical formulas or equations, mathematical calculations;
> (b) Certain methods of organizing human activity— fundamental economic principles or practices (including hedging, insurance, mitigating risk); commercial or legal interactions (including agreements in the form of contracts; legal obligations; advertising, marketing or sales activities or behaviors; business relations); managing personal behavior or relationships or interactions between people (including social activities, teaching, and following rules or instructions); and
> (c) Mental processes—concepts performed in the human mind (including an observation, evaluation, judgment, opinion).

Id. at 52 (footnotes omitted). The Guidance states that, except in rare circumstances, "[c]laims that do not recite matter that falls within these enumerated groups of abstract ideas should not be treated as reciting abstract ideas" and thus would be patent-eligible. *Id.* at 53. If the claim recites a judicial exception, the claim is further analyzed under prong two, which requires "evaluat[ion of] whether the claim recites additional elements that integrate the exception into a practical application of that exception." *Id.* The Revised Guidance explains that, "[i]f the recited exception is integrated into a practical application of the exception, then the claim is eligible at Prong Two of . . . Step 2A [of the Revised Guidance]." *Id.*

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Prong One of Step 2A of Revised Guidance

With respect to the first prong of Step 2A of the Revised Guidance, we agree with the Examiner that claim 8 recites patent-ineligible subject matter. In particular, mathematical concepts such as mathematical relationships, mathematical formulas or equations, and mathematical calculations are abstract ideas. 84 Fed. Reg. 52. Claim 8 recites "computing . . . a first derivative of the EEG signal," which Appellants acknowledge to be a mathematical calculation. (Br. 16 (Claims App.); *id.* at 7 (stating that "comput[ing] the first derivative of the EEG signal . . . is a known mathematical operation").) Claim 8 also recites "analyzing the first derivative of the EEG signal to compute at least one suppression detection parameter," wherein the computing encompasses computing the "median amplitude of the first derivative of the EEG signal" or its root mean square. (Appeal Br. 15 (Claims. App.), claim 2; Spec. 11:4–8.) Such computations also describe mathematical relationships and/or constitute mathematical calculations.

Likewise, claim 8 recites "the at least one suppression detection parameter being used to detect suppression periods in the EEG signal" and "determining a treatment for the subject or patient based at least in part on the outputted parameter." These claim limitations recite a patent-ineligible law of nature (i.e., the natural correlation between the suppression detection parameter and the existence of a suppression period in the EEG signal) while adding the words, "apply it." *Mayo*, 566 U.S. at 72 (stating that "to transform an unpatentable law of nature into a patent-eligible *application* of

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such a law, one must do more than simply state the law of nature while adding the words 'apply it'").

More specifically, the Specification states that "the first derivative represents the rate at which the amplitude of the . . . EEG signal is changing and is thus useful for alerting the user or clinician when the amount of fluctuations in the EEG signal increase or decrease. A rapid decrease in brain activity (soma potential) may be indicative of suppression of the signal." (*Id.* at 16:20–23.) The Specification then states that the suppression detection parameter, such as the median absolute value of an epoch of predetermined size of the first derivative of the signal, "is used to analyze the first derivative of the signal for periods of suppression. (Spec. 16:26–30.)

In other words, the suppression detection parameter is a parameter that provides information about the rate of change in soma potential or brain activity, which is naturally correlated to suppression periods. Accordingly, "the at least one suppression detection parameter being used to detect suppression periods in the EEG signal" merely recites the natural relationship between the suppression detection parameter and suppression periods, and "determining a treatment for the subject or patient based at least in part on the outputted parameter" tells the relevant audience, e.g., the clinician, to apply the natural law in treating patients.

In addition, these limitations of "the at least one suppression detection parameter being used to detect suppression periods in the EEG signal" and "determining a treatment for the subject or patient based at least in part on the outputted parameter" may be performed in the human mind. For instance, the Specification describes determining if the EEG signal is

suppressed simply by "comparing the suppression detection parameters against a predetermined threshold value for each suppression detection parameter to identify periods of suppression" and "comparing the calculated suppression period length against a pre-determined time threshold." (Spec. 7:11–13.) Similarly, "determining a treatment" is a matter of "evaluation, judgment and/or opinion." Thus, these limitations also recite abstract mental processes. 84 Fed. Reg. 52.

Appellants contend that "the claim features cannot be done solely by a human, in one's mind, or by pen and paper – another fact that goes against the claim being directed to a patent ineligible abstract idea." (Br. 10, 11)

We are not persuaded. While certain limitations in claim 8 are indeed mental processes (e.g., "the at least one suppression detection parameter being used to detect suppression periods in the EEG signal"; "determining a treatment for the subject . . . based at least in part on the outputted parameter"), patent ineligible subject matter includes not only mental processes but also laws of nature and mathematical concepts. 84 Fed. Reg. 52, 54. Furthermore, as discussed below, a claim is not necessarily patent-eligible simply because it recites elements in addition to the patent-ineligible judicial exceptions. Thus, the fact that claim 8 cannot be performed *solely* by a human or by pen and paper does not indicate that the claim is patent eligible.

Prong Two of Step 2A of Revised Guidance

With respect to the second prong of Step 2A of the Revised Guidance, we find that claim 8 does not recite additional elements that integrate the

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recited judicial exception(s) into a practical application of that the exception(s). 84 Fed. Reg. at 54.

More specifically, the additional elements of claim 8 that are not either mathematical calculations, laws of nature, or mental processes include (1) "acquiring . . . raw EEG signal using two or more electrodes from a subject or patient"; (2) a processor; and (3) "outputting a parameter . . . to a device for automatically controlling the patient's level of anesthesia." (Br. 16 (Claims App.).)

These additional elements, individually and in combination, do not suffice to integrate the recited judicial exceptions into a practical application. Acquiring raw EEG signal using two or more electrodes and outputting a parameter to a device for automatically controlling the level of anesthesia merely gather the data to be used in a mathematical calculation and present a result based on the mathematical calculation/abstract mental process of computing a suppression detection parameter. Thus, they are "insignificant extra-solution activity." 84 Fed. Reg. at 55 (explaining that additional element that adds insignificant extra-solution activity to the judicial exception does not integrate the exception into a practical application); *see also In re Meyer*, 688 F.2d 789, 794 (CCPA 1982) (a claimed step that "test[s] for a response . . . is nothing more than a data gathering step," which "cannot make an otherwise nonstatutory claim statutory"); *In re Richman*, 563 F.2d 1026, 1030 (CCPA 1977) (holding that antecedent steps that "merely determine values for the variables used in the mathematical formulae used in making the calculations . . . . do not suffice to render the claimed methods, considered as a whole, statutory subject matter"); *cf. Electric Power Grp., LLC v. Alstom S.A.*, 830 F.3d at 1350, 1353–1354

(Fed. Cir. 2016) (holding that claims involving "merely presenting the results of abstract processes of collecting and analyzing information, without more . . . , is abstract as an ancillary part of such collection and analysis").

Similarly, the processor in claim 8 is merely used as a tool to perform the mathematical calculation of determining the derivative of the raw EEG signal. "[M]erely us[ing] a computer as a tool to perform an abstract idea" does not integrate a judicial exception into a practical application. 84 Fed. Reg. at 55.

Appellants contend that the claims are not directed to an abstract idea because the claimed method involves and is "inextricably tied" to physical machines or apparatuses. (Br. 5, 7.) Appellants contend that, "as necessarily modified in the method of the invention [the claimed components] are not 'generic,'" and, in any event, use of generic components is not sufficient to establish a prima facie case that the claims are directed to an abstract idea because "patentable inventions may involve combinations of known elements." (*Id.* at 6.) Appellants contend that the claims satisfy the "machine[-]or[-]transformation" test by "altering the raw data collected with the sensors and using it to adjust treatment of the anesthetic." (*Id.* at 10, 11).

We are not persuaded. It is true that additional elements can integrate a judicial exception into a practical application if they "implement[] a judicial exception with, or use[] a judicial exception in conjunction with, a particular machine or manufacture that is integral to the claim." 84 Fed. Reg. 55. In this case, however, the only physical machines or apparatuses recited in the claim are two or more electrodes, a processor, and a device for automatically controlling the patient's level of anesthesia. None of these,

however, is "a *particular* machine . . . that is *integral* to the claim." As discussed above, the electrodes are used only in the insignificant pre-solution activity of data gathering. Likewise, the processor is used only to perform the generic computer function of computation (i.e., computing a first derivative of a waveform). *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208, 226 (2014) (noting the basic calculation function of a generic computer). Finally, the device for automatically controlling the patient's level of anesthesia is used only in the insignificant post-solution activity of receiving an outputted parameter. In particular, claim 8 does not require the device to *take any particular action based on the outputted parameter*.

We are also not persuaded by Appellants' contentions that the claims are patent-eligible because (1) as modified in the method, the claimed components are not generic and (2) use of generic components is not sufficient to establish a prima facie case that the claims are directed to an abstract idea. (Br. 6.) As discussed above, we agree with the Examiner that at least the processor recited in the claims is a generic computer component. (Ans. 9.) However, the rejection is based on the analysis as set forth in *Mayo* and not based merely on the ground that the claimed components are generic.

Finally, we are not persuaded by Appellants' argument that the claims satisfy the machine-or-transformation test by "altering the raw data collected with the sensors and using it to adjust treatment of the anesthetic." (Br. 10, 11). As an initial matter, the Supreme Court has clarified that, even though "the 'machine-or-transformation' test is an '*important and useful clue*' to patentability," the test does not trump the section 101 exclusions created by case law. *Mayo*, 566 U.S. at 1303. Furthermore, Appellants appear to argue

that the "transformation" of EEG data into a suppression detection parameter satisfies the machine-or-transformation test. However, our reviewing court has explained that "[t]he mere manipulation or reorganization of data . . . does not satisfy the transformation prong" of the test. *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1375 (Fed. Cir. 2011). Finally, we note that, contrary to Appellants' assertion, claim 8 does not require "using [the suppression detection parameter] to adjust treatment of the anesthetic."

Citing *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245 (Fed. Cir. 2014) and Example 2 in the training examples of the January 27, 2015 USPTO Interim Eligibility Guidance, which is based on the fact pattern and claim at issue in *DDR Holdings*, Appellants next contend that the claims are not directed to an abstract idea because "the claimed solution in the present invention is necessarily rooted in the technology in order to overcome a problem specifically arising in the realm of [a] specific monitoring/therapy." (Br. 5–6).

We are not persuaded. In *DDR Holdings*, the claims recited "[a]n e-commerce outsourcing system" comprising a processor programmed to serve "a composite web page" with content from a third-party but having a look and feel of the host web page when a link to the third-party product or catalogue is activated from the host web page. *DDR Holdings*, 773 F.3d at 1249. The Federal Circuit found that the claims were patent-eligible "because they do not merely recite the performance of some business practice known from the pre-Internet world [(i.e., the abstract idea)] along with the requirement to perform it on the Internet," but instead provide a "claimed solution . . . necessarily rooted in computer technology in order to overcome a problem specifically arising in the realm of computer networks."

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Id. at 1257. In contrast, in this case the claimed processor *is* simply used to implement the abstract idea (i.e., the mathematical calculation of the first derivative of the EEG waveform), which is not a calculation that has meaning only in the context of computers and/or computer networks.

Appellants contend that the invention goes beyond "calculat[ing] a mathematical formula" to "compute non-abstract parameters." (Br. 7–8.) In particular, Appellants contend that "the computation of the suppression detection parameter using the specific steps as claimed [is] not . . . an abstract idea but a specific signal processing method used to identify these parameters." (Br. 12.) Appellants also contend that the invention is not a "law of nature, a natural phenomenon, or an abstract idea," but instead "monitors <u>and</u> treats a subject under anesthesia whose EEG is suppressed," by "provid[ing] a unique method of identifying burst suppression from an EEG signal to adjust medications and treat the subject in open or closed loop form," "so as to improve the safety of the subject undergoing . . . anesthesia." (*Id.* at 8–9, 11).

We are not persuaded. As an initial matter, claim 8 does not recite any specific steps for computing the suppression detection parameter, stating only that the "at least one suppression detection parameter" is computed by "analyzing the first derivative of the EEG signal." (Br. 16 (Claims App.).) Indeed, the Specification states that "[t]he suppression detection measure can be virtually any type of operator or algorithm which is capable of detecting the drastic changes in the EEG signal which may be representative of burst and suppression period." (Spec. 11:4–6.) Thus, contrary to Appellants' argument, the limitation does not provide "a *specific* signal processing method used to identify [the suppression detection parameter]"

and, as discussed above, recites a law of nature – i.e., the natural correlation between (1) certain characteristics of the first derivative of an EEG waveform and (2) the existence of a suppression period.

In any event, as recited in the Specification and in claims 2, 4, 9, 11, 21, and 23, computation of the suppression detection parameter encompasses computation of e.g., median absolute values, root mean square values, standard deviation, and mean. (Spec. 11:4–8; Br. 15–18 (Claims App.).) Thus, the computation of the suppression detection parameter at least recites mathematical concepts and/or calculations, which are abstract ideas. 84 Fed. Reg. 52.

As to Appellants' apparent contention that the claims are not directed to a judicial exception because additional elements integrate the judicial exceptions into a practical application, we are not persuaded because, as already discussed and contrary to Appellants' assertions, claim 8 does not require *treatment* of a subject under anesthesia whose EEG is suppressed. Instead, it merely recites "*determining* a treatment for the subject" based at least in part on an outputted parameter that is in turn based on the suppression detection parameter. Thus, claim 8 is more similar to the patent-ineligible claims in *Mayo*, which "simply state the law of nature while adding the words 'apply it'" than the patent-eligible claims in *Vanda Pharm. Inc. v. West-Ward Pharm. Int'l Ltd.*, 887 F.3d 1117, 1134–1135 (Fed. Cir. 2018), which recites specific treatment steps requiring administration of a particular drug (iloperidone) in particular amounts (12 mg/day or less or greater than 12 mg/day, up to 24 mg/day) based on a patient's genotype.

Appellants contend that "[t]he processor and sensors [recited in the claims] are used not to calculate a mathematical formula but rather to identify the subject (who is under anesthesia) condition to determine how to adjust further anesthesia delivery to the subject." (Br. 9.)

We are not persuaded. As recited in claim 8, the only function of the electrodes (i.e., sensors) is to acquire raw EEG signal. (Br. 15 (Claims App.).) Similarly, the only function of the processor recited in claim 8 is "computing . . . substantially at the same time as the EEG signal is acquired a first derivative of the EEG signal directly from the acquired raw EEG signal." (*Id.*) Indeed, it is clear that the recited processor and sensors are *not* used to determine, e.g., how to adjust further anesthesia delivery to the subject, because claim 13, which depends from claim 8, recites that the "measure of EEG suppression is displayed to the *clinician* to determine a treatment plan for the subject's or patient's present condition." (Br. 17 (Claims App.).)

Finally, Appellants contend that claim 8 is not directed to an abstract idea and/or amounts to significantly more than such an idea because "the claimed invention does not preempt the entire field of endeavor" regarding "monitoring patients under anesthesia" and because the Examiner has not shown that the alleged abstract idea is "something fundamental, a building block, or a basic tool of science or technology." (*Id.* at 7, 9–10, 11, 12, 13). More particularly, Appellants contend that claim 8 does not cover "every possible means for carrying out a solution technique for determining suppression during anesthesia in a subject's brain waves and adjusting the anesthesia based on the identified suppression" but instead "measures

suppression in the subject's brain wave signals in a specific way." (*Id.* at 12, 13.)

We are not persuaded. We note once again that claim 8 does not require adjusting anesthesia based on identified suppression. Moreover, "[w]hile preemption may signal patent ineligible subject matter, the absence of complete preemption does not demonstrate patent eligibility." *Ariosa*, 788 F.3d at 1379. In *Ariosa*, for instance, our reviewing court held various dependent claims to be invalid as directed to patent-ineligible subject matter, even though these claims are limited to specific techniques of amplifying and detecting nucleic acid. *See id.* at 1374, 1378 (finding invalid dependent claims requiring amplification of nucleic acid by polymerase chain reaction or detection of nucleic acid via a sequence specific probe because they are "focused on the use of the natural phenomenon in combination with well-understood, routine, and conventional activity").

Whether Claim 8 Amounts to "Significantly More"

Having determined that claim 8 is directed to a patent-ineligible law of nature, we next consider whether claim 8 recites "an element or combination of elements that is 'sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.'" *Ariosa*, 788 F.3d at 1375 (citation omitted). We agree with the Examiner that it does not. (Ans. 5–7.)

As discussed above, the additional elements that are not either an abstract idea or a law of nature include (1) "acquiring . . . raw EEG signal using two or more electrodes from a subject or patient"; (2) a processor; and

(3) "outputting a parameter . . . to a device for automatically controlling the patient's level of anesthesia."

The Examiner finds, and Appellants have not persuasively disputed, that the additional elements in the claim are well-understood, routine, and conventional. (*See, e.g.,* Ans. 5–6, 9, 10–11, and 17.) For example, as the Examiner points out, prior art teaches using two or more electrodes to acquire EEG signal. (Final Act. 4; Ans. 5–6; Kangas[3] Abstract, 4:28–31 (using "[a]n electro-cap or headband containing a plurality of electrodes" to collect EEG data, wherein "[t]he number of electrodes is at least 2" and includes a reference electrode and one or more receiving electrodes).) The Specification also explains that, for purposes of detecting EEG signals, "[c]ommon locations for . . . electrodes include frontal (F), temporal (T), parietal (P), anterior (A), central (C) and occipital (O)." (Spec. 9:5–7.)

Likewise, a processor is a generic computer component, and the claim requires the processor only to perform the generic computer function of computing a first derivative of a waveform (i.e., the EEG signal). *Alice*, 573 U.S. at 226 (noting the basic calculation function of a generic computer). Finally, as the Examiner noted in a previous obviousness rejection and Appellants do not appear to dispute, the prior art teaches a device for automatically controlling the patient's level of anesthesia.[4] (Oct. 3, 2016

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[3] Kangas et al., U.S. Patent No. 5,775,339, issued July 7, 1998.

[4] As noted throughout this opinion, claim 8 does not require the device recited to actually control or adjust the patient's level of anesthesia. Thus, we interpret "a device for automatically controlling the patient's level of anesthesia" to mean a device *capable* of automatically controlling the patient's level of anesthesia. We do not decide whether it is well-understood, routine, and conventional to actually use such a device to control a patient's level of anesthesia, for instance during surgery.

Non-Final Act. 20; Meriläinen[5] 5:55–6:2 (teaching a method whereby a doctor can make decisions to increase or decrease the depth of anesthesia in patient based on depth of the hypnotic component of anesthesia, adequacy of anesthesia, and/or or other physiological parameters of interest and further teaching that, "[i]n addition it should be understood that instead of the open-loop system controlled by the doctor, an automatic controller to run the entire system on a closed-loop basis is also possible").)

Appellants contend that, assuming the claims are directed to patent-ineligible concepts, the claims contain additional elements amounting to significantly more than the abstract idea. (Br. 11.) In particular, Appellants contend that "[t]he algorithm, output, and treatment components and steps . . . cannot be considered conventional and well-known, particularly when the claim is viewed as a whole," as evidenced by the fact that the claims have not been rejected as obvious over prior art. (*Id.* at 11–12, 13.)

We are not persuaded. We have emphasized several times that, as drafted, the claims do not comprise a treatment step. More to the point, the fact that Appellants' claim may be novel and nonobvious does not make the claim eligible for a patent under § 101 where the novelty or inventive concept is grounded in an abstract idea. *See, e.g., Parker v. Flook*, 437 U.S. 584, 591–92 (1978).

Appellants further contend that the claimed invention "provide[s] a method and system for objectively quantifying suppression-burst with a highly accurate and reproducible method that is used to adjust treatment of a subject undergoing anesthesia" and constitutes "an improvement in the technical field of titration of therapy for patients undergoing anesthesia."

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[5] Meriläinen, US Patent No. 6,526,297 B1, issued Feb. 25, 2003.

(Br. 12.) Appellants contend that, similar to *Diamond v. Diehr*, 450 U.S. 175 (1981), "[t]he present invention allows for improved accuracy and reliability as well as automation of a method resulting in improved decision making regarding the desired end result." (*Id.* at 13.)

We are not persuaded. As an initial matter, we note once again that claim 8 does not recite "adjusting the anesthesia based on the identified suppression." Thus, unlike the claims in *Diehr*, which are directed toward methods of operating a rubber-molding press and manufacturing precision molded articles, claim 8 does not incorporate the recited judicial exception into a practical application. Likewise, any alleged improvement recited in claim 8 is not an improvement to the functioning of a computer or other technology or technical field but to the mathematical formula used to analyze the EEG signal. Such improvement to an abstract idea does not confer eligibility on an otherwise patent-ineligible claim. *See Versata Dev. Grp., Inc. v. SAP Am., Inc.,* 793 F.3d 1306, 1335 (Fed. Cir. 2015) (affirming unpatentability of claims that use a computer to improve the performance of price determination but does not improve the computer's performance).

According, we affirm the Examiner's rejection of claim 8 as being directed to paten-ineligible judicial exception(s) without significantly more. Claims 1, 2, 4–7, 9, 11–14, 21, and 23–26, which are not argued separately, fall with claim 8. 37 C.F.R. § 41.37(c)(1)(iv).

SUMMARY

For the reasons above, we affirm the Examiner's decision rejecting claims 1, 2, 4–9, 11–14, 21, and 23–26 as being directed to patent-ineligible judicial exception(s) without significantly more.

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED